Final
Hazardous Toxic and Radioactive Waste Project
Remedial Investigation Report

Iona Island Naval Ammunition Depot
Formerly Used Defense Site
Stony Point, Rockland County, New York

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	Degrees Celsius
°F	Degrees Fahrenheit
%	Percent
%D	Percent difference
%R	Percent recovery
µmol/g_{oc}	Micromoles per grams organic carbon
µg/dL	Microgram(s) lead per deciliter
µg/L	Microgram(s) per liter
95UCL	95 Percent upper confidence limit
ADR	Automated Data Review
AGC	Advanced geophysical classification
Alion	Alion Science and Technology Corporation
AOC	Area of concern
ALM	Adult lead model
AM	Amino
ASR	Archives Search Report
AST	Aboveground storage tank
ASTM	ASTM International
ATSDR	Agency for Toxic Substances and Disease Registry
AVS	Acid volatile sulfide
BADU	Background Decision Unit
bgs	Below ground surface
Bluestone	Bluestone Environmental Group, Inc.
BTEX	Benzene, toluene, ethylbenzene, and xylene
CAS	Chemical Abstracts Service
CCME	Canadian Council of Ministries of the Environment
CEC	Cation-exchange capacity
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CHHRS	Con Hook Hudson River shoreline
CHMS	Con Hook Marsh shoreline
CON	Containerized
COPEC	Contaminant of potential ecological concern
COPC	Contaminant of potential concern
COC	Chain of custody
CSM	Conceptual site model
CV	Coefficient of variation
DERP	Defense Environmental Restoration Program

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

DGM	Digital geophysical mapping
DO	Dissolved oxygen
DoD	Department of Defense
DNB	Dinitrobenzene
DNT	Dinitrotoluene
DQO	Data quality objective
DU	Decision unit
DUA	Data Usability Assessment
DUMP	Dump Area
EA	EA Engineering, P.C. and its affiliate EA Science and Technology
EcoSSL	Ecological Soil Screening Level
EF	Exposure frequency
ELAP	Environmental Laboratory Accreditation Program
EPA	U.S. Environmental Protection Agency
EPC	Exposure point concentration
ERA	Ecological risk assessment
ESV	Ecological sediment screening value
EXDU	Explosives building decision unit
FB	Field blank
f_{OC}	Fraction of organic carbon
FS	Feasibility study
ft	Foot (feet)
FUDS	Formerly Used Defense Site
FUDSChem	Formerly Used Defense Site Online Chemical Database
gal	Gallon
GIS	Geographic information system
GLI	Great Lakes Initiative
Greeley-Polhemus	Greeley-Polhemus Group, Inc.
GSA	General Services Administration
GSE	Green Seal Environmental, Inc.
H_a	Alternative hypothesis
H_0	Null hypothesis
HHRA	Human health risk assessment
HI	Hazard index
HPA	Historical Photographic Analysis
HQ	Hazard quotient
HTRW	Hazardous toxic and radioactive waste

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

ID	Identification
IHRS	Iona Island Hudson River Shoreline
in.	Inch(es)
ISM	Incremental sampling methodology
ITRC	Interstate Technology Regulatory Council
LCL	Lower confidence limit
LMW	Low molecular weight
LOAEL	Lowest observed adverse effects level
LOD	Limit of detection
LOQ	Limit of quantitation
MC	Munition constituent
MD	Munitions debris
MCL	Maximum contaminant level
MDL	Method detection limit
MEC	Munitions and explosives of concern
meq/100g	Milli-equivalents per 100 grams
mg/kg	Milligram(s) per kilogram
mg/L	Milligrams per liter
mL	Milliliter(s)
MMRP	Military Munitions Response Program
MRS	Munitions Response Site
MS	Matrix spike
MSD	Matrix spike duplicate
mV	Millivolt
N/A	Not applicable
ND	Not detected
No.	Number
NOAA	National Oceanic and Atmospheric Administration
NOAEL	No observed adverse effect level
NRWQC	National Recommended Water Quality Criteria
NTU	Nephelometric turbidity unit
NYSDEC	New York State Department of Environmental Conservation
ORP	Oxidation-reduction potential
OSWER	Office of Solid Waste Emergency Response
PAH	Polycyclic aromatic hydrocarbon
PARCCS	Precision, accuracy/bias, representativeness, completeness, comparability, and sensitivity

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

PCB	Polychlorinated biphenyl
PIPC	Palisades Interstate Park Commission
POL	Petroleum, oil, and lubricants
QA	Quality assurance
QAPP	Quality assurance project plan
QC	Quality control
QSM	Quality Systems Manual
RCRA	Resource Conservation and Recovery Act
RI	Remedial investigation
RPD	Relative percent difference
RRDS	Riprap Filled Drainage Swale
RSD	Relative standard deviation
RSL	Regional screening level
RSLERA	Refined Screening-Level Ecological Risk Assessment
RSV	Refinement screening value
SEDD	Staged electronic data deliverable
SEM	Simultaneously extracted metals
SI	Site investigation
SIM	Selected ion monitoring
SLERA	Screening-level ecological risk assessment
SU	Sampling unit
SVOC	Semi-volatile organic compound
TAL	Target analyte list
TB	Trip blank
TCL	Target Compound List
TNT	Trinitrotoluene
TOC	Total organic carbon
TWS	Tidal Wetland Swale
UCL	Upper confidence limit
UFP	Uniform Federal Policy
USACE	U.S. Army Corps of Engineers
USAGC	U.S. Army Geospatial Center
USCS	Unified Soil Classification System
USFWS	U.S. Fish and Wildlife Service
UST	Underground storage tank
VOC	Volatile organic compound

ES. EXECUTIVE SUMMARY

This Hazardous Toxic and Radioactive Waste (HTRW) Remedial Investigation (RI) Report presents the results of the activities completed at the Iona Island Naval Ammunition Depot Formerly Used Defense Site (FUDS), located in Stony Point, Rockland County, New York (FUDS Project Number C02NY074402) (**Figure ES-1**). The HTRW RI is being conducted to characterize the nature and extent of hazardous substances in environmental media at the Iona Island Naval Ammunition Depot FUDS attributable to historical Department of Defense (DoD) operations and to evaluate potential risk to human health and ecological receptors.

The Iona Island Naval Ammunition Depot FUDS consists of approximately 124 acres of land and inland water. The Navy used the site as an Ammunition Depot from 1900 to 1947. Activities included preparing, assembling, maintaining, inspecting, testing, and issuing ammunition; however, there was no manufacturing conducted on site. Iona Island Naval Ammunition Depot was deactivated in 1947. The former depot was excessed by the Navy in 1957 and transferred to the General Services Administration (GSA). The GSA conveyed the FUDS property to Palisades Interstate Park Commission (PIPC) in 1965. The PIPC currently utilizes a portion of Iona Island as a storage facility; however, the property is closed to the public and use is restricted to park purposes only. The FUDS is part of the much larger Hudson River National Estuarine Research Reserve, a Significant Coastal Fish and Wildlife Habitat Area and National Natural Landmark.

Investigations have been ongoing at Iona Island since 1992. Previous investigations identified areas of concern (AOCs) located in the locations/footprints of former buildings/structures where various contaminants related to the facilities or from historical processes during the site's commission as an ammunition depot have been detected or may be present in environmental media (**Figure ES-2**). The former buildings/structures and foundations were demolished/ removed by the PIPC between 1965 and 1972. Two previous investigations include the 1996 Data Collection Activities (Greeley-Polhemus 1997) and 2007 Site Inspection (Alion Science and Technology 2008), which reported widespread detections of metals and polycyclic aromatic hydrocarbons (PAHs) in surface soil and/or subsurface soil.

Based on the results of previous investigations, historical DoD operations at the Iona Island Naval Ammunition Depot FUDS may have resulted in the release of contaminants to environmental media at concentrations that may pose a risk to human and ecological receptors. Existing data from previous investigations were insufficient to evaluate nature and extent of contaminants in environmental media attributable to historical DoD operations and to evaluate whether concentrations of contaminants pose an unacceptable risk to human health and/or the environment. Much of the existing data were generated from biased sampling designs and there is an insufficient quantity of data to make the evaluations on nature and extent of contaminants and risk to human health and the environment. The HTRW RI was proposed to address these insufficiencies and is the first comprehensive investigation of the Iona Island Naval Ammunition Depot FUDS. A two-phased investigation approach was conducted as part of the HTRW RI to facilitate data collection, evaluation, and discussion as discussed in the paragraphs below.

Phase I was conducted to evaluate the presence/absence and/or nature and extent of hazardous substances in onsite soil within the FUDS boundary, evaluate the source-pathway-receptor interactions, and evaluate the subsequent risk to human and ecological receptors. Phase I field activities were completed in March and April 2020 and consisted of onsite and background incremental sampling methodology (ISM) soil sampling and a shoreline reconnaissance along Iona Island to evaluate the source-pathway-receptor interactions. A total of 30 onsite Phase I Decision Units (DUs) encompassing approximately 25 acres of Iona Island were sampled during Phase I to evaluate preliminary contaminants of potential concern (COPCs) in soil identified during the project planning stage (**Figure ES-3**). These preliminary COPCs included target analyte list (TAL) metals, PAHs, polychlorinated biphenyls, volatile organic compounds (benzene, toluene, ethylbenzene, and xylenes), and/or explosives residues as based on previous investigations and prior usage of former buildings/structures. In addition, 8 background DUs were sampled within Bear Mountain State Park were sampled to establish background soil concentrations for metals and PAHs.

Of the onsite 30 DUs sampled during Phase I, 27 DUs (approximately 22 acres total) encompassed AOCs in the upland area of Iona Island where upland soil is present (DU-1 through DU-7, DU-9 through DU-16, DU-20, DU-21 through DU-23, DU-25, and EXDU-1 through EXDU-7) (**Figure ES-3**). The remaining 3 DUs (approximately 3 acres total) encompassed AOC #16 – Area D (Former Dump Area) within the marsh area between Iona and Round Islands where hydric soil is present (DU-17, DU-18, and DU-19).

Metals and PAHs were detected in upland surface soil (0-6 inches [in.] below ground surface [bgs]) at concentrations above background. In addition, metals and PAHs were detected in hydric surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at DU-17, DU-18, and DU-19 established within the marsh area between Iona and Round Islands to evaluate AOC #16 – Area D (Former Dump Area). Preliminary evaluations of analytical results indicated potential risk to terrestrial ecological receptors (plants and soil invertebrates in upland soil and (plants, soil invertebrates, and insectivorous birds and mammals at AOC #16 – Area D [Former Dump Area]). Although pH data were evaluated in onsite upland and hydric soil during Phase I, additional physical parameter data (grain size, total organic carbon [TOC], cation exchange capacity [CEC], redox potential) were needed to evaluate bioavailability of metals and PAHs to terrestrial receptors as part of the Refined Screening-Level Ecological Risk Assessment (RSLERA).

Contaminant migration pathways to the Hudson River and Iona Marsh shorelines were not identified within the upland area during Phase I. Therefore, TAL metals and PAHs in upland soil were unlikely to be transported to the shoreline and be present in shoreline media at concentrations that may pose risk to human health or aquatic ecological receptors. However, preferential surface water migration pathways were identified during the Phase I shoreline reconnaissance leading from AOC #16 – Area D (Former Dump Area) to the Hudson River and Iona Marsh shorelines (**Figure ES-4**). These pathways included tidal flow to the Hudson River and two defined surface water channels leading to Iona Marsh (riprap filled drainage swale and tidal wetland swale). Based on the results of Phase I, further investigation was needed to evaluate contaminant migration pathways to the Hudson River and Iona Marsh shorelines and evaluate

whether metals from AOC #16 – Area D (Former Dump Area) were present in shoreline media at concentrations that may pose risk to human health and/or aquatic ecological receptors.

The Phase II field investigation was conducted to close data gaps identified after completion of Phase I and support development of the Human Health Risk Assessment (HHRA) and Ecological Risk Assessment (ERA). Phase II field activities were conducted in April 2022 and included onsite surface water and sediment sampling for TAL metals to evaluate the potential for inorganic constituents to impact the shoreline environment (**Figure ES-4**). Background surface water and sediment sampling was conducted to establish background concentrations for metals. In addition, Phase II included the collection of physical parameters in soil and sediment to evaluate bioavailability of contaminants to ecological receptors. Groundwater was not encountered nor sampled during previous investigations or during field activities conducted during Phase I; therefore, groundwater sampling was not conducted during Phase II. Phase II analytical results indicated metals in shoreline sediment at concentrations above background, particularly along the Hudson River shoreline adjacent to the northeastern boundary of AOC #16 – Area D (Former Dump Area).

The HHRA and ERA (comprised of a screening level ecological risk assessment [SLERA] and RSLERA) were completed using Phase I and Phase II analytical data to evaluate whether FUDS eligible site-related contaminants of potential concern and/or contaminants of potential ecological concern detected in onsite media affected by past DoD usage pose unacceptable risk to human health or terrestrial and aquatic ecological receptors.

The HHRA concluded that based upon potential receptors and their current or reasonably anticipated future exposures at the site, lead in sediment located along the Hudson River shoreline (IHRS-DU-01) adjacent to AOC #16 – Area D (Former Dump Area) presented potential concerns for recreational users.

The ERA concluded that in the Former Dump Area soil exposure area, plants, soil invertebrates, insectivorous mammals, insectivorous birds, and herptiles are potentially at risk from metals (chromium, copper, lead, mercury, and/or zinc), with risk being driven by avian exposure to lead. This risk potentially extends to two federal/state-listed species of bats (i.e. Indiana bat, northern long-eared bat) and two species of insectivorous birds which are New York State listed species of special concern (i.e. cerulean warbler and golden-winged warbler). In the Iona Island Hudson Shoreline sediment exposure area, plants, benthic invertebrates, demersal fish, herptiles and insectivorous birds are potentially at risk from metals (antimony, cadmium, copper, lead, nickel and zinc), with risk being driven by exposure to lead. This risk from sediment potentially extends to two species of endangered demersal fish (juvenile sturgeon) (i.e. Atlantic sturgeon, short-nosed sturgeon).

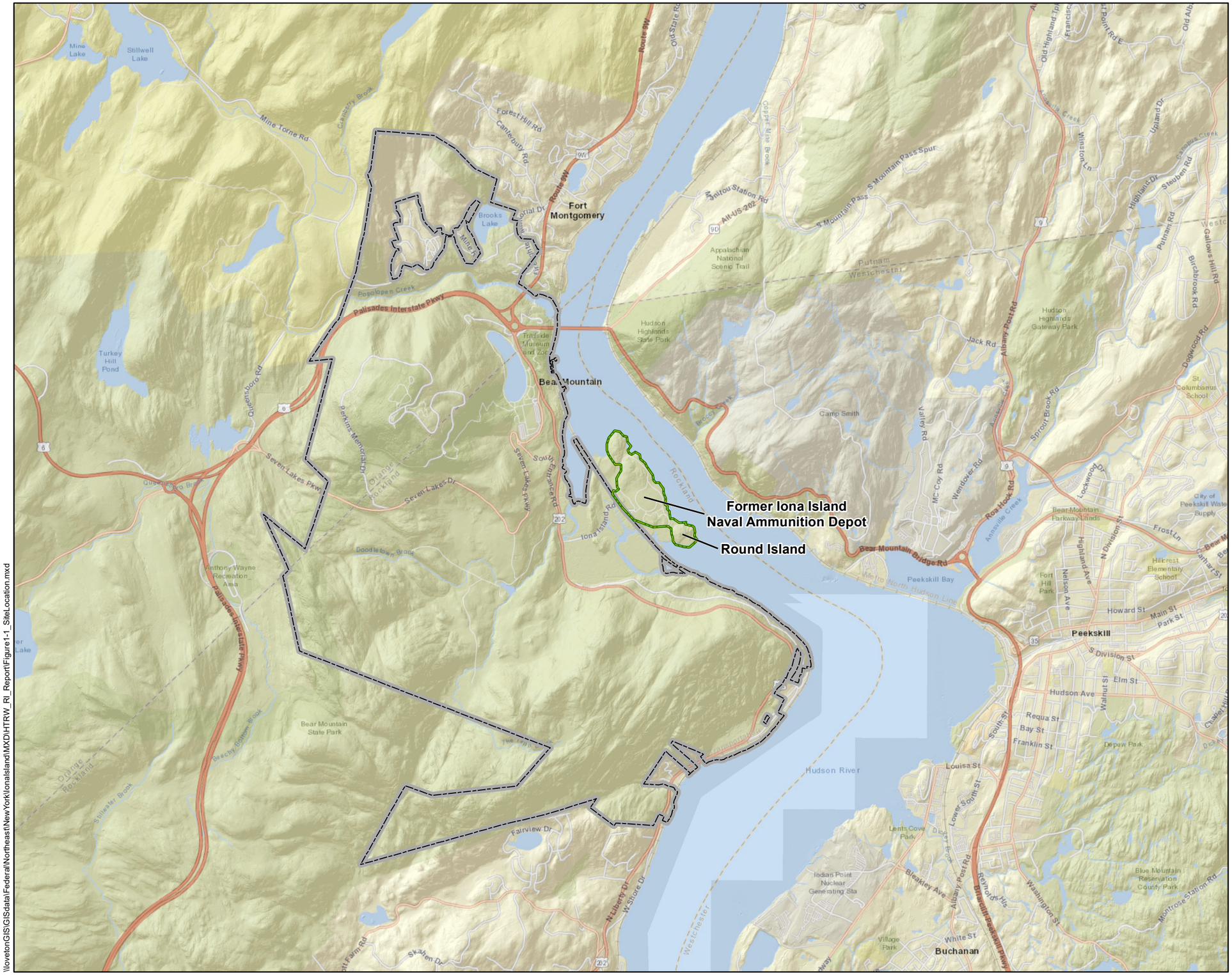
Ecological risk from soil in the Former Dump Area is mitigated for common species by the small spatial extent of the area (< 2 acres), dense phragmites stands and twice daily inundation during tidal cycles; population level effects are unlikely from soils in this area. Similarly, population level risk is unlikely for common species due to the small extent of sediment in shoreline areas immediately adjacent to the Former Dump Area. The attenuation of risk these factors is not as

clear for the two listed bats species, two listed bird species and two endangered fish species (listed because of preferred riverine habitat by the Former Dump Area for a juvenile life stage), as value is put on a single individual in these instances.

The conclusions of the SLERA/RSLERA show that potential risks are confined to a small area of the site with a sharply defined lateral extent of contamination due to island topography and the Hudson River, as well as a sharply defined vertical extent of contamination due to bedrock at approximately three (3) ft bgs based on test pitting and shoreline bathymetric data. Size notwithstanding, based upon current nature and extent information, the Former Dump Area represents on-going source area due to the presence of ash from the former on-site incinerator, as encountered during test pitting.

In accordance with USACE's Environmental Quality Risk Assessment Handbooks, Volumes 1 (human health) (USACE 1999), and 2 (environmental evaluation) (USACE 2010), baseline risk assessments must be completed for the FUDS (USACE 2022). The HHRA and the SLERA/RSLERA meet the definition of baseline risk assessments (USEPA 2001); therefore, the RI is complete.

It is recommended that this project proceed directly to an FS, rather than spend time and resources determining a less conservative cleanup number by conducting a Baseline Ecological Risk Assessment. The conclusion of this RI is that the portion of this FUDS, known as the Former Dump Area, indicates potentially significant risk. Based upon its small size, and sharply defined boundaries for the contamination, this FUDS should proceed to a FS to evaluate the appropriate remedy to address these risks (USEPA 2001). The FS will consider State applicable or relevant and appropriate requirements associated with both the environment and human health. A letter will be sent to the New York State Department of Environmental Conservation / New York State Department of Health requesting the state's proposed list of applicable or relevant and appropriate requirements.



VICINITY MAP

Legend

- FUDS Boundary
- Bear Mountain State Park Boundary (NYS Office of Parks, Recreation & Historic Preservation, 2018)

0 0.5 1
Miles
1 in = 1 miles

N

FIGURE ES-1
General Location of the Iona Island Naval Ammunition Depot Formerly Used Defense Site

HAZARDOUS TOXIC AND RADIOACTIVE WASTE REMEDIAL INVESTIGATION REPORT

Source
Basemap: ESRI World Street Map - ArcGIS Online Map Service (ESRI 2009).
DEM: 2012, Photo Science, Inc., Coastal New York LiDAR (Hydro Flattened Raster DEM), 1-Meter Resolution, New York State GIS

Map Date: 9/19/2022

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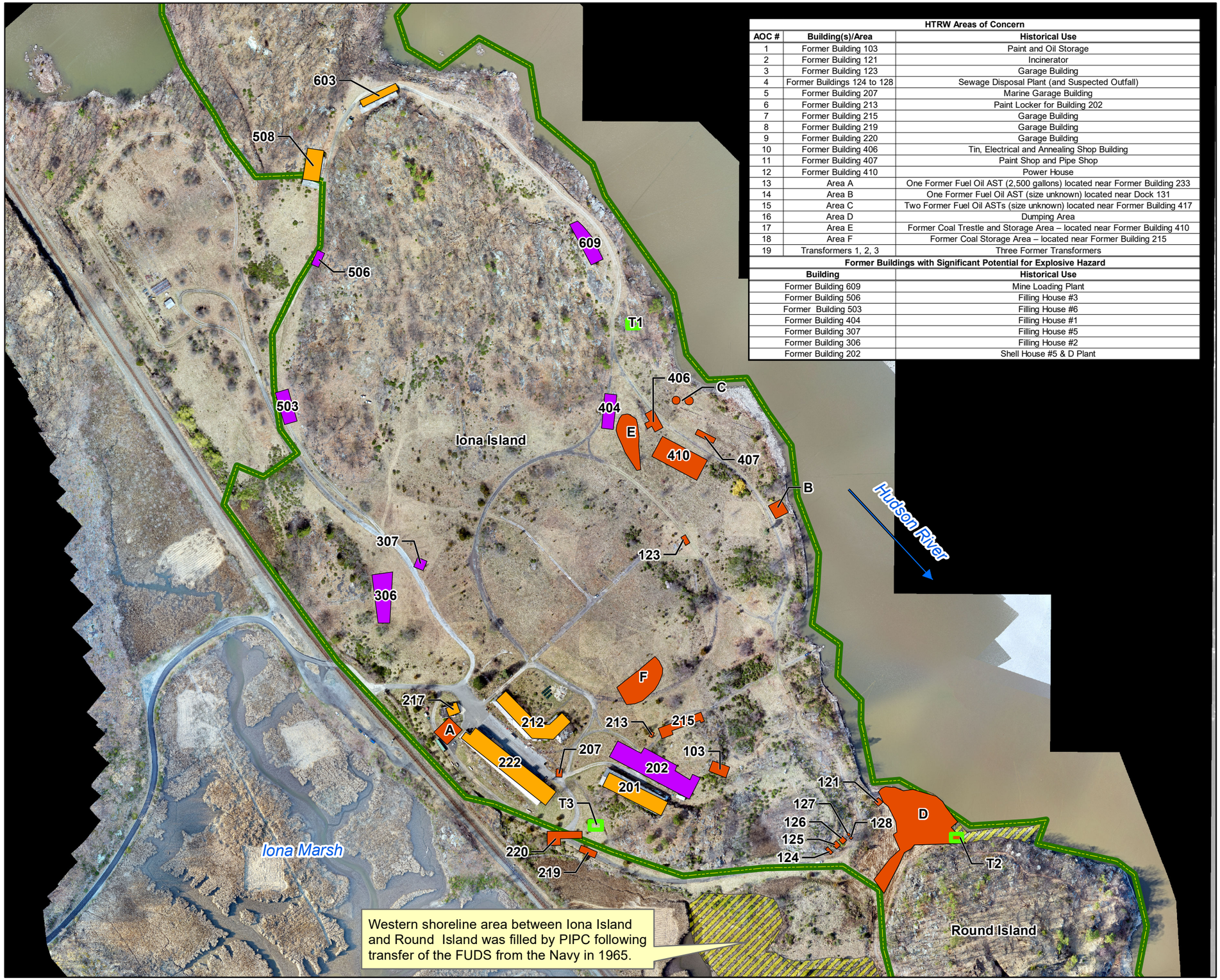


HTRW Areas of Concern		
AOC #	**Building(s)/Area**	**Historical Use**
1	Former Building 103	Paint and Oil Storage
2	Former Building 121	Incinerator
3	Former Building 123	Garage Building
4	Former Buildings 124 to 128	Sewage Disposal Plant (and Suspected Outfall)
5	Former Building 207	Marine Garage Building
6	Former Building 213	Paint Locker for Building 202
7	Former Building 215	Garage Building
8	Former Building 219	Garage Building
9	Former Building 220	Garage Building
10	Former Building 406	Tin, Electrical and Annealing Shop Building
11	Former Building 407	Paint Shop and Pipe Shop
12	Former Building 410	Power House
13	Area A	One Former Fuel Oil AST (2,500 gallons) located near Former Building 233
14	Area B	One Former Fuel Oil AST (size unknown) located near Dock 131
15	Area C	Two Former Fuel Oil ASTs (size unknown) located near Former Building 417
16	Area D	Dumping Area
17	Area E	Former Coal Trestle and Storage Area – located near Former Building 410
18	Area F	Former Coal Storage Area – located near Former Building 215
19	Transformers 1, 2, 3	Three Former Transformers

Former Buildings with Significant Potential for Explosive Hazard	
Building	**Historical Use**
Former Building 609	Mine Loading Plant
Former Building 506	Filling House #3
Former Building 503	Filling House #6
Former Building 404	Filling House #1
Former Building 307	Filling House #5
Former Building 306	Filling House #2
Former Building 202	Shell House #5 & D Plant

VICINITY MAP

Legend

- FUDS Boundary
- HTRW Project Areas of Concern
- FormerTransformers
- Remaining Structure (Not FUDS Eligible)
- Former Buildings with Significant Potential for Explosive Hazard
- Disturbed Ground/Fill Area
- Surface Water Flow Direction

0 300 600
Feet
1 in = 300 ft

N

FIGURE ES-2
HTRW Project Areas of Concern

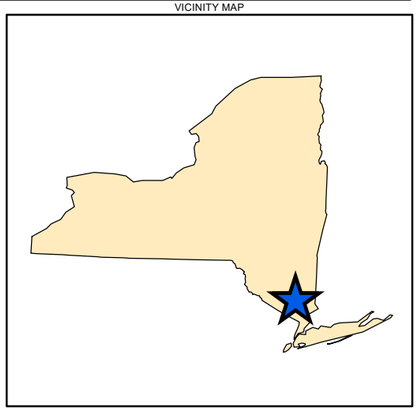
HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial: EA Engineering, Science, and Technology. April 7, 2020

Map Date: 1/11/2024

\\lovetonGIS\GISdata\Federal\Northeast\NewYork\IonaIsland\MXD\HTRW_RI_Report\FigureES-2_HTRW_AOCs.mxd

VICINITY MAP



Legend

- FUDS Boundary
- Phase I Former Building/Structure
- Remaining Structure (Not FUDS Eligible)
- Previous Elevated Concentration of COPC (Greeley-Polhemus 1997 and Alion 2008)
- Phase 1 Soil Decision Unit
- Surface Water Flow Direction

0 300 600
Feet
1 in = 300 ft

N

FIGURE ES-3
Phase I Decision Units

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial: EA Engineering, Science, and Technology. April, 7 2020
AOC Boundary: USAGC 2018

Map Date: 2/29/2024

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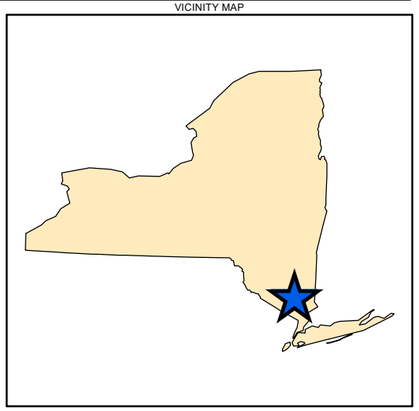
VICINITY MAP



Legend

- FUDS Boundary
- Phase I Former Building/Structure
- AOC #16 – Area D (former Dumping Area)
- Phase I Soil Decision Unit
- Upland
- Marsh/Wetland
- Surface Water Migration Pathway
- Phase II Sediment Decision Unit
- Surface Water Flow Direction

0 200 400
Feet
1 in = 220 ft

N

FIGURE ES-4
Phase II Onsite Investigation Areas

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial: EA Engineering, Science, and Technology. April, 7 2020
AOC Boundary: USAGC 2018
Upland and Marsh/Wetland: Cornell Cornell Institute
for Resource Information Sciences (IRIS) 2011

Map Date: 2/29/2024

\\lovetonGIS\GISdata\Federal\Northeast\NewYork\IonaIsland\MXD\HTRW_QAPP_Addendum\Figure1-3_PhaseII_InvestigationAreas.mxd

1. INTRODUCTION

This Remedial Investigation (RI) Report presents the results of the RI conducted at the Iona Island Naval Ammunition Depot Formerly Used Defense Site (FUDS), located in Stony Point, Rockland County, New York, in support of the Hazardous Toxic and Radioactive Waste (HTRW) project (FUDS Project Number [No.] C02NY074402) (hereinafter referred to as the HTRW RI) (**Figure 1-1**).

The Navy used the Site as an Ammunition Depot from 1900 to 1947, with the major effort consisting of assembling naval ammunition for World War II. Although no ammunition was manufactured at Iona Island, various types of explosives were assembled on site. Activities included preparing, assembling, maintaining, inspecting, and testing ammunition; storing bulk explosives, ammunition, and ordnance material; and issuing ammunition to the fleet, shore establishments, armed merchantmen, transport, and district forces (U.S. Army Geospatial Center [USAGC] 2018).

The former depot was excessed by the Navy in 1957 and transferred to the General Services Administration (GSA). GSA conveyed the FUDS property to the Palisades Interstate Park Commission (PIPC) in 1965. The majority of buildings and structures, including building foundations, were demolished and removed by PIPC between November 1965 and December 1973 (USAGC 2018).

Historical Department of Defense (DoD) operations at the Iona Island Naval Ammunition Depot FUDS may have resulted in the release of contaminants to environmental media at concentrations that may pose a risk to human health and ecological receptors. The HTRW RI was proposed to characterize the nature and extent of hazardous substances in environmental media at the Iona Island Naval Ammunition Depot FUDS attributable to historical DoD operations and evaluate potential risk to human health and ecological receptors.

The USACE conducted the HTRW RI under the Defense Environmental Restoration Program (DERP) for FUDS (DERP-FUDS) and in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendment and Reauthorization Act, and the National Oil and Hazardous Substances Contingency Plan (National Contingency Plan). The FUDS program performs cleanup of properties that were formerly owned by, leased to, or otherwise possessed by the United States and under the jurisdiction of the Secretary of Defense prior to October 1986. Only DoD-generated eligible contamination, which occurred before the transfer of the property to private owners or federal, state, or local governments, is eligible for DERP FUDS response. Types of contamination that may be eligible for DERP FUDS response include CERCLA hazardous substances or pollutants or contaminants, military munitions, petroleum, oil, and lubricants (POL), or unsafe conditions posed by buildings or structures. Metals that are listed as CERCLA hazardous substances under Title 40 of the Code of Federal Regulations (CFR) Table 302.4—List of Hazardous Substances and Reportable Quantities (40 CFR 302.4, updated 23 February 2024) include antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel,

selenium, silver, thallium, and zinc (EPA 2024). Metals that are not a CERCLA hazardous substance (e.g., manganese) are not eligible for DERP FUDS response.

There are three projects at the Iona Island Naval Ammunition Depot FUDS:

- C02NY074401 Containerized (CON) HTRW project, which include response actions at an area of an eligible FUDS property to address:

  — Underground storage tanks (USTs), aboveground storage tanks (ASTs), transformers, hydraulic systems, investigative-derived waste, abandoned inactive monitoring wells, etc. Response actions for drums containing hazardous substances, pollutants, and contaminants are performed under the HTRW project category.

  — Incidental removal of contaminated soil resulting from a leaking UST or other container.

  — Long-term corrective actions required by Resource Conservation and Recovery Act (RCRA) Subtitle I, involving significant soil and groundwater response actions following UST closure/removal actions.

- C02NY074402 HTRW project, which includes environmental response actions at an area of an eligible FUDS property as the result of historical DoD operations related to hazardous substances, pollutants, and contaminants as defined in CERCLA; POL; DoD-unique materials; hazardous wastes or hazardous waste constituents; low-level radioactive materials or low-level radioactive wastes and explosive compounds released to soil, surface water, sediments, or groundwater as a result of historical DoD operations.

- C02NY074403 Military Munitions Response Program (MMRP) project, which include response actions at an area of an eligible FUDS property related to military munitions and explosives of concern (MEC) and their munition constituent (MC) as the result of historical DoD operations at FUDS.

This report addresses the C02NY074402 HTRW project. The FUDS CON/HTRW project was closed out in 2012. The MMRP project was addressed under a separate MMRP RI completed in 2022 (EA). A Decision Document has been completed and approved for the MMRP project and that project is now closed. The HTRW RI was completed by EA Engineering, P.C. and its affiliate EA Science and Technology (EA)[1] as the prime contractor for the U.S. Army Corps of Engineers (USACE) Baltimore District under Contract No. W912DR-15-D-0014, Delivery Order No. W912DR18F0587. Work was completed under the oversight of the USACE Baltimore and New England Districts in accordance with the Performance Work Statement dated 20 June 2018 issued with the TO.

[1]EA Engineering, P.C. is affiliated with EA Engineering, Science, and Technology, Inc., PBC who does business as EA Science and Technology in State of New York

1.1 PROBLEM IDENTIFICATION

Investigations have been ongoing at the at the Iona Island Naval Ammunition Depot FUDS since 1992. Two previous investigations (the 1996 Data Collection Activities [Greeley-Polhemus Group, Inc. (Greeley-Polhemus) 1997] and 2007 Site Inspection [Alion Science and Technology Corporation (Alion) 2008]) reported widespread detections of metals and polycyclic aromatic hydrocarbons (PAHs) in surface soil and/or subsurface soil.

Existing data from previous investigations were insufficient to evaluate nature and extent of contaminants in environmental media attributable to historical DoD operations and to evaluate whether concentrations of contaminants pose an unacceptable risk to human health and/or ecological receptors. Much of the existing data were generated from biased sampling designs and there is an insufficient quantity of data to make the evaluations on nature and extent of contaminants and risk to human health and the environment. The HTRW RI was proposed to address these insufficiencies and is the first comprehensive investigation of the Iona Island Naval Ammunition Depot FUDS.

Based on previous documents, aerial photographs, and available information, 19 areas of concern (AOCs) were identified as eligible for further inclusion in the C02NY074402 HTRW project. These FUDS-eligible AOCs encompass the locations/footprints of former buildings/structures where contaminants related to the former buildings/structures and/or historical processes conducted during the site's commission as an ammunition depot may be present, including 16 former buildings, 4 former ASTs[2], a former dump area, 2 former coal storage areas[3], and 3 former transformer locations[4] (**Figure 1-2 and Table 1-1**):

- AOC #1: Former Building 103 – Paint and Oil Storage
- AOC #2: Former Building 121 – Incinerator
- AOC #3: Former Building 123 – Garage Building
- AOC #4: Former Buildings 124 to 128 – Sewage Disposal Plant (and Suspected Outfall)

[2]The ASTs themselves are not the AOCs. The FUDS-eligible AOCs are the former AST locations/footprints. The ASTs were removed but the sites were not formally closed and were not included in the Containerized (CON) HTRW project at the Site (C02NY074401) which was closed out in 2012.
[3]PAH detections owing to particles of coal are not addressed under CERCLA as coal is considered a product rather than a hazardous waste. However, PAH detections released from coal particles and absorbed on to (e.g., subsurface) soils would be actionable under CERCLA. The chemical analyses that were done during previous investigations did not distinguish PAH contamination absorbed on to soils from PAHs in coal particles.
[4] The transformers themselves are not the AOCs. The FUDS-eligible AOCs are the former transformer locations/ footprints. Although the transformers may have contained PCBs, FUDS response is not normally undertaken unless there is evidence of transformer leakage/spills prior to transfer from DoD jurisdiction. While there is no record of transformer leackage/spills, confirmation via sampling of soil for PCBs was not previously conducted at the locations/footprints of the former transformers.

- AOC #5: Former Building 207 – Marine Garage Building
- AOC #6: Former Building 213 – Paint Locker for Building 202
- AOC #7: Former Building 215 – Garage Building
- AOC #8: Former Building 219 – Garage Building
- AOC #9: Former Building 220 – Garage Building
- AOC #10: Former Building 406 – Tin, Electrical, and Annealing Shop Building
- AOC #11: Former Building 407 – Paint Shop and Pipe Shop
- AOC #12: Former Building 410 – Power House
- AOC #13: Area A – One Former Fuel Oil AST (2,500 gallons [gals]); located near Former Building 233[2]
- AOC #14: Area B – One Former Fuel Oil AST (size unknown); located near Dock 131[2]
- AOC #15: Area C – Two Former Fuel Oil ASTs (size unknown); located near Former Building 417[2]
- AOC #16: Area D – Former Dump Area
- AOC #17: Area E – Former Coal Trestle and Storage Area; located near Former Building 410[3]
- AOC #18: Area F – Former Coal Storage Area; located near Former Building 215[3]
- AOC #19: Three Former Transformers – T1 northwest of Building 406, T2 near Area D, and T3 northeast of Building 220[4].

Activities conducted at the former buildings/structures and potential AOC-specific contaminants related to those activities have been interpreted based on building names presented in the Archives Search Report (ASR) (USACE 1997) and Historical Photographic Analysis (HPA) (USAGC 2018). The former buildings/structures and foundations were demolished/removed by PIPC between 1965 and 1972 (USAGC 2018). The locations of the former buildings/structures and foundations have been identified based on historical documentation/records, historical drawings, and aerial photographs that were georeferenced within geographic information system (GIS) software.

In addition to the above listed AOCs, a review of additional former buildings was conducted during preparation of the HTRW RI Uniform Federal Policy (UFP)-Quality Assurance Project Plan (QAPP) (EA 2020a) at the request of USACE to identify locations where filling or possible spilling of explosive-containing materials could have occurred. Seven former explosive storage and filling operations buildings were identified as having potential for exposure risk from remaining explosives residues in environmental media to human and ecological receptors (**Figure 1-2 and Table 1-2**). Information regarding utilities, piping, building sumps, or other additional release pathways for explosives at these locations is not available. The buildings have been demolished and associated slabs removed, and the underlying soil has been reworked. Although these buildings were not included in the HTRW project, the presence of explosives material in soil at these former building locations has not been previously evaluated. Therefore, these areas (listed below) were included in the Phase I investigation at the request of USACE to confirm the presence/absence of explosives constituents in soil and to evaluate potential exposure risk from remaining explosives residues to human and ecological receptors:

- Building 609 – Mine Loading Plant
- Building 506 – Filling House #3 (Bombproof)
- Building 503 – Filling House #6
- Building 404 – Filling House #1
- Building 307 – Filling House #5
- Building 306 – Filling House #2
- Building 202 – Shell House #5 & D Plant.

1.2 RI PURPOSE, SCOPE, AND OBJECTIVES

The ultimate objective of the Iona Island Naval Ammunition Depot FUDS Project process is to complete a Decision Document, in compliance with CERCLA, as amended, that will lead to close out of the Site. The purpose of this HTRW RI is to determine whether further response actions, pursuant to CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan, is warranted at the Iona Island Naval Ammunition Depot FUDS in support of the C02NY074402 HTRW Project. The objective of the HTRW RI is to collect environmental analytical data at the Iona Island Naval Ammunition Depot FUDS that are scientifically defensible and representative of site conditions to:

- Evaluate the nature and extent of potential impacts associated with former structures and/or operations
- Evaluate potential risks to human health and ecological receptors

- Complete a future feasibility study (FS), if required, identifying the most feasible alternative for remedial action, if necessary.

Specific goals for the HTRW RI are as follows:

- At the 19 HTRW AOCs, evaluate the nature and extent of contaminants associated with historical DoD operations in environmental media at concentrations above human health and/or ecological screening criteria values

- At the 7 additional former buildings identified as having potential for exposure risk from remaining explosives residues to human or ecological receptors, evaluate the presence or absence of explosives in surface and subsurface soil at concentrations above screening criteria values

- Update/refine the HTRW project site-specific human health and ecological (terrestrial and aquatic) Conceptual Site Models (CSMs)

- Prepare human health and ecological risk assessments to evaluate whether the environmental impacts associated with historical DoD operations at the former buildings/structures included in this HTRW RI pose an unacceptable risk to human health or the environment.

If the RI concludes no unacceptable risk to human health and the environment, then the FUDS property will proceed to No Action via a Proposed Plan and Decision Document; however, if potential significant risk to human health and/or ecological receptors is identified, the FUDS property will proceed to a FS followed by a Proposed Plan and Decision Document.

1.3 REPORT ORGANIZATION

The organization of this HTRW RI provides a framework to assist the reader in understanding the progression of the investigation. The outline of this report is as follows:

Section 1 Introduction—This section introduces the project, including authorization, project purpose and scope, location and setting, site history, environmental investigations performed to date, and physical setting.

Section 2 Conceptual Site Model—This section presents the CSMs for human health, terrestrial ecological receptors, and aquatic ecological receptors. These CSMs provided the basis for identifying data collection needs during implementation of the HTRW RI.

Section 3 HTRW RI Field Activities—This section provides an overview of the field activities and tasks conducted during each phase of the HTRW RI.

Section 4 Data Usability—This section presents the results of the Phase I and Phase II data quality assessment.

Section 5 Site Physical Characteristics Discussion—This section presents the results of the Phase I shoreline reconnaissance physical parameter data collected during each phase of the HTRW RI, as well as an evaluation of representativeness for soil and sediment background sampling locations.

Section 6 Nature and Extent of Contamination—This section presents the contaminant concentration analytical results for soil, surface water, and sediment samples collected during each phase of the HTRW RI, as well as comparisons to screening criteria and background concentrations.

Section 7 Contaminant Fate and Transport—This section presents an evaluation of environmental fate and transport mechanisms necessary to determine the potential for continued presence of contaminants and offsite migration, as well as an evaluation of bioavailability of contaminants in onsite soil and sediment to ecological receptors.

Section 8 Human Health and Ecological Risk Assessments—This section presents a discussion of the human health risk assessment (HHRA) and ecological risk assessment (ERA) (including the Screening-Level Ecological Risk Assessment (SLERA) and Refined Screening-Level Ecological Risk Assessment [RSLERA]) prepared to evaluate potential risk to human and ecological receptors exposed to onsite environmental media.

Section 9 Conclusion and Recommendations—This section provides a summary of and conclusions for the HTRW RI.

Section 10 References— Lists the literature referenced in this document.

Appendixes A through H provide supporting information used in the preparation of this HTRW RI. Appendix A presents field documentation and field photographs. Appendix B presents laboratory analytical reports. Appendix C presents data validation reports. Appendix D presents data usability assessment (DUA) reports. Appendix E presents the Phase I shoreline reconnaissance memorandum. Appendix F presents the background comparison data. Appendix G presents the HHRA. Appendix H presents the ERA.

1.4 SITE BACKGROUND

1.4.1 Location and Setting

The Iona Island Naval Ammunition Depot FUDS property consists of approximately 124 acres of land and inland water located on Iona Island and Round Island along the west side of the Hudson River, in the Town of Stony Point, Rockland County, New York (**Figure 1-1**). Iona Island is located within the Lower Hudson River Valley region, which includes all of Putnam, Rockland, and Westchester counties and is considered part of the downstate New York region

due to its geographical and cultural proximity to New York City. According to the U.S. Census Bureau 2019 population estimate for Rockland County, New York, the population density is approximately 1637 persons per square mile.

Iona Island is in Bear Mountain State Park on the east side of U.S. 202/Route 9W, 6 miles south/downstream of West Point Military Academy, 1 mile south/downstream of the Bear Mountain Bridge, and 41.2 miles upstream from New York Harbor. Iona Island is bordered on the east by the Hudson River; on the northwest by the mouth of Doodletown Bight, an expanse of shallows and mudflats; and on the west and southwest by Iona Marsh, a tidal marsh that occupies one mile between Iona Island and the mainland. Active River Subdivision (CSX Transportation) railroad tracks parallel the western shoreline of the Hudson River. The Iona Marsh Shoreline located along the west side of Iona Island is divided by the railroad embankment.

The southeastern part of Iona Island, known as Round Island, was once cut-off by marshes and was attached to Iona Island with fill in the early 20th century (New York State Department of Environmental Conservation [NYSDEC] and U.S. Department of Commerce 1992). The hill on the western side of Iona Island, south of the railroad tracks, was also once treated as separate and referred to as Courtland Island. The shoreline areas of the island and adjoining marshes are located within the Hudson River.

Iona Island is connected to the mainland by a narrow two-lane road off U.S. 202/Route 9W near Doodletown. A non-climbable steel fence on top of a rubble wall and the River Subdivision (CSX Transportation) railroad track embankment separates Iona Island and the FUDS from Iona Marsh. The FUDS is accessed by crossing active River Subdivision (CSX Transportation) railroad tracks and entering through an unmanned gate during normal working hours.

1.4.2 Current Site Usage

PIPC currently utilizes a portion of Iona Island as a storage facility; however, the property is closed to the public and use is restricted to park operations and maintenance purposes only. The FUDS property is part of the much larger Hudson River National Estuarine Research Reserve, a Significant Coastal Fish and Wildlife Habitat Area and National Natural Landmark.

1.4.3 Operational History

The following history of operational use was obtained from the Naval Ammunition Depot Iona Island FUDS HPA prepared by USAGC in 2018.

Prior to use by the military, Iona Island was utilized as a resort hotel during the Civil War. There was no documented evidence available of past use of ordnance-related items on the island prior to use by the military. The Navy acquired Iona Island from the L.H. Mace Brokerage Company of New York City in 1899 for construction of the Iona Island Naval Ammunition Depot. In 1942, an additional approximately 13 acres of marshland, Round Island, was purchased and used for ammunition storage (USACE 1997).

In 1903, at least one 13-inch (in.) shell exploded between Shell Houses 3 and 4 (former Buildings 210 and 209, respectively) on Iona Island (see MMRP RI for additional info; EA 2021). The explosion destroyed Shell Houses 3 and 4, and their contents, and damaged Shell Houses 1 and 2 (former Buildings 115 and 116, respectively) (USACE 1997). Some of the contents of the explosion thought to be included were 13-in. shells that may have been thrown out from the point of the explosion as far as 1,250 feet (ft). Other munitions stored in the area during the time of the explosion included 1-pounders, 6-pounders, and 6-in. ammunition. It is expected that the explosion involved black powder rather than high explosives.

During World War I, almost all the depth bombs and ammunition used in the Atlantic area passed through Iona. In 1914, work increased by approximately 14 percent. All submarines were sent to Iona Island to be filled with explosives, in addition to the regular work conducted there. In 1915, over 2 million pounds of powder were made up in charges and about 327 carloads of material were handled during the year with large shipments made by transport, tug, and barge. A 1919 annual report to the Secretary of the Navy states that most of the 14-in. ammunition for the Army and Navy Railroad battery was prepared at Iona Island.

After World War I, although Iona Island was one of two of the Navy's main depots on the east coast, a program of reducing personnel and material and keeping active work to a minimum was followed under the United States' general program of limitation of arms treaty. In the 1930s, Iona Island supplied ammunition of calibers to the fleet for service allowances, target practice, and reserve war requirements.

Between 1941 and 1945, the major activity conducted on Iona Island was assembling naval ammunition for World War II. More than 2,300 Navy ships and 2,300 merchant ships received their ammunition from Iona Island during World War II. In addition, 77 bases, 500 shore stations and 700 foreign naval ships were serviced with ammunition.

After World War II, use of the island as an ammunition depot became obsolete because of lack of expansion room to accommodate new types of ammunition. In 1947, the Department of the Navy decided to deactivate the Iona Island Naval Ammunition Depot and made the property available for restricted lease. The FUDS was re-designated as an Annex to the United States Naval Ammunition Depot, Earle, New Jersey, and in 1957, declared the Annex excess. In 1955 and 1960, the GSA utilized the Iona Island Naval Ammunition Depot FUDS through a permit for stockpiling materials such as rubber and copper. In 1960, the GSA received official jurisdiction of the property and other agencies under GSA control utilized the property for record storage during the 1960s. These agencies included the following: Maritime Administration, Atomic Energy Commission, Civil Service Commission, Army Corps of Engineers, and the Navy's Bureau of Ships. The Maritime Administration also conducted occasional trans-shipments of heavy freight at the main wharf on an occasional basis. On 30 March 1965, Iona Island was deemed evacuated after the last load of stockpiled materials left the property. In 1965, the PIPC acquired both Iona and Round islands (USACE 1997).

1.4.4 Site Layout History

At the time of purchase in 1899, Iona Island consisted of 116 acres of rough, rocky, and partly wooded ground and 13 acres of marsh. The Island was transformed into an ordnance depot, first called Naval Magazine, and changed prior to World War I to United States Naval Ammunition Depot (USAGC 2018).

Iona began as a relatively small installation. By 1902 the following buildings had been constructed: four magazines, two fixed ammunition houses, four shell houses (fixed ammunition), three storehouses, one power house with steam, electric, and air-compressing plant, three storehouses; six hose houses, one pumphouse, one testing laboratory and telephone exchange, one locomotive house, a tin, electrical and annealing shop, one house for gunner's residence (inspectors quarters), four double cottages for principal employees, an administrative building, gatehouse, and a stable and barn. In 1903, one shipping house and two magazines were built. By 1910, four additional hose houses, two filling houses (one bombproof), three magazines (one for bulk Explosive D), one quilting house, one primer house, one tank repair house, one pump house located by the dock, a paint and oil storage building, paint and pipe shop, labor office and dispensary, a garage and greenhouse were built. By 1920, an ammunition box storage building and cartridge case storage buildings were built, one hose house, two fuse houses, eight magazines including two subsurface magazines, one gun-cotton magazine and a dynamite magazine, one shell house and D plant, one shipping house, one storehouse, powder tank storage, a water storage standpipe with 188,000 gallon capacity, stone crusher, a heating plant for filling houses No. 2 and No. 5, a paint and oil locket, blacksmith shop, one personnel quarters and a marine barracks, a time-clock house, wagon shed, lumber shed, garden tool house, garage and cow barn.

In 1924, a total of 106 buildings including two water storage tanks and one water storage standpipe were present on Iona Island (USACE 1998). In the late 1920s through the 1930s, various programs of maintenance and remodeling were carried out by the Bureau of Yards and Docks in addition to other several buildings being built. For example, ten magazine buildings were remodeled for fireproofing; three black-powder magazines and a railroad track to serve them were ordered; and two water tanks were provided, the water system enlarged, and two engine-driven generators installed. In addition, a 0.85-acre dump area is first identified between Round Island and Iona Island on a 1930-dated U.S. Navy layout plan (USAGC 2018).

Round Island, the southernmost portion of the depot, was utilized by the Navy for ammunition storage. The Navy partially filled in the area between Iona Island and Round Island to provide a connection between the two islands. Subsurface magazines were quarried out of rock on Round Island, and the rock removed was used to create a blast barrier between the magazine storage and the depot activities on Iona Island (Bluestone Environmental Group, Inc. [Bluestone] 2018).

In 1951 when the depot was deactivated, there were 146 buildings on the Island (USAGC 2018). A 22 June 1965 letter presented in the ASR provides information on the site layout at the time of DoD transfer to PIPC; the roads on the Island were in poor condition, with many of the buildings not served by roads. Instead, buildings served by railroad with spurs from the West Shore

Railroad leading to each warehouse and to the pier. Most buildings had been built between 1914 and 1918 and were made of brick while additional buildings constructed in 1941 were made of concrete faced cinder block. Most buildings had no natural or artificial lighting, heating, or other utilities; they were large, open warehouses with high ceilings and no partitions or separation of floors. Several homes were also present on the Island, and previously served as residences for naval officers. The homes were vacant but well maintained. Redevelopment for industrial or warehousing use would have required extensive renovation of buildings, clearance of structures, and construction of roads, parking lots, and new sewer system and utility lines (USACE 1998).

Most buildings and structures were demolished and removed between November 1965 and December 1973 (USAGC 2018). It is possible that fill material was used during regrading following demolition and excavation/removal of foundations, and that surface and subsurface soil was significantly reworked/mixed across much of the former operations area. The FUDS has remained undeveloped since its transfer from DoD ownership to PIPC in 1965. PIPC developed demolition plans for the remaining buildings and for construction of a recreational park; however, the plans to develop the Island into a recreational park were not executed. The only construction that occurred on the Island was the parking lot located directly west of Iona Island and outside of the FUDS boundary. The contract plans illustrate the locations of the former buildings, which PIPC removed except for a few buildings which currently remain onsite. The plans also illustrate a fill area (believed to be building demolition debris) that currently provides access between Iona Island and Round Island (Alion 2008) (**Figure 1-2**).

Original structures still standing include Building 201 (Empty Projectile Magazine); Building 212 (former Marine Barracks); Building 217 (Fire Station and Labor Office), Building 222 (Miscellaneous Storage Building), Building 508 (Bag Charge Magazine); and Building 603 (Pyrotechnic Magazine) (Bluestone 2018) (**Figure 1-2**). Building 222 (Store House) is utilized by Bear Mountain State Park for shipping and receiving. Building 212 is in disrepair but has not been demolished due to concerns with asbestos. The old roads in the main part of the former depot (near former Buildings 123 and 410) are still accessible by vehicle. The fill area between Round Island and Iona Island is vegetated; however, solid ground allows the area to be traversable by foot.

1.5 PREVIOUS INVESTIGATIONS

1.5.1 Initial Site Visit (USACE 1992)

USACE New York District performed an initial site visit on 30 October 1992. According to the Preliminary Assessment (USACE 1992), there was potential groundwater and soil contamination from a fuel oil spill at a former AST, coal storage, a former dump area, an incinerator, and former buildings used as a garage, paint storage, and sewage treatment plant. No damage to flora or fauna, or evidence of illegal or unauthorized dumping, was observed during the site visit.

The discussion of the initial site visit in the Revised Site Survey Summary Sheet (USACE 1995), listed the following remaining structures as beneficially used by the present owner: Building 201 (Empty Projectile Magazine); Building 212 (former Marine Barracks); Building 217 (Fire

Station and Labor Office); Building 222 (Miscellaneous Storage Building); Building 508 (Bag Charge Magazine); and Building 603 (Pyrotechnic Magazine). These buildings are still visible on current aerial photographs of the site and are identified as "remaining structures (not FUDS eligible)" on **Figure 1-2**.

1.5.2 Data Collection Activities (Greeley-Polhemus 1997)

In October 1996, Greeley-Polhemus and Smith Technology Corporation, under contract to USACE New York District, conducted data collection activities at Iona Island Naval Ammunition Depot in Stony Point, New York (Greeley-Polhemus 1997). The data collection report was submitted in April 1997. Eight AOCs specific to the Iona Island Naval Ammunition Depot FUDS were targeted for investigation, including three former AST locations.

Ten soil samples were collected from the following locations for select analytes (**Figure 1-3**):

- Paint and Oil Storage Building 103; one shallow soil boring (currently designated AOC #1)
- Incinerator Building 121; one shallow soil boring (currently designated AOC #2)
- Sewage Disposal Plant Buildings 124 to 128; one shallow soil boring (currently designated AOC #4)
- Paint Shop and Pipe Shop Building 407; one shallow soil boring (currently designated AOC #11)
- Power House Building 410; one shallow soil boring (currently designated AOC #12)
- One former fuel-oil AST at Dock 131; one shallow soil boring (currently designated AOC #14 – Area B)
- Two former fuel-oil ASTs at Building 417; two shallow soil borings (currently designated AOC #15 – Area C)
- Former dump area, two shallow soil borings (currently designated AOC #16 – Area D).

A stainless steel, hand-driven soil coring device was used to collect soil samples at each location from 0.0 to 2.0 ft below ground surface (bgs). Screening of the soil samples with a photoionization detector did not indicate contamination. Visual inspection of the soil samples also did not suggest the presence of contamination; however, some debris (plastic, metal, bricks, etc.) was observed on the ground surface at the former Incinerator Building site (AOC #2) and at the Former Dump Area (AOC #16).

Soil samples were analyzed for the following compounds (**Table 1-3**):

- RCRA metals, Target Compound List (TCL) semi-volatile organic compounds (SVOCs), TCL volatile organic compounds (VOCs), and TCL polychlorinated biphenyls (PCBs) at the former Paint and Oil Storage Building 103 (AOC #1), Sewage Disposal Plant Buildings 124 to 128 (AOC #4), and Paint Shop and Pipe Shop Building 407 (AOC #11), and AOC #16 – Area D (Former Dump Area) soil samples

- RCRA metals and TCL SVOCs at the former Incinerator Building 121 (AOC #2) soil samples

- TCL SVOCs and TCL VOCs at the former Power House Building 410 (AOC #12) soil samples

- TCL SVOCs and benzene, toluene, ethylbenzene, and xylene (BTEX) at the former fuel AST sites soil borings (AOCs #13, #14, and #15).

Metals (arsenic, barium, cadmium, total chromium, lead, mercury, and silver), SVOCs (dinitrotoluenes [DNTs], di-n-butylphthalate, phenol, and PAHs), and one PCB (Aroclor 1260) were detected in the soil at concentrations exceeding NYSDEC Recommended Soil Cleanup Objectives, as published on 16 November 1992 (not specified as residential or industrial). Maximum concentrations of barium, cadmium, total chromium, lead, mercury, and silver were detected in the samples collected near Former Building 121 (Incinerator) (AOC #2) and the AOC #16 – Area D (Former Dump Area). Arsenic was detected at a maximum concentration in the sample from former Building 103 (Paint and Oil Storage Building) (AOC #1).

SVOC detections (primarily PAHs) were widespread; however, the sum of the detected SVOC concentrations did not exceed the 1992 RSCO of 500 milligrams per kilogram (mg/kg) for total SVOCs in any sample (Greeley-Polhemus 1997). SVOCs (primarily 2,4-dinitrotoluene, 2,6-dinitrotoluene, and PAHs) were detected in samples from AOC #16 – Area D (Former Dump Area) and former Building 410 (Power House) (AOC #12). Aroclor 1260 exceeded the RSCO of 1 mg/kg in one of the two samples from the AOC #16 – Area D (Former Dump Area). Except for typical laboratory contaminants, VOCs were not detected in the soil samples.

Greeley-Polhemus recommended evaluating site risks based on the Relative Risk Site Evaluation Program and conducting sampling to further delineate metals and SVOC contamination (Greeley-Polhemus 1997).

1.5.3 Military Munitions Response Program Site Inspection (Alion 2008)

Alion, with support from EA, performed an MMRP site investigation (SI) in 2007/2008 under contract to the U.S. Army Engineering and Support Center in Huntsville and USACE Baltimore District (Alion 2008). The scope of the SI was restricted to the evaluation of the presence of material potentially presenting an explosive hazard, MEC, munitions debris (MD), and/or MC related to historical use of the FUDS prior to transfer.

The MMRP SI included a qualitative reconnaissance of Iona Island and Round Island, using both visual observations and analog geophysics (magnetometer), to identify material potentially presenting an explosive hazard, MEC, or MD, as well as visual indicators of suspect areas impacted by munitions including distressed vegetation, stained soil, targets, and visual metallic debris. The qualitative reconnaissance addressed the former 1903 explosion area; the eastern shorelines along the former dock areas; areas where ordnance items were historically observed at low tide; and at AOC #16 – Area D (Former Dump Area) located between Iona Island and Round Island. The total estimated acreage subject to the qualitative reconnaissance was approximately 14.9 acres. No MEC or MD was visually observed during the field event. Geophysical anomalies encountered during the reconnaissance were attributed to surface/cultural debris (Alion 2008).

MC sampling was conducted within the approximately 124.2-acre FUDS Munitions Response Site (MRS)-01 1903 explosion area (**Figure 1-4**). MRS-01 is centered between former Buildings 209 and 210. The MRS radius extends outward 1,250 ft based on the kick-out radius of 13-in. shells (USACE 2004). The 1,250-ft radius of the MRS was determined as part of the ASR (USACE 1997) and was based on DoD 6055.09-STD, DoD Ammunition and Explosives Safety Standards, dated October 1992.

In December 2007, a total of 23 surface soil samples (including 5 background samples) were collected from the 1903 Explosion MRS using a 7-point wheel composite method, from 0 to 2 in. bgs (Alion 2008). Five sediment samples (including 3 background samples) were also collected. The background samples were collected from an area west and upgradient of the FUDS boundary and outside of the limits of the 1903 Explosion Area. Background locations selected were from areas deemed unimpacted by past DoD or current owner operations and were of similar soil characteristics as the biased soil samples. There was no observed visual or magnetic evidence of MEC, MD, or other military-related disturbance at background sample locations.

Prior to sampling, research was conducted to focus the list of analytes to MC potentially associated with the munitions used when the FUDS was active (Alion 2008). As a result, the soil and sediment samples were analyzed for the following (**Table 1-4 and Table 1-5**):

- Select Target Analyte List (TAL) Metals – antimony, copper, lead, nickel, and zinc (EPA Method 6010B) and mercury (EPA Method 7471A). Iron was also a munitions constituent, but was not analyzed during the SI sampling event, because it is not a CERCLA hazardous substance (Alion 2008; EPA 2024).

- Explosives – 2,4,6- Trinitrotoluene (TNT); 4-amino (AM)-2,6- DNT; 2-AM-4,6-DNT; 2,4-DNT; 2,6-DNT; 2-nitrotoluene; 3-nitrotoluene; 4-nitrotoluene (EPA Method 8330A); and nitroglycerin (EPA Method 8330).

No surface water or groundwater samples were collected. Screening-level human health and ecological risk assessments were performed using the 2007 MC sampling and analysis results. Chemical concentrations were compared to applicable human health criteria (residential for soil,

residential and industrial for sediment), ecological screening criteria, and background concentrations.

Two explosives (2,4,6-TNT and 4-AM-2,6-DNT) were detected at one location, II-EA-SS-02-08, in the central portion of the Iona Island Naval Ammunition Depot FUDS, but at concentrations below applicable human health and ecological screening criteria in one of the 18 surface soil samples (II-EA-SS-02-08). The other 10 explosives were not detected above laboratory reporting limits. There were no explosives detected in the sediment samples (Alion 2008).

Only a qualitative comparison was done between the maximum and average concentrations and the background results. Lead concentrations exceeded background concentrations and human health screening criteria in sediment samples but were below the industrial soil criteria in surface soil samples. Antimony, copper, and lead exceeded background concentrations and associated ecological screening criteria values in surface soil. In sediment, antimony, copper, lead, nickel, and zinc exceeded background concentrations and ecological screening criteria.

The SI recommended that a RI/FS be performed for both MEC/MD and MC, based on historical discoveries of MD, potential for MEC/MD to remain on site, and potential for risks to human health and ecological receptors from metals MC in surface soil and sediment (Alion 2008).

1.5.4 Explosives Residue Risk Evaluation (EA 2020a)

In January 2019 during development of the HTRW RI UFP-QAPP (EA 2020a), EA conducted a review of former buildings/structures at the Iona Island Naval Ammunition Depot FUDS at the request of USACE to identify locations where filling or possible spilling of explosive-containing materials could have occurred (EA 2019). EA reviewed previous documents including the ASR (USACE 1998) and HPA (USAGC 2018) and, based on limited information available (e.g., building titles), identified 20 former buildings as locations where filling or possible spilling of explosive-containing materials could have occurred (**Table 1-2**). These buildings have not been previously investigated. Based on further review and input from USACE, 7 of these 20 former buildings were identified as locations with potential for exposure risk from remaining explosives residues in environmental media to human and ecological receptors (**Figure 1-2**). PIPC conducted a site walk and confirmed there are no foundations or slabs remaining at these former building locations:

- Building 609 – Mine Loading Plant
- Building 506 – Filling House #3 (Bombproof)
- Building 503 – Filling House #6
- Building 404 – Filling House #1

- Building 307 – Filling House #5
- Building 306 – Filling House #2
- Building 202 – Shell House #5 & D Plant.

1.6 PHYSICAL SETTING

1.6.1 Regional Climate

The climate in Rockland County, New York is classified as humid continental and subjected to some modification by the Atlantic Ocean. Minimum temperatures average 22.9 degrees Fahrenheit (°F) in the winter and maximum temperatures average 82.3 °F in the summer [U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA) 2021]. Mean monthly air temperatures below 40 °F occur from December through March and freeze dates with temperatures below 28 °F generally occur from late October to mid-April. Precipitation averages from 35 to 49 in. annually, with over half of the precipitation (26.14 in.) falling between May and October (U.S. Department of Commerce, NOAA 2021). Annual snowfall averages 26 in.

The predominant wind direction varies throughout the year, with wind most often from the north from March to April, from the west from April to August, from the south for from August to September, from the north from September to October, and from the west from October to March. The average hourly wind speed varies seasonally, with an average wind speed of more than 5.8 miles per hour from November to April and an average of 4.2 miles per hour from April to November (Weather Spark 2023).

1.6.2 Physiography and Topography

Iona Island is a bedrock island in the Hudson Highlands physiographic province of the New England Uplands. The surface of the New England Upland slopes southeastward from maximum inland altitudes around 2,200 ft above mean sea level (amsl) to approximately 400 to 500 ft at its riverine edge (USACE 1998). The Hudson Highlands is part of a northeast-trending mountain mass extending from Pennsylvania to Connecticut. The Hudson River cuts through the Hudson Highlands in a 15 mile long relatively straight, north/south-oriented, narrow, steep-sided gorge with bedrock flanks between West Point and Peekskill, New York. Channel width in the Hudson Highlands region is less than 0.6 miles (Yozzo et al. 2005). Maximum relief is about 1,600 ft where the Hudson River dissects the Hudson Highlands. Topography in the Hudson Highlands region is relatively rugged with prevalent bedrock-controlled landforms (New York State Department of Transportation 2013). Erosional and depositional effects of glaciation are widespread and conspicuous in upland areas of the Hudson Highlands region.

Former buildings and structures were located within the upland area of Iona Island, which has rocky terrain with varying degrees of slopes (**Figure 1-5**). Elevations within the upland area

range from about 0 ft National Geodetic Vertical Datum 1988 (NAVD88) along the immediate shoreline to 84 ft NAVD88 in the northern portion of the island.

AOC #16 – Area D (Former Dump Area) is confined to a low-lying, tidally influenced marsh area between Round and Iona Island. This area is bounded to the northeast by the Hudson River and to the southwest by a fill area emplaced by the PIPC following Navy transfer of the FUDS in 1965. Surface elevations within this low-lying marsh area range from 0 ft amsl at the Hudson River shoreline to 2 ft amsl (EA 2020b). Elevations within the fill area to the southwest range from 2 to 5 ft amsl. Elevations rise steeply along the bedrock wall of Round Island to the southeast and along Iona Island to the northwest.

An intertidal marsh (Iona Marsh) encompasses approximately 225 acres between Iona Island and the western shore of the Hudson River. Radiocarbon analysis of the peat indicates that the marsh began to form at least 6,000 years ago, behind Iona Island, in what is believed to have been an old channel of the Hudson River (Yozzo et al. 2005). Surface elevations within the marsh range from 0 ft to approximately 7 ft amsl.

1.6.3 Hudson River Bathymetry

Steep bedrock shorelines confine the Hudson River for much of its tidal reach. The bedrock knobs of Iona Island project approximately 84 ft above the river, and bedrock dives down under Iona Marsh, where sediments are more than 100 ft deep (U.S. Department of Commerce, NOAA and NYSDEC. 1982). Tidal shallows extend north of Iona Marsh (Doodletown Bight), east of Iona Marsh and south of Round Island, and west of AOC #16 – Area D (Former Dump Area) (**Figure 1-6**).

A review of the depth chart of the Hudson River (USACE New York District 2018 and NOAA National Centers for Environmental Information [NCEI] 2022), and visual observations of the shoreline during the MMRP RI DGM shoreline survey (EA 2021) indicates that there is a shallow bedrock shelf extending from the eastern side of Iona Island out into the Hudson River. The shelf extends eastward into the river channel, with depths ranging from 0 to approximately -10 ft shoreline below the river surface. The shelf along the shoreline of AOC #16 – Area D (Former Dump Area) extends 250 to 350 ft into the Hudson River channel before sloping steeply downward to a depth of approximately -95 ft below the river surface. Northwest of AOC #16 – Area D (Former Dump Area) the shelf narrows to less than 100 ft along the majority of the eastern shoreline of Iona Island.

1.6.4 Surface Water Drainage

The Hudson River originates in the Adirondack Mountains of Upstate New York, and flows southward 315 miles to the Atlantic Ocean at New York Harbor, between New York City and Jersey City. Maximum river depths are found in the Hudson Highlands between West Point and Peekskill, New York, with the deepest point of 196 ft at West Point (Yozzo et al. 2005). The lower half of the Hudson River from Troy to New York Harbor, a distance of 125.5 miles, is an estuary (drowned river valley) affected by semidiurnal tides, with two highs and two lows

occurring within a 25-hour period. The tidal range averages approximately 2.9 ft. Intertidal marshes along the Hudson River including Iona Marsh, and the low-lying marsh area between Iona Island and Round Island, are inundated with water twice daily during high tide and during storm events.

Salinity zones in the Hudson are determined by a combination of hydrographic factors, primarily the tidal surge of saline water upriver from the Atlantic Ocean and the magnitude of freshwater flow into the upper estuary. Freshwater flow in the Hudson estuary follows a typical seasonal pattern, with highest flow during the spring and lowest flow during late summer and early fall under an average runoff regime the salt front (0.5 parts per trillion) reaches Newburgh, New York, by late summer/early fall. During conditions of high freshwater runoff, usually during spring, the salt front may be pushed downriver as far as the Bronx, New York (Yozzo et al. 2005).

The section of the Hudson River at Iona Island is very narrow and deep, with strong currents and a rocky bottom substrate. The width of the Hudson River at Iona Island is approximately 0.3 mile east of Iona Island, and the river in this area has a depth of approximately 165 ft. Tidal influence at Iona Island is approximately 3.5 ft, and shorelines may not be accessible during high-tide conditions (Alion 2008).

Iona Island is separated from the mainland by Doodletown Brook on the west and north and Snake Hole Creek on the south (**Figure 1-7**). Doodletown Brook originates in Bear Mountain State Park, draining an area of approximately 2.9 square miles, and is the principal tributary to Iona Marsh west of Iona Island (Yozzo et al. 2005). Doodletown Brook flows east and north approximately 1,960 ft from the Bear Mountain State Park shoreline to Doodletown Bight. Snake Hole Creek originates in the low marshes southwest of Iona Island and flows approximately 5,190 ft southwesterly, southeast, and finally east to the Hudson River. The Creek divides Iona Island Marsh into Salisbury Meadow on the west side and Ring Meadow on the east side. The shoreline between Iona Island and Round Island adjacent to Ring Meadow was infilled by PIPC after Navy transfer of the Island in 1965.

1.6.5 Shoreline Environment

The western and southern portions of Iona Island are separated from the adjacent marshes by the active River Subdivision (CSX Transportation) railroad tracks (**Figure 1-7**). The low-lying marsh area between Iona Island and Round Island is separated from Ring Meadow by an area of fill emplaced by PIPC following transfer of the FUDS from the Navy in 1965 (**Figure 1-2**).

The eastern and northern shorelines along the Hudson River and Doodletown Bight consist primarily of riprap, gravel, cobbles, boulders, and exposed bedrock (USACE 1998 and Alion 2008). A limited area of exposed sand and gravel shoreline area is present along the Hudson River shoreline extending northwest from at AOC #16 – Area D (Former Dump Area). This shoreline area changes to cobbles and boulders (riprap) extending southward along Round Island. A retaining wall spans the Hudson River shoreline north of AOC #16 - Area D (Former Dump Area). Aerial photographs and orthoimagery indicate that the wall is not present along the

shoreline in the area between AOC #14 - Area B and AOC #15 - Area C (**Figure 1-2**); exposed shoreline with gravel, cobbles, and boulders is visible in this area on recent orthoimagery.

1.6.6 Geology

Field notes from the 1996 investigation document overburden at Iona Island as fill material overlying fine to coarse sand, with some silt and gravel. Bedrock is either exposed at ground surface or encountered depths up to approximately 25 in. bgs (USACE 1998).

The bedrock of the New England Upland and Hudson Highlands is folded, faulted, and includes metamorphosed sediments that have been intruded by numerous plutonic masses (USACE 1998). The rock is resistant to erosion and forms rocky knobs on Iona Island that project 100 ft above the Hudson River, and hills that rise more than 1,000 ft within 0.5 miles of the island (Bear Mountain). Based on the bedrock geology map for the Lower Hudson, bedrock at Iona Island consists primarily of biotite-quartz-plagioclase paragneiss (Fisher et al. 1970).

1.6.7 Hydrogeology

Groundwater at and near Iona Island is found in both overburden and underlying bedrock. It is possible that perched water (possibly intermittent based on precipitation) is present above the less permeable bedrock. Shallow groundwater is likely influenced by the Hudson River.

Crystalline bedrock of the Hudson Highlands acts as a relatively poor aquifer. Groundwater in the gneiss and granitic rocks only occurs in fractures and joints (Heisig 2010). The majority of fractures are pervasive, shallow to moderately dipping toward the southwest. Occasional steeply dipping faults are also present. Bedrock groundwater at Iona Island is likely encountered at depths greater than 6 ft as based on the rock outcrop soil description reported in the Rockland County Soil Survey (Bonnell 1990).

Groundwater recharge is primarily from infiltration of local precipitation, with downward seepage of water through overburden into underlying bedrock and/or direct infiltration of precipitation on exposed bedrock surfaces. Upward seepage of water from bedrock also recharges surficial deposits in low-lying areas. Shallow groundwater flow in surficial deposits and weathered bedrock likely follows topography with discharge to surface water bodies (e.g., Hudson River). Due to the crystalline nature of the bedrock, groundwater flow in bedrock is restricted to joint and fracture systems that generally trend northeast-southwest (Olcott 1995). Based on the bedrock orientation, local bedrock groundwater flow is to the southwest, with local bedrock groundwater likely discharging to the marsh area southwest of the site.

Groundwater usage in the Hudson Highlands is largely limited to domestic wells along the periphery of the parklands. Maximum yields of wells completed in the crystalline rocks rarely exceed 70-gals per minute, and limited aquifer storage in crystalline rock makes such wells susceptible to decreased yields during dry periods unless they are in hydraulic connection with surface water (Heisig 2010).

1.6.8 Soil

Most of the land surface of Iona Island has been filled, built on at one point in time, and/or paved (USACE 1998). Native soil remaining at Iona Island is derived from glacial till and is shallow, acidic, and nutrient poor (Yozzo et al. 2005). The following soil mapping units were located on and immediately adjacent to Iona Island (Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture 2018).

- Chatfield-Rock outcrop complex; 4 to 16 percent slopes
- Hollis-Rock outcrop complex; 35 to 60 percent slopes
- Ipswich mucky peat; 0 to 2 percent slopes, very frequently flooded.

The Chatfield-Rock outcrop is the primary native soil at Iona Island and is classified as well-drained gravelly-sandy loam soil, 20 to 40 in. deep to the restrictive feature. Hollis-Rock outcrop, classified as somewhat excessively drained with 8 to 23 in. to the restrictive feature, is found in upland area west of Iona Island that divides Iona Marsh from Doodletown Bight. Ipswich mucky peat is found in Iona Marsh and is classified as very poorly drained, with more than 80 in. to the more restrictive feature, and up to 59 in. of muck and mucky peat (Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture 2018).

While soil at AOC #16 – Area D (Former Dump Area) is mapped as Chatfield-Rock outcrop complex, hydric soil is present in this area. Hydric soil is defined as soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. This terrestrial environment is separate from the remainder of Iona Island, which includes upland soil (not designated as poorly drained, very poorly drained, alluvial, or flood plain).

1.6.9 Sediment

In general, muddy sediments dominate the Hudson Highlands section of the Hudson River, where Iona Island is located, and there is a complicated pattern of dynamic and depositional environments between the non-depositional bedrock outcrops, which are found along the river margins (Nitsche et al. 2007). At Iona Island, the eastern shoreline of the Hudson River is a high energy environment while the western shoreline and tidal marsh area is a low energy/depositional environment. Sediments in the tidal marshes and shallows west of Iona Island consist of peat and silt and are more than 100 ft deep (U.S. Department of Commerce, NOAA and NYSDEC. 1982).

1.6.10 Ecological Habitats

The mainland of Iona Island and the elevated topography area southwest of Iona Island dividing Iona Marsh and Doodletown Bight is classified as terrestrial habitat ((**Figure 1-5**). The upland

terrestrial areas of the island consist of deciduous, rocky woodland communities including oaks (*Quercus* spp.), ashes (*Fraxinus* spp.), birches (*Betula* spp.), willows (*Salix* spp.), red maple (*Acer rubrum*), and elms (*Ulmus* spp.). Compaction of soil and site disturbance have resulted in a significant presence of invasive species (estimated at 60 percent of the vegetation on the island) including multiflora rose (*Rosa multiflora*), autumn olive (*Elaeagnus umbellate*), Norway maple (*Acer platanoides*), oriental bittersweet (*Celastrus orbiculatus*), and black swallow-wort (*Vincetoxicum nigrum*) (Yozzo et al. 2005).

The woodlands are maintained for their value as cover, perch sites, and buffer zones. Towards the center of the island, where historical buildings once stood, open grasslands and low-lying shrubs dominate the landscape. Resident wildlife species that occurs in the general vicinity of Iona Island include muskrat (*Ondatra zibethicus*), white-tailed deer (*Odocoileus virginianus*), box turtle (*Terrapene carolina*), northern water snake (*Nerodia sipedon*), timber rattlesnake (*Crotalus horridus*), red fox (*Vulpes vulpes*), rat snake (*Pantherophis* spp.), and green frog (*Rana clamitans*) (Yozzo et al. 2005). These species may or may not be present on the Iona Island.

The low-lying area that separates Iona Island and Round Island was filled in the early 20th century. A Navy dumping area is located along the Hudson River side of the islands (AOC #16 – Area D (Former Dump Area) (**Figure 1-2**). In addition, an area of fill on the western shoreline was placed by PIPC following Navy transfer of the FUDS in 1965. The low-lying area between Iona Island and Round Island classifies, according to US Fish & Wildlife Service Cowardin et al. (1979) wetlands classification system, as a Riverine system comprised of persistent emergent vegetation (*Phragmites australis* and cattails [*Typha angustifolia*]), tidally influenced, and regularly flooded by oligosaline waters (0.5-5 parts per thousand) (**Figure 1-8**). However, based on field observations, this area is dominated by persistent emergent vegetation such as *Phragmites* and cattails (*Typha angustifolia*) and not woody shrubs, making it a Palustrine persistent emergent tidal regularly flooded system. Hydric soil in this area is inundated/saturated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation, including cattail and common reed (*Phragmites australis*). There is also a small (0.35 acre) freshwater emergent wetland on the western side of the Island (palustrine, emergent, persistent, semi-permanently flooded) (USFWS 2018a).

The intertidal marsh (Iona Marsh) that encompasses approximately 225 acres between Iona Island and the western shore of the Hudson River is one of the largest, undeveloped tidal wetlands on the Hudson River (Yozzo et al. 2005). The National Wetlands Inventory (USFWS 2018a) classifies the marsh as an estuarine and marine wetland (E2EM1N6 – estuarine, intertidal, emergent, persistent, regularly flooded, oligohaline 0.5–5 parts per thousand salinity). Tidal mudflats submerged aquatic vegetation beds, and small areas of rocky uplands also occur in the area. In Doodletown Bight, the northern portion of Iona Island Marsh, mudflats are visible at low tide (Yozzo et al. 2005).

Vegetation within Iona Marsh is dominated by narrow leaf cattail (*Typha angustifolia*) with common reed (*Phragmites australis*) and swamp rose mallow (*Hibiscus moscheutos*). Crack willow (*Salix fragilis*) is present at the mouth of Doodletown Brook within the tidal swamp. Compaction of soil and site disturbance have resulted in a significant presence of invasive

species (estimated at 60 percent of the vegetation on the Island). Recent wetland restoration has been conducted in Iona Island Marsh west of the Island, with approximately 50 percent of the marsh restored from invasive species (including *Phragmites australis*) to native vegetation such as narrow-leaf cattail (Bluestone 2018).

Iona Island Marsh is especially important for marsh-nesting birds. Probable or confirmed breeding species include herons, least bittern (*Ixobrychus exilis*), Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), wood duck (*Aix sponsa*), Virginia rail (*Rallus limicola*), belted kingfisher (*Ceryle alcyon*), marsh wren (*Cistothorus palustris*), and red-winged blackbird (*Agelaius phoeniceus*). Large concentrations of herons, waterfowl and shorebirds occur during spring and fall migrations (March–April and September–November, respectively). The Island is considered a bald eagle sanctuary (Levine 2011).

The Hudson River is classified as estuarine and marine deep water (estuarine, subtidal, unconsolidated bottom, subtidal, oligohaline 0.5–5 parts per thousand salinity) (USFWS 2018a). Benthic macroinvertebrates such as snails and amphipods are common among the rocks and boulders along the Hudson River shoreline. Migratory birds including osprey (*Pandion haliaetus*) and bald eagles (*Haliaeetus leucocephalus*) are found along the Hudson River shoreline of Iona Island. Here they hunt for the more than 200 species of fish that populate the Hudson River, which serves as a nursery ground for important species such as sturgeon, striped bass, and American shad (Levine 2011).

1.6.11 Threatened and Endangered Species

Under the Endangered Species Act of 1973 (ESA), threatened species are species that may become endangered if conditions surrounding the species begin, or continue, to deteriorate. Endangered species are species whose prospects for survival in an area are assumed to be in immediate danger because of a loss or change in habitat, over-exploitation, predation, competition, or disease. In addition to threatened and endangered species, the state of New York also identifies species of special concern as any species that does not meet the criteria of an endangered or threatened species but is particularly vulnerable and could easily become an endangered, threatened, or extirpated species. Special concern species are established by policy, not by regulation, and are used for planning and informational purposes; they do not have the legal weight of endangered and threatened species. There are several protected species that may occur at the site and these species and their status are provided in **Table 1-6.** Additionally, there are 10 migratory birds of conservation concern known to use the Island as habitat.

Atlantic sturgeon (*Acipenser oxyrhynchus*) and shortnose sturgeon (*Acipenser brevirostrum*) are classified as Endangered by National Marine Fisheries Service and are protected in the State of New York (NOAA 2023a; NYSDEC 2019). These species of sturgeon live primarily in the ocean but migrate to coastal rivers for spawning. In New York, spawning and nursery grounds for juveniles are located in the Lower Hudson River, such as near Iona Island (Edinger et al. 2014). As adults, they will spend time at the fresh water/salt-water interface, which fluctuates near Iona Island. Sturgeon are known to shelter in deep holes (i.e., deep Hudson River channel),

and in their adult and juvenile life stages foraging occurs in mucky substrate for crustaceans, worms, and mollusks (NOAA 2023b). Suitable foraging habitat would be expected in the estuaries surrounding Iona Island.

1.6.12 Land Use and Demography

Iona Island Marsh was designated a National Natural Landmark in 1974 by the National Park Service. Iona Island is currently under the administration of the PIPC and maintained by staff of Bear Mountain State Park. Public use of the island is limited to educational outings and history tours. Site access is limited to authorized employees of Bear Mountain State Park who use a few of the remaining buildings for storage, to researchers who work in the marsh areas, and to guided tour groups six to eight times per year between May and October. The island is partially fenced, and the main gate is unmanned, which allows for limited access to Iona Island from Bear Mountain State Park. Boating along the Hudson River is open to the public, and because the shoreline of Iona Island is not fenced, there is potential for recreational users of the Hudson River to access the island via the shoreline. Additionally, the island has been historically used for camping. The Boy Scouts have previously used the Site for activities.

In 1965, when GSA conveyed the property to the PIPC, it was under a "restrictive clause" (park purposes only) (USACE 1995). The majority of Iona Island is currently open space. There is a parking lot and scenic overlook located directly west of Iona Island. While PIPC developed plans for construction of a recreational park and while some stormwater sewers were partially installed, these plans were not fully executed. In addition, although a developer has proposed plans for constructing an environmental center/nature center, these plans have not been approved. There are no current plans to develop the island for recreational purposes and no anticipated future use of the site other than its current use as a conservation area. There are no anticipated construction plans other than the possibility of converting existing buildings for use or constructing a new storehouse.

Subsurface utilities information at the Iona Island Naval Ammunition Depot FUDS is not available. Previous investigation documents including the ASR (USACE 1997) and HPA (USAGC 2018) did not include information on utilities, piping, building sumps, wash-out areas, or wastewater retention ponds. Two potential sewer discharge pipes were identified in historical installation layout maps from 1934 and 1947 (USAGC 2018). One 10-in. diameter discharge pipe reportedly extended offshore into the Hudson River in the area between Iona Island and Round Island. A second discharge pipe identified as an outfall sewer on trestle reportedly extended off the shoreline in the area southeast of Building 201.

A description of Iona Island from 1937 presented in the ASR (USACE 1997) states that a fresh water supply consisted of a rainwater collection system into two reservoirs of 2,000,000-gal capacity connected by equalizer pipe, which was pumped and stored in two steel tanks with a combined capacity of 4,200,000 gals. The Iona Island War Diary from 1945 presented in the ASR states that on 10 December a new water supply system involving a pipeline to Doodletown was placed in partial use pending completion of some final pump house piping. This system had

sufficient capacity to furnish this Depot with its entire freshwater requirements under normal operating conditions (USACE 1997).

Shallow overburden groundwater at Iona Island is not used as a potable or non-potable water source. Bedrock groundwater and surface water at Iona Island are not used as a potable water source. In the 1990s, the water supply line that supplied Iona Island broke (near NYS Route 9W) on the causeway. Bear Mountain State Park did not repair the waterline break and a bedrock well was installed (March 1997) behind the existing storehouse (Building 222). During well installation, bedrock fracking was used to get the well to yield water. Per Charlie Tonneson, Bear Mountain Park Engineering Department, this new well is not treated and is used for non-potable purposes only (bottled water is brought on Iona Island for drinking purposes).

Land use surrounding Iona Island is recreational and military, with Bear Mountain State Park along the western shore of the Hudson River and Camp Smith Military Reservation along the eastern shore. The site is also surrounded by the Iona Island/Doodletown Bird Conservation Area (NYSDEC 2017). For the portions of the adjacent Bear Mountain State Park that are open to the public, recreational opportunities include hiking, boating, and bird watching. There is no public canoeing or kayaking allowed in the marshes surrounding Iona Island. Access to the marsh is limited to guided canoe and kayak trips.

Iona Island is part of the much larger Hudson River National Estuarine Research Reserve and Significant Coastal Fish and Wildlife Habitat Area, managed under New York's Coastal Management Program. In addition, the Iona Island Marsh became a registered National Natural Landmark in 1974.

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2. CONCEPTUAL SITE MODEL

As defined in EM 200-1-12 – *CSMs*, a CSM describes sources of contamination, as well as complete, potentially complete, or incomplete exposure pathways; current, determined, or reasonably anticipated future use of property; and potential receptors (USACE 2012b). The CSM is used as a planning tool to integrate information from a variety of resources, to evaluate the information with respect to project objectives and data needs, and to evolve through an iterative process of further data collection or action.

The CSM is broken out into three sections: Potential Sources, Interactions, and Receptors with complete, potentially complete, and incomplete exposure pathways identified for each receptor. Each section is discussed below.

- **Potential Sources**—Sources are those areas and/or media where contaminants related to former DoD activities entered (or may have entered) the environment.

- **Interactions**—Interactions encompass release mechanisms, transport, and exposure pathways. Interactions describe ways that receptors come into contact with contaminants related to former DoD activities. This can include physical transportation of the contaminants and transfer from one media to another through various processes such that media other than the source area can become contaminated. Interactions also include exposure routes (such as ingestion, inhalation, and dermal contact) for each receptor.

- **Receptors**—A receptor is an organism (human or ecological) that is able to make contact with contaminants related to former DoD activities. The pathway evaluation must consider both current and reasonably anticipated future land use, as receptors are determined on that basis. Human receptor subcategories include current and/or future site workers, construction workers, contractors, visitors/recreational users, and trespassers. Ecological receptors include biota such as nesting and migratory birds, mammals, reptiles, amphibians, fish, invertebrates, and plants.

In general, an exposure pathway consists of the following components:

- Source and mechanism of chemical release to the environment (e.g., spill)

- Environmental transport medium (e.g., surface soil)

- Point of contact with the contaminated medium (exposure point)

- Exposure route at the exposure point (e.g., dermal contact with surface soil).

If all four components are present (or potentially present), the pathway is considered complete (or potentially complete). Each pathway defines a unique mechanism by which potential

receptors are directly or indirectly exposed to contaminants. The following definitions are used to identify exposure pathways:

- ***Complete Pathway***—There are confirmed exceedances of screening criteria and background concentrations, and there is confirmed receptor and media interaction (i.e., a source, migration route, and receptor must be identified). Exposure is evaluated quantitatively.

- ***Potentially Complete Pathway***— Under current site conditions, there is confirmed receptor and media interaction that may be anticipated in the future; however, the exposure, either due to the type of receptor or the nature of the source, may be limited or has not been confirmed. Exposure is evaluated quantitatively. The potentially complete pathway arises in the following instances:

  — There are confirmed exceedances of screening criteria and background concentrations, but the receptor may not significantly interact with the media.

  — No data were collected for the specific media; however, there are confirmed exceedances of screening criteria and background concentrations in neighboring media (e.g., no surface water or sediment samples were collected; however, there was an exceedance of screening criteria and background concentrations in soil).

- ***Incomplete Pathway***—There is no receptor and media interaction or there are no exceedances of screening criteria or background concentrations.

The preliminary CSM for the Naval Ammunition Depot Iona Island FUDS was developed during the MMRP SI and updated during the planning phases of the HTRW RI based on site-specific data and historical information including literature reviews, aerial photographs, maps, training manuals, technical manuals, and field observations.

2.1 HTRW SOURCE AREAS

Source areas at the Iona Island FUDS include the 19 AOCs identified as being eligible for further inclusion in the HTRW project and the 7 former explosive storage and filling operations buildings where filling or possible spilling of explosive-containing materials could have occurred. The 19 AOCs were identified in previous investigations and include the locations/footprints of 16 former buildings, 4 former ASTs, a former dump area, 2 former coal storage areas, and 3 former transformers where contaminants related to the facilities or from historic processes during the site's commission as an ammunition depot may be present (**Table 1-1 and Figure 1-2**). The 7 former explosive storage and filling operations buildings were identified in 2020 during development of the UFP-QAPP (EA 2020a) as having potential for exposure risk from remaining explosives residues in environmental media to human and ecological receptors (**Table 1-2**).

2.2 PRELIMINARY CONTAMINANTS OF POTENTIAL CONCERN

This HTRW RI was conducted in accordance with the CERCLA process, and relies on applicable federal requirements, regulations, and guidance documents. Therefore, previous discrete analytical sample data (Section 1.5) were evaluated during development of the UFP-QAPP (EA 2020a) to identify analytes in soil and sediment with concentrations above EPA screening criteria and background concentrations (**Tables 1-3 to 1-5**). The following screening criteria were used to evaluate previous analytical data:

- EPA Industrial and Residential Soil Regional Screening Levels (RSLs) with hazard quotients (HQ) adjusted from 1 to 0.1 (updated May 2019) (EPA 2019). A restrictive clause is in place for the island stating that it shall only be used for park purposes; therefore, residential development is unlikely to occur at the Site (USACE 1995). However, EPA Residential Soil RSLs were included to assess exposure to potential child receptors at Iona Island, including site visitors during nature walks and potential campers.

- EPA Region 4 Ecological Soil Screening Levels (EcoSSLs) (February 2005 through April 2008), as presented in the EPA Region 4 ERA Supplemental Guidance, Scientific Support Section Superfund Division EPA Region 4, March 2018 (EPA 2018).

- EPA Region 4 Marine/Estuarine Sediment Screening Benchmarks (EPA 2018).

Preliminary contaminants of potential concern (COPCs) were identified for each source area (19 AOCs and 7 former explosive storage and filling operations buildings) during development of the UFP-QAPP (EA 2020a) based on a review of historical use of each source area, the evaluation of previous discrete analytical sample data against EPA screening criteria and background concentrations, and further evaluation of potential contaminant presence in the environment (**Table 1-1**). A comprehensive list of preliminary COPCs identified for this HTRW RI during UFP-QAPP development (EA 2020a) included TAL metals, PAHs, BTEX, PCBs, and explosives residues. **Table 1-1** provides a summary of preliminary COPCs for each of the 19 AOCs. Explosives residues were considered the preliminary COPCs for the 7 former explosive storage and filling operations buildings.

2.3 RELEASE MECHANISMS

Release mechanisms include those physical processes that contribute to the introduction and distribution of a contaminant in the environment.

The primary release mechanisms for site contaminants from former buildings/structures at the Iona Island FUDS during operational use included spills, direct releases to the ground, and improper disposal including dumping. These primary release mechanisms may have resulted in contamination of soil at and/or beneath former buildings/structures.

Contaminants in surface and shallow subsurface soil may have been transported to a range of exposure media (including air, subsurface soil, groundwater, surface water, and sediment) through secondary and tertiary release mechanisms. Secondary release mechanisms from surface and shallow subsurface soil to other media include the following:

- Surface and subsurface soil removal/reworking
- Leaching and infiltration from surface soil into the subsurface via gravity and/or percolation of precipitation/surface water
- Overland runoff and erosion to the shoreline
- Volatilization and/or wind erosion.

The majority of buildings and structures, including building foundations, were demolished and removed by PIPC between November 1965 and December 1973, and imported fill may have been placed over much of the former operational areas (USAGC 2018). Contaminants in surface and subsurface soil were likely mobilized beyond the footprint of the AOCs during demolition of former buildings/structures and reworking of surface and subsurface soil.

Potential contaminants may have leached/infiltrated from surface soil into the subsurface through gravity and/or percolation of precipitation/surface water, thus migrating to the subsurface soil and groundwater. Leaching/infiltration may be ongoing if a soil source is present at Iona Island, particularly at AOC #16 - Area D (Former Dump Area). In addition, contaminants may have been transported along the surface via overland runoff and erosion and ultimately deposited in shoreline sediments; these release mechanisms may be historically significant but are unlikely to contribute to current exposure pathways due to the vegetated nature of the soil.

Volatilization and/or wind erosion was potentially historically significant but are unlikely to contribute to current exposure pathways due to the time since release, chemical properties of the contaminants including volatility of some of the VOCs, and the significant amount of vegetative cover present throughout the site.

Tertiary release mechanisms from contaminated secondary media may include the following:

- Discharge from groundwater to sediment and surface water
- Infiltration from subsurface soil and shallow groundwater to deeper bedrock groundwater. Uptake of contaminants from abiotic media (e.g., soil, sediment, and surface water) into prey tissue that is consumed by wildlife.

2.4 FATE AND TRANSPORT PATHWAYS

Contaminants released through deposition may have remained in surface soil by adsorbing to soil particles. When released to the environment, contaminants such as some metals and PAHs tend to sorb to soil, sediment, and other organic materials. Reworking of surface and subsurface soil during demolition was likely a major pathway for contaminants that may have been bound to soil particles, such as metals and PAHs, to be widely dispersed across the former operational area. In addition, demolition and regrading potentially released and mixed lead-based paint particles into the soil. While metals may generally sorb/bond to soils, very fine paint chips/particles would result in a more sporadic hit-or-miss distribution of contamination.

The types of contaminants previously detected or potentially present in site soils would be bound to soil particles but could be released in the liquid phase in response to changes in the chemical environment of the soil solution. Desorption would be dependent on the solubility of the individual chemical and the properties of the soil. Natural processes such as adsorption, ion exchange, complexation, and precipitation can cause constituents to become immobilized.

Contaminants in soil could also migrate via advective transport (bulk movement) or desorption (leaching) with the flow of surface water or groundwater toward the adjacent marshes and the Hudson River. Contaminants with high solubility in the upland area may be mobilized during precipitation events. If upland soils have lower organic carbon, some contaminants could leach from that soil, and flow towards the river and sediment that may have higher organic carbon to which the contaminant can adsorb. In addition, contaminants with high solubility at AOC #16 – Area D (Former Dump Area) within the low-lying marsh area between Iona Island and Round Island may be mobilized during tidal and storm water inundation. Once mobilized, contaminants could be transported to the shoreline via advective transport (bulk movement) or as particulate complexes. However, vegetation, particularly the *Phragmites australis* root system within the low-lying marsh area between Iona Island and Round Island, would limit advective transport of soil and contaminants.

Once released into the liquid phase, a contaminant can move freely to a living organism. Some toxic forms of metals (e.g., lead) accumulate in plants, while others (e.g., mercury) accumulate in animal tissue. Contaminants that are bioaccumulated in plants or animals become available to the higher organisms that feed on them. The fate and behavior of contaminants in soil and sediment are determined by retention/release processes, which regulate the concentration of metals in the soil solution and thus their bioavailability. Physical properties, such as pH, texture, ion exchange capacity, soil organic matter content, and porosity influence bioavailability.

2.5 HUMAN HEALTH EXPOSURE

Iona Island is part of the Hudson River National Estuarine Research Reserve and is under the administration of PIPC. The majority of the Island is open space. Bear Mountain State Park employees are present on the island and access buildings used as storage areas at the property. Additionally, researchers are also present on the island and working in the marshes.

Iona Island is currently used by a limited number of recreational canoers who must obtain a permit for access. The site recreational use is limited to educational outings and history tours (6-8 times per year with approximately 50 people). Additionally, the island has been historically used for camping. The Boy Scouts have previously used the Site for activities.

Currently, there are no barriers to restrict access to the shoreline of the Island and trespassers are a possibility. In addition, because the shoreline is not fenced, there is a potential for kayakers or other boaters to visit the site along the shoreline from the Hudson River.

The future use of Iona Island is anticipated to remain consistent with current use and will continue to be maintained by park employees and be used as an area for research. Hypothetical future plans for Iona Island may include recreational use and construction of a nature or retreat center; however, these plans are not currently approved. Communication with the Director of Development and Special Projects at PIPC indicates that construction or redevelopment is unlikely at the site for the foreseeable future; however, it is possible that existing structures could be renovated or improved. Potential future work could involve repair to existing foundations.

In the 1990s, the water supply line that supplied Iona Island broke (near NYS Route 9W) on the causeway. Bear Mountain State Park did not repair the waterline break and a bedrock well was installed (March 1997) behind the existing storehouse (Building 222). According to the Bear Mountain Park Engineering Department, this new well is not treated and is used for non-potable purposes only (bottled water is brought on Iona Island for drinking purposes). The well is under pressure to obtain water due to low water yields. As a result, groundwater is not used as a potable water source on Iona Island; therefore, there is no potential exposure to contaminants in groundwater used as drinking water for current users. In addition, in 1965, when GSA conveyed the property to the PIPC, it was under a "restrictive clause" (park purposes only) (USACE 1995). Therefore, Iona Island will not be developed for commercial or residential use in the future, and there is no potential exposure to contaminants in groundwater used as drinking water for future users.

Based upon the current use and reasonably anticipated future use of the Iona Island, the following potential human receptors were identified for onsite media:

- Current and future Bear Mountain State Park employees (park personnel)
- Future construction workers
- Current and future researchers
- Current and future recreational User
- Current and future trespassers
- Current and future Boy Scouts/campers.

The sections below identify the major routes of exposure and their applicability to each of the identified receptors.

2.5.1 Park Personnel

The park personnel are assumed to be adults who work for the PIPC. Park personnel may perform maintenance activities such as grass mowing, site inspections, and general maintenance of the buildings. The park personnel are not expected to dig or perform other excavation activities. Therefore, contact is limited to surface soil. These workers may also perform maintenance or similar activities within Iona Marsh and along the Hudson River shoreline. Therefore, there is a potential for contact to sediment within these areas. The following exposure pathways are considered complete or potentially complete for the park personnel:

- Incidental ingestion of surface soil, sediment, and/or surface water
- Dermal contact with surface soil, sediment, and/or surface water
- Inhalation of windblown particulates from surface soil.

The particulate pathway assumes contaminants are attached to soil particles and become airborne through wind action. Due to the moisture content of sediment, particulates in sediment are not expected to become airborne.

2.5.2 Researcher

Researchers are assumed to be adults working at the site on a limited or part-time basis. They are not full-time employees with PIPC. The researcher is assumed to work or plant within AOC #16 – Area D (Former Dump Area) and Iona Marsh, so contact with soil within AOC #16 – Area D (Former Dump Area) and sediment within the marsh areas is expected. Sediment within the marsh is assumed as a contact similar to soil. Plantings within the marsh are assumed within the top 6 inches of soil, which is considered to be within surface soil. The researchers are not expected to dig or perform other subsurface activities. Therefore, contact is limited to surface soil. The following exposure pathways are considered complete or potentially complete for the researcher:

- Incidental ingestion of surface soil
- Dermal contact with surface soil
- Inhalation of windblown particulates from surface soil.

The particulate pathway assumes contaminants are attached to soil particles and become airborne through wind action.

2.5.3 Construction Worker

Construction workers are assumed to be adults working at the site during short-term construction projects (i.e., 1 year or less). They are expected to dig and perform other subsurface activities, including installation of utilities. Therefore, contact to both surface soil and subsurface soil is expected. Because the construction worker performs excavation activities, they may contact perched groundwater. These workers are not expected to contact sediment within the marsh area/wetlands. The following exposure pathways are considered complete or potentially complete for the construction worker:

- Incidental ingestion of surface and subsurface soil and perched groundwater
- Dermal contact with surface and subsurface soil and groundwater
- Inhalation of windblown particulates from surface and subsurface soil
- Inhalation of VOCs (if present) in the air of a trench.

2.5.4 Recreational Users

The recreational user represents a multiple age-range family that may visit the site from canoeing or access from the State Park. The adult recreational user is assumed to be over 18 years of age. The adolescent recreational user is assumed from 6 to 16 years. The child recreational user is assumed from 2 to 6 years. Recreational users younger than 2 years of age are not anticipated due to site access and site conditions that are not conducive to playgrounds or other play areas. The recreational user is representative of other low frequency receptors that may visit the site during tours or other group events. Risk results for the recreational user are protective of other low frequency visitors. The recreational user is not expected to dig or perform other subsurface activities; therefore, contact is limited to surface soil. Additionally, recreational users may contact sediment and surface water within the marsh area/wetlands or along the Hudson River shoreline. The following exposure pathways are considered complete or potentially complete for the recreational user:

- Incidental ingestion of surface soil, sediment, and surface water
- Dermal contact with surface soil, sediment, and surface water
- Inhalation of windblown particulates from surface soil.

The particulate pathway assumes contaminants are attached to soil particles and become airborne through wind action. Due to the moisture content of sediment, particulates in sediment are not expected to become airborne.

2.5.5 Trespasser

The trespasser represents a receptor who may visit the site while boating along the eastern shoreline (Hudson River) or western shoreline or hiking in the state park. A trespasser is not expected to dig or perform other subsurface activities. The following exposure pathways are considered complete or potentially complete for the trespasser:

- Incidental ingestion of soil, sediment, and/or surface water
- Dermal contact with soil, sediment, and/or surface water
- Inhalation of windblown particulates from soil.

The particulate pathway assumes contaminants are attached to soil particles and become airborne through wind action. Due to the moisture content of sediment, particulates in sediment are not expected to become airborne.

2.5.6 Boy Scout/Camper

The Boy Scouts are assumed at an age from 5 to 18 years who would visit the site to camp and may perform other activities, such as planting or clean-up. The Boy Scout may contact surface soil, subsurface soil, and sediment within the marshes/wetlands. While the Boy Scout/camper may contact subsurface soil, they are not assumed to have significant contact with shallow groundwater. Any subsurface contact is expected to be from digging and is likely limited to soil. Any digging is not expected to produce large holes or trenches, which is likely expected with a construction worker, which would allow for groundwater to accumulate. The following exposure pathways are considered complete or potentially complete for the Boy Scout/camper:

- Incidental ingestion of soil, sediment, and/or surface water
- Dermal contact with soil and sediment, and/or surface water
- Inhalation of windblown particulates from soil.

The particulate pathway assumes contaminants are attached to soil particles and become airborne through wind action. Due to the moisture content of sediment, particulates are not expected to become airborne.

2.6 ECOLOGICAL EXPOSURE

The sections below present the terrestrial and aquatic receptors identified for inclusion in the CSM and major routes of exposure and their applicability to each of the identified receptor groups.

2.6.1 Terrestrial Receptors.

Terrestrial plants, invertebrates, birds, mammals, and herptiles are the primary ecological receptor categories that could be exposed to contaminants in soil. Potential terrestrial receptors are based on feeding guilds. Representative categories include the following:

- Terrestrial plant community
- Terrestrial invertebrate community, as represented by earthworms (*Lumbricus terrestris*)
- Populations of herbivorous mammals (feeding on plants), as represented by meadow vole (*Microtus pennsylvanicus*)
- Populations of insectivorous mammals (feeding on insects, worms, and other invertebrates), as represented by short-tailed shrew (*Blarina brevicauda*)
- Populations of insectivorous birds (feeding on insects, worms, and other invertebrates), as represented by American robin (*Turdus migratorius*)
- Populations of predatory (carnivorous) mammals (feeding on other animals), as represented by red fox (*Vulpes vulpes*)
- Populations of predatory (carnivorous) birds (feeding on other animals), as represented by red-tailed hawk (*Buteo jamaicensis*)
- Populations of herptiles (i.e., amphibians and reptiles).

2.6.2 Terrestrial Exposure Pathways

Plants may absorb constituents from surface and subsurface soil via roots. They may also absorb constituents from air or airborne particles through the stomata in leaves, although the waxy surfaces of leaves may limit this exposure. Soil invertebrates may ingest constituents in soil and also may be exposed to constituents in soil through direct contact. Some plant roots may exist in deeper soil layers and invertebrates such as earthworms have the potential to burrow deeper into the soil. Therefore, exposure pathways linking plants and soil invertebrates to surface and subsurface soil are complete and relevant for assessment. As part of the base of the food web, plants and invertebrates also provide food/prey items for foraging by upper-trophic level wildlife (e.g., birds and mammals).

The major exposure route for wildlife (i.e., birds, mammals, and herptiles) is ingestion of constituents in contaminated media (EPA 2007a). The surface water ingestion pathway is a complete but not significant exposure pathway as constituents tend to bind to suspended sediments and settle out of the water column. Surface water ingestion is not likely to be a risk driving exposure route. Wildlife may ingest constituents by incidentally ingesting soil while

grooming or foraging. Some constituents may bioaccumulate in animal tissues. Therefore, wildlife may also ingest constituents through the prey items that they consume as food. Ingestion of constituents in soil and/or food are considered complete exposure pathways for wildlife.

Wildlife may be exposed to constituents in air, surface water, or soil via direct contact during foraging. Birds and mammals have protective outer coverings (feathers and fur) that prevent or limit the dermal absorption of constituents from environmental media (EPA 2007a, U.S. Army Center for Health Promotion and Preventative Medicine [USACHPPM] 2004). EPA guidance identifies that, in most cases, dermal exposures are likely to be less significant than exposures through ingestion, and their evaluation involves considerable uncertainty (EPA 2007a, USACHPPM 2004). Therefore, the dermal exposure route is considered complete but not significant for birds and mammals and therefore is not quantitatively evaluated in the ERA. Since herptiles may be more sensitive to dermal exposure (Weir et al. 2010), the dermal exposure route is considered a complete exposure pathway for herptiles.

Some mammals burrow into the soil to create dens and burrows which serve, not only as a home for these species, but also benefit the environment by aerating the soil. As a result, these mammals may be exposed to and incidentally ingest both surface and subsurface soil. Foxes have been observed on the island and likely burrow in dens, which were observed during a site visit in October 2018. As such, mammals are assumed to burrow and be exposed to both surface and subsurface soil.

Inhalation is a complete pathway for wildlife that may inhale constituents that have volatilized or that are adsorbed to airborne particulates. EPA guidance indicates that, in general, the inhalation pathway is complete but not significant compared to ingestion pathways (EPA 2007a) and therefore is not quantitatively evaluated in the ERA.

In summary, the following terrestrial exposure pathways are complete and quantitatively evaluated in the ERA:

- Direct contact to constituents in soil for plants
- Ingestion and direct contact to constituents in soil for soil invertebrates and herptiles
- Ingestion of constituents in soil and food for wildlife (birds, mammals, and herptiles).

2.6.3 Aquatic Receptors

Aquatic organisms such as plants, aquatic life, benthic invertebrates, herptiles, and aquatic-feeding mammals and birds are the primary ecological receptors that could be exposed to contaminants in sediment and surface water. Potential aquatic receptors are based on feeding guilds and availability of wildlife exposure models. Representative categories include the following:

- Aquatic plant community
- Benthic invertebrate community
- Aquatic life (zooplankton, demersal fish, and large pelagic fish)
- Populations of herbivorous mammals (feeding on aquatic plants), as represented by muskrat (*Ondatra zibethicus*)
- Populations of herbivorous birds (feeding on aquatic plants), as represented by mallard duck (*Anas platyrhynchos*)
- Populations of insectivorous birds (feeding on benthic invertebrates), as represented by lesser scaup (*Aythya affinis*)
- Populations of piscivorous mammals (feeding on fish), as represented by river otter (*Lontra canadensis*)
- Populations of piscivorous birds (feeding on fish), as represented by great blue heron (*Ardea herodias*)
- Populations of herptiles (i.e., amphibians and reptiles).

2.6.4 Aquatic Exposure Pathways

Sediments are ingested by benthic invertebrates, demersal (bottom-feeding) fish, pelagic fish (within the water column) and incidentally by wildlife (i.e., bird, mammals, and herptiles) that feed in the aquatic environment. These receptors are also directly exposed to the sediment. Pelagic fish exposure to sediment is complete but not significant compared to exposure captured by demersal fish exposure to sediment and this exposure pathway is not quantitatively evaluated. EPA guidance indicates that dermal exposures from direct contact are likely to be less significant than exposures through ingestion for birds and mammals due to protective outer coverings (EPA 2007a, USACHPPM 2004). Therefore, the sediment dermal exposure route is considered complete but not significant for birds and mammals. Since herptiles may be more sensitive to dermal exposure (Weir et al. 2010), the dermal exposure route is considered a complete exposure pathway for herptiles.

Food web models are typically not conducted for benthic invertebrates as exposure parameters are not readily available in EPA's Wildlife Exposure Factors Handbook (1993) or for fish due to the lack of site fidelity (see Section 2.1.6.2 of the ERA in **Appendix H** for more information). Sediment quality criteria are expected to be protective of benthic invertebrates and fish via all exposure routes.

Aquatic and wetland plants have root systems that are also directly exposed to sediment. Areas with dense *Phragmites* root mats will limit wildlife exposure to sediment. Desorption of constituents from sediment to the water column can occur, impacting water column invertebrates (i.e., zooplankton) and pelagic (predacious) fish.

Demersal and pelagic fish as well as aquatic-feeding wildlife (e.g., birds, mammals, and herptiles) may ingest constituents through the prey items that they consume as food. For instance, insectivorous birds and demersal fish consume benthic invertebrates; herbivorous birds and mammals consume wetland aquatic plants; pelagic fish, large piscivorous mammals (e.g., river otter), and birds (e.g., bald eagle and heron) consume fish; and herptiles may consume any of the aquatic biota items. Ingestion of constituents in sediment and aquatic biota are considered complete exposure pathways for aquatic wildlife and are evaluated quantitatively in the food web models.

Ingestion of aquatic biota is considered complete for fish, but this pathway is not evaluated quantitatively in the food web models due to fish being transient in nature. Moreover, modeling exposures and ultimate associations with toxicity for aquatic receptors is limited. For example, US EPA's Aquatox model is available but is limited to organic contaminants and is therefore not applicable for sites impacted by heavy metals such as Iona Island and the Hudson River. Additionally, another model available for quantifying exposure/toxicity to aquatic receptors is US EPA's Web-ICE; however, this is limited to acute exposure scenarios as outputs focus on acute endpoints (i.e. mortality), thus the application of such a model for legacy impacted sediments will not yield applicable information for an exposure characterization of persistent contaminants from sediments, such as the case for Iona Island sediment at the Hudson River littoral zone. Finally, in the context of contaminant exposures, food web models are unlikely the most representative exposure route as fish are predominantly exposed at the gill-water interface (Evans 1987). Ingestion of aquatic biota is considered a complete but not significant exposure pathway for demersal and pelagic fish. For more information on how exposure is evaluated for aquatic receptors by taxa see Section 2.1.6.2 of the ERA in **Appendix H** for more information.

Ingestion and direct contact with surface water is a complete pathway for each of the aquatic receptors (aquatic plants [direct contact only], benthic invertebrates, zooplankton, demersal fish, pelagic fish, and wildlife [birds, mammals, and herptiles]). The surface water ingestion pathway is a complete but not significant exposure pathway for wildlife as constituents tend to bind to suspended sediments and settle out of the water column. Surface water ingestion is not likely to be a risk driving exposure route. Benthic invertebrate and aquatic plant exposure to surface water is complete but not significant compared to exposure to sediment. Surface water quality criteria are expected to be protective of benthic invertebrates, fish, and aquatic plants via all exposure routes.

As discussed above, EPA guidance indicates that dermal exposures from direct contact are likely to be less significant than exposures through ingestion for wildlife (birds and mammals) due to protective outer coverings (EPA 2007a, USACHPPM 2004). The direct contact exposure pathway for surface water was considered complete but not significant and was not quantitatively evaluated for birds and mammals. Since herptiles may be more sensitive to dermal

exposure (Weir et al. 2010), the dermal exposure route is considered a complete exposure pathway for herptiles.

In summary, the following aquatic exposure pathways are considered complete and quantitatively evaluated in the ERA:

- Direct contact to sediment for aquatic plants
- Ingestion and direct contact to sediment for benthic invertebrates
- Ingestion and direct contact to sediment and surface water for demersal fish and herptiles
- Ingestion and direct contact to surface water for zooplankton and pelagic fish
- Ingestion of constituents in sediment and food for aquatic wildlife (birds, mammals, and herptiles).

3. HTRW RI ACTIVITIES

This HTRW RI was conducted to characterize the nature and extent of impacts to environmental media associated with 19 AOCs identified as being eligible for further investigation under the FUDS HTRW project, and to assess potential exposure pathways and risk to human receptors and/or ecological receptors. HTRW RI field activities were conducted in accordance with the UFP-QAPP (EA 2020a), the UFP-QAPP Addendum (EA 2022b), and the Accident Prevention Plan (EA 2019a). These documents present the plans for conducting work at the site in a safe manner and in a way that allowed the generation of data that meet project data quality objectives (DQOs).

A two-phased approach (Phase I and Phase II) was employed during the HTRW RI to facilitate data collection, evaluation, and discussion. Each phase included field investigation activities with collection of samples for onsite field screening and offsite laboratory analysis, data validation, evaluation of data usability, data analysis, and evaluation of potential impacts to human health and ecological receptors. Phase I and Phase II field activities are detailed under Sections 3.1 and 3.3 below.

3.1 PHASE I FIELD ACTIVITIES

Phase I was conducted to evaluate the presence/absence and/or nature and extent of hazardous substances in onsite soil within the FUDS boundary, evaluate the source-pathway-receptor interaction, and evaluate the subsequent risk to terrestrial receptors. The Phase I investigation, including investigation areas, media to be sampled, sampling locations, and analytes to be sampled, was designed in 2018-2020 based on the history of former buildings/structures and results of previous investigations, which have been ongoing at Iona Island since 1992. A UFP-QAPP was prepared to implement the HTRW RI, including specific procedures for execution of the technical field sampling, laboratory analytical procedures, quality assurance (QA), quality control (QC), and the assessment of oversight planning that will help ensure the quality of the investigation (EA 2020a).

Phase I field investigation and data analysis activities were conducted in 2020-2021 in accordance with the UFP-QAPP (EA 2020a). Field activities consisted of onsite and background soil sampling and a shoreline reconnaissance along Iona Island. Specific goals for Phase I included the following:

- Characterize contaminant concentrations in surface soil (from 0 to 6 in. bgs) and shallow subsurface soil (from 6 to 36 in. bgs or refusal) associated with the former buildings/ structures evaluated under the HTRW RI, including TAL metals; PAHs; BTEX, PCBs, and/or explosives residues

- Establish regional background metals and PAH concentration ranges in soil

- Evaluate whether contaminants concentrations in onsite soil related to historical DoD activities present a potential risk to human health and/or terrestrial ecological receptors

- Evaluate the source-pathway-receptor interaction, including identifying potential areas of sediment accumulation that could be suitable for sampling along the shoreline; identifying potential pathways that lead to the shoreline environment (i.e., channels, drainage ditches, culverts, sewage outfalls/discharge pipes, etc.); evaluating whether there are barriers to overland transport from Iona Island to the shoreline (e.g., the railroad); and conducting a receptor and resource inventory evaluation

- Evaluate the physical characteristics (total organic carbon [TOC] and grain size) of shoreline sediment and evaluate the potential for sediment to accumulate contaminants. Sediment consisting of fine-grained particles and high organic matter (i.e., high TOC) are more likely to present a "sink" for historical contaminants and serve as a source of exposure to organisms, as opposed to coarser-grained particles (e.g., sand and gravel) with low TOC that are less likely to accumulate historical contaminants.

Phase I field activities were completed in March-April 2020. The Phase I investigation area at Iona Island covered the majority of the former operational area, the eastern (Hudson River) and western (Iona Marsh) shorelines of Iona Island, and the eastern and western sides of the active River Subdivision (CSX Transportation) railroad tracks. Onsite field activities completed during Phase I are summarized in the list below. A copy of the Phase I field book/field notes and the Phase I photographic log is presented in **Appendix A**.

- Onsite surface soil (0-6 in. bgs) and subsurface soil (6 to maximum of 36 in. bgs) sampling using incremental sampling methodology (ISM) to evaluate the presence/absence and nature/extent of contaminants in onsite soil related to former DoD activities. Soil sampling was conducted using ISM to reduce data variability and increase sample representativeness

- Background soil sampling using ISM in Bear Mountain State Park outside the influence of the Iona Island Naval Ammunition Depot FUDS to establish regional background concentrations of metals and PAHs

- Field screening of soil samples for pH to support development of the ERA; pH was determined in the field through field screening due to time constraints regarding sample holding times for pH analysis

- Completion of a shoreline reconnaissance survey to identify potential pathways that lead to the shoreline environment, evaluate whether there are barriers to overland transport from Iona Island to the shoreline, and conduct a receptor and resource inventory evaluation

- Collection of discrete sediment samples along the Hudson River and Iona Marsh for analysis of TOC and grain size to identify physical characteristics of sediment and evaluate whether sediments could be a potential "sink" for site-related contaminants.

Several metals are naturally occurring in soil. In addition, PAHs are also present in the environment from both natural sources (e.g., forest fires) and human activities (e.g., petroleum products). Therefore, Phase I included a background soil investigation to establish regional background metal and PAH concentration ranges in surface and subsurface soil.

3.1.1 Pre-Investigation Field Activities

Equipment and supplies for the Phase I investigation were transported to the site on 9 March 2020. Pre-investigation field activities were conducted from 9 to 13 March 2020 and included a MEC surface sweep, brush/vegetation reduction, and flagging of sampling locations. Decision unit (DU) grid corners were located in the field with a hand-held global positioning system unit and marked with high-visibility flagging and stakes.

3.1.2 ISM Soil Sampling

Phase I soil sampling was conducted from 16 to 20 March 2020 and 30 March through 1 April 2020. The Phase I soil investigation area encompassed the 19 AOCs eligible for further inclusion in the HTRW project. The investigation also included the 7 former explosive storage and filling operations buildings that were identified as having potential for exposure risk from remaining explosives residues in environmental media to human and ecological receptors (**Figure 3-1**). In addition, previous investigations indicated that PAHs and metals were likely mobilized beyond the footprints of former buildings/structures during demolition and subsequent reworking of surface and subsurface soil. Those areas where elevated concentrations of PAHs and metals were previously detected in surface and/or subsurface soil were also investigated during Phase I.

3.1.2.1 Establishment of Soil Decision Units

A total of 32 onsite DUs (DU-1 through DU-25, EXDU-1 through EXDU-7) were established to evaluate contaminants in soil during Phase I (**Figure 3-1**). 26 of these onsite DUs, including DU-1 through DU-19 and EXDU-1 through EXDU-7, were established to address contamination originating from former buildings, AOC #16 – Area D (Former Dump Area), and former coal storage areas, and to further evaluate locations where elevated concentrations of contaminants were detected during previous investigations. These 26 DUs were sized at approximately 1-acre each (200 ft x 200 ft or 100 x 400 ft) as this represents the smallest area for which human or ecological receptors may be exposed. The American robin, which represents the insectivorous bird guild in the ERA, has an extremely small foraging range that is essentially equivalent to 1-acre. Likewise, a potential researcher in the area may only be exposed to an acre. The remaining 6 onsite DUs, including DU-20 through DU-25, were sized at 60 ft x 60 ft DUs to evaluate the presence/absence of contaminants in the footprints of significantly smaller structures, including former fuel oil ASTs and former transformer locations (**Figure 3-1**).

In addition to onsite DUs, 8 non-contiguous background DUs (BADU-1 through BADU-8) were established in Bear Mountain State Park outside the influence of the Iona Island Naval Ammunition Depot FUDS to collect background samples for metals and PAHs (**Figure 3-2**). Each background DU was located in the same soil type as the Phase I investigation area (Chatfield-rock outcrop complex, rolling) and sized at approximately 1-acre (200 x 200 ft). Onsite and background DUs were established following the procedures in the UFP-QAPP (EA 2020a).

A summary of each onsite and background DU and the rationale for its establishment is presented in the bulletized list below. DU boundaries were modified during pre-investigation activities (Section 3.1.1 of this RI report) based on conditions encountered in the field (i.e., presence of exposed bedrock limiting soil sample collection). Photographs of conditions of onsite and background DUs are presented in **Appendix A**.

- DU-1: 200 ft x 200 ft DU established to evaluate potential contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at and in the vicinity of AOC #17 – Area E (Former Coal Trestle and Storage Area) and AOC #10 – Former Building 406 (Tin, Electrical and Annealing Shop Building). Potential AOC-specific contaminants for AOC#10 include metals and SVOCs. Potential AOC-specific contaminants for AOC#17 include metals (specifically arsenic, cadmium, and mercury) and SVOCs.

- DU-2: 200 ft x 200 ft DU established to evaluate potential contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at and in the vicinity of AOC #17 – Area E (Former Coal Trestle and Storage Area). Potential AOC-specific contaminants for AOC#17 include metals (specifically arsenic, cadmium, and mercury) and SVOCs.

- DU-3: 200 ft x 200 ft DU established to evaluate potential contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at and in the vicinity of AOC #12 – Former Building 410 (Power House) and AOC #11 – Former Building 407 (Paint Shop and Pipe Shop). Potential AOC-specific contaminants for AOC#12 include PAHs and metals (such as arsenic, cadmium, and mercury).

- DU-4: 200 ft x 200 ft DU established to evaluate potential metals and PAH contamination in surface soil (0-6 in. bgs) and subsurface soil (6–36 in. bgs) at previous sampling location II-EA-SD-02-01(which had elevated concentrations of antimony, copper, lead, and mercury) and previous sampling location IX407-B1 (which had elevated concentrations of arsenic, lead, and fluoranthene).

- DU-5: 200 ft x 200 ft DU established to evaluate potential contamination in surface soil (0–6 in. bgs) and subsurface soil (6-36 in. bgs) at AOC #3 – Former Building 123 Garage Building) and previous sampling location II-EA-SS-02-06 (which had elevated concentrations of antimony, copper, lead, mercury, and zinc). Potential AOC-specific contaminants for AOC#3 include metals and SVOCs.

- DU-6: 200 ft x 200 ft DU established to evaluate potential metals contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at and in the vicinity of previous sampling locations II-EA-SS-02-09 (which had an elevated concentration of copper) and EA-SS-02-03 (which had elevated concentration of lead).

- DU-7: 200 ft x 200 ft DU established to evaluate potential metals contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at and in the vicinity of previous sampling location II-EA-SS-02-08 (which had elevated concentrations of copper, lead, and zinc).

- DU-8: 200 ft x 200 ft DU established to evaluate potential contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at and in the vicinity of AOC #5 – Former Building 207 (Marine Garage Building). The DU is contained by existing Buildings 201, 212, and 222. Potential AOC-specific contaminants for AOC#5 include metals and SVOCs.

- DU-9: 200 ft x 200 ft DU established to evaluate potential contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at and in the vicinity of AOC #8 – Former Building 219 (Garage Building) and AOC #9 – Former Building 220 (Garage Building). Potential AOC-specific contaminants for AOC#8 and AOC #9 include metals and SVOCs.

- DU-10: 200 ft x 200 ft DU established to evaluate potential metals contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at and in the vicinity previous sampling location II-EA-SS-02-14 (which had elevated concentration of copper).

- DU-11: 200 ft x 200 ft DU established to evaluate potential contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at and in the vicinity of AOC #18 – Area F (Former Coal Storage Area). Potential AOC-specific contaminants for AOC#18 include metals (such as arsenic, cadmium, and mercury) and SVOCs.

- DU-12: 200 ft x 200 ft DU established to evaluate potential contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at and in the vicinity of AOC #6 – Former Building 213 (Paint Locker for Building 202) and AOC #7 – Former Building 215 (Garage Building). Potential AOC-specific contaminants for AOC#6 and AOC #7 include metals and SVOCs.

- DU-13: 200 ft x 200 ft DU established to evaluate potential contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at and in the vicinity of AOC #1 – Former Building 103 (Paint and Oil Storage) and previous sampling location IX-103-B1 (which had elevated concentrations of arsenic, cadmium, lead, fluoranthene, and pyrene). Potential AOC-specific contaminants for AOC#1 include metals and SVOCs.

- DU-14: 200 ft x 200 ft DU established to evaluate potential metals contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at and in the vicinity of previous sampling location II-EA-SS-02-13 (which had elevated concentrations of lead and mercury).

- DU-15: 200 ft x 200 ft DU established to evaluate potential metals contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at and in the vicinity of previous sampling location II-EA-SS-02-15 (which had elevated concentrations of lead and mercury).

- DU-16: 200 ft x 200 ft DU established to evaluate potential contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at and in the vicinity of AOC #4 – Former Buildings 124-128 (Sewage Disposal Plant). Potential AOC-specific contaminants for AOC#4 include metals and SVOCs.

- DU-17: 200 ft x 200 ft DU established to evaluate potential contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at and in the vicinity of AOC #2 – Former Building 121 (Incinerator), AOC #16 – Area D (Former Dump Area), and previous sampling locations IX-121-B1 (which had elevated concentrations of arsenic, cadmium, lead, fluoranthene, and pyrene) and II-EA-SD-02-02 (which had elevated concentrations of antimony, copper, lead, nickel, and zinc). Potential AOC-specific contaminants for AOC #2 include residual organics and metals, and PAHs from incomplete combustion. Potential AOC-specific contaminants for AOC #16 are unknown, but could include SVOCs, PCBs, explosives, and metals.

- DU-18: 200 ft x 200 ft DU established to evaluate potential contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at AOC #16 – Area D (Former Dump Area) and in the vicinity of previous sampling locations IX DMP-B22 (which had elevated concentrations of arsenic, cadmium, total chromium, lead, silver, 2,4-DNT, 2,6-DNT, and Aroclor 1260) and IXDMP-B1 (which had elevated concentrations of lead and Aroclor 1260). Potential AOC-specific contaminants for AOC #16 are unknown, but could include SVOCs, PCBs, explosives, and metals.

- DU-19: 200 ft x 200 ft DU established to evaluate potential contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at AOC #16 – Area D (Former Dump Area) and in the vicinity of previous sampling location II-EA-SS-02-16 (which had elevated concentrations of antimony, copper, lead, mercury, and zinc). Potential AOC-specific contaminants for AOC #16 are unknown, but could include SVOCs, PCBs, explosives, and metals.

- DU-20: 60 ft x 60 ft DU established to evaluate potential contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at a former AST located near former Building 233 (AOC #13 – Area A). Potential AOC-specific contaminants include BTEX and PAHs.

- DU-21: 60 ft x 60 ft DU established to evaluate potential contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at a former AST located near former Dock 131 (AOC #14 – Area B). Potential AOC-specific contaminants include BTEX and PAHs.

- DU-22: 60 x 60 ft DU established to evaluate potential contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at two former ASTs located near former Building 407 (AOC #15 – Area C). Potential AOC-specific contaminants include BTEX and PAHs.

- DU-23: 60 ft x 60 ft DU established to evaluate potential contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at former transformer T1 (AOC #19). Potential AOC-specific contaminants include PCBs.

- DU-24: 60 ft x 60 ft DU established to evaluate potential contamination in surface soil (0–6 in. bgs) and subsurface soil (6–36 in. bgs) at former transformer T2 (AOC #19). Potential AOC-specific contaminants include PCBs.

- DU-25: 60 x 60 ft DU established to evaluate potential contamination in surface soil (0–6 in. bgs) and subsurface soil (6-36 in. bgs) at former transformer T3 (AOC #19). Potential AOC-specific contaminants include PCBs.

- EXDU-1: 200 ft x 200 ft DU established to evaluate the presence or absence of residual explosives contamination in surface soil from Building 609 – Mine Loading Plant.

- EXDU-2: 200 ft x 200 ft DU established to evaluate the presence or absence of residual explosives contamination in surface soil from Building 506 – Filling House #3.

- EXDU-3: 200 ft x 200 ft DU established to evaluate the presence or absence of residual explosives contamination in surface soil from Building 503 – Filling House #6.

- EXDU-4: 200 ft x 200 ft DU established to evaluate the presence or absence of residual explosives contamination in surface soil from Building 404 – Filling House #1.

- EXDU-5: 200 ft x 200 ft DU established to evaluate the presence or absence of residual explosives contamination in surface soil from Building 307 – Filling House #5.

- EXDU-6: 200 ft x 200 ft DU established to evaluate the presence or absence of residual explosives contamination in surface soil from Building 306 – Filling House #2.

- EXDU-7: 100 ft x 400 ft DU established to evaluate the presence or absence of residual explosives contamination in surface soil from Building 202 – Shell House #5 and D Plant.

- BADU-1: 200 ft x 200 ft DU located in Bear Mountain State Park northwest of the intersection of Perkins Memorial Drive and Seven Lakes Drive.

- BADU-2: 200 ft x 200 ft DU located in Bear Mountain State Park north of the intersection of Perkins Memorial Drive and Seven Lakes Drive.

- BADU-3: 200 ft x 200 ft DU located in Bear Mountain State Park south of the intersection of Perkins Memorial Drive and Seven Lakes Drive.

- BADU-4: 200 ft x 200 ft DU located in Bear Mountain State Park southeast of the intersection of Perkins Memorial Drive and Seven Lakes Drive.

- BADU-5: 200 ft x 200 ft DU located in Bear Mountain State Park north of Seven Lakes Drive and west of Suffren Bear Mountain Trail.

- BADU-6: 200 ft x 200 ft DU located in Bear Mountain State Park at the intersection of Suffren Bear Mountain Trail and Seven Lakes Drive.

- BADU-7: 200 ft x 200 ft DU located in Bear Mountain State Park south of Seven Lakes Drive and southwest of the Suffren Bear Mountain Trail intersection.

- BADU-8: 200 ft x 200 ft DU located in Bear Mountain State Park south of Seven Lakes Drive and southeast of the Suffren Bear Mountain Trail intersection.

3.1.2.2 ISM Soil Sampling Methods

ISM surface soil (0–6 in. bgs) incremental samples were collected from 30 of the 32 onsite DUs and from each background DU (**Table 3-1**). While separate surface soil (0–6 in. bgs) incremental samples were proposed to be collected within each onsite DU (DU-1 through DU-25 and EXDU-1 through EXDU-7), two DUs (DU-8 and DU-24), were not sampled during Phase I (**Figure 3-1**). DU-8 was not sampled due to the presence of debris observed within the DU that was not related to historical DoD operations, including numerous rusted and deteriorating 55-gal drums, deteriorating pallets, piles of roofing shingles, and chain-link fencing. PIPC has accepted responsibility for the drums/debris observed at DU-8 and the NYSDEC concurs that the PIPC is responsible for this area. DU-24 was not sampled as the majority of the DU consisted of exposed bedrock with little to no soil cover.

Subsurface soil depths were initially evaluated when attempting to collect surface soil increments across each DU (i.e., advancing the ISM sampling tool to 6 in. bgs). Following completion of surface soil sampling, a minimum of 5 hand-auger borings were advanced in each DU to evaluate subsurface soil conditions. Boring locations were advanced in areas where there was no evidence of bedrock or hardscapes. Subsurface soil with depth greater than 12 in. bgs were only encountered at 5 onsite DUs (DU-17 through DU-21) (**Table 3-2**). At the remaining onsite and background DUs, shallow subsurface soil was limited to a maximum of 12 in. bgs; and therefore,

no subsurface soil samples were collected from these DUs. In addition, subsurface soil was not collected at background DUs due to the presence of exposed/shallow bedrock and shallow depth to refusal (less than 12 in. bgs) throughout the DUs.

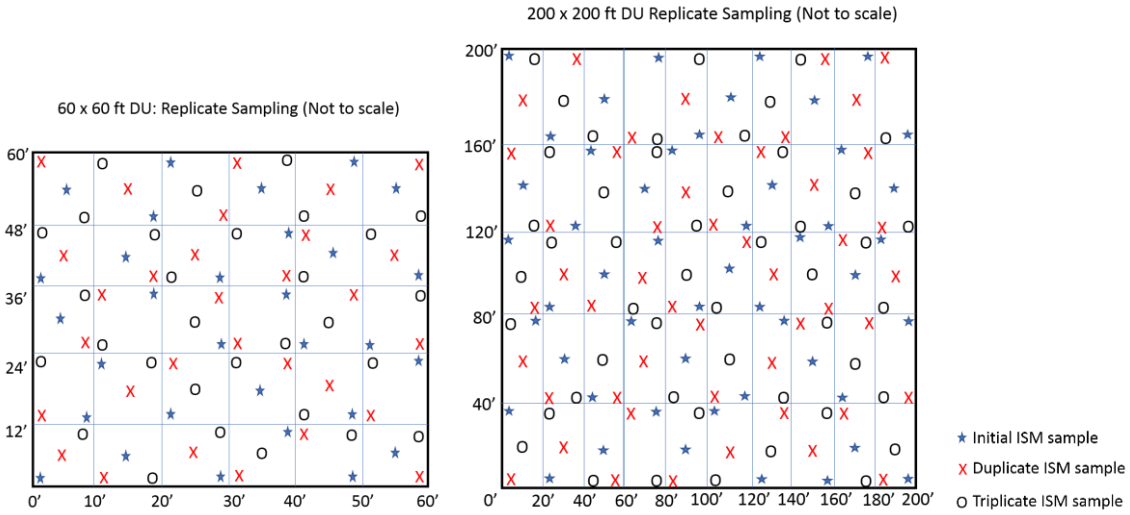
ISM soil samples at onsite DUs were collected in triplicate (initial ISM sample plus two additional samples) for the purpose of calculating the 95% upper confidence limit (UCL) of the mean (95UCL) at each DU using statistical tests. Single incremental samples were collected from each of the 8 background DUs to provide a background dataset of 8 samples. Each ISM soil sample was prepared by collecting multiple increments of soil within a DU and physically combining these increments into a single sample, referred to as the "incremental sample." ISM soil samples collected from the approximately 1-acre (200 x 200 or 100 x 400 ft) sized DUs (DU-1 through DU-19, EXDU-1 through EXU-7, and BADU-1 through BADU-8) were comprised of 50 increments of soil. Each ISM soil sample collected from the smaller 60 x 60 ft DUs (DU-20 through DU-25) was comprised of 30 increments of soil.

3.1.2.2.1 Surface Soil Sampling (0-6 in. bgs)

Surface soil ISM samples were collected from depths of 0-6 in. bgs using random sampling within grid pattern methodology (Interstate Technology Regulatory Council [ITRC] 2020), while avoiding concrete, exposed bedrock, pavement, shallow depth to refusal, and other features that inhibited collection of a surface soil increment. Each 60 ft x 60 ft DU was subdivided in the field into 30 grid cells, each approximately 10 ft x 12 ft in area, and each approximately 1-acre sized (200 ft x 200 ft or 100 ft x 400 ft) DU was subdivided into 50 grid cells, each approximately 20 ft x 40 ft in area. Surface soil increments were collected from random locations within grid cells (i.e., varying between the four corners or center of each grid box) in order to generate an unbiased estimate of the mean and variance. Triplicate incremental samples collected within each onsite DU were comprised of soil increments taken from different, randomly selected locations within each gridded area. Increments for each sample were not collected from the same locations or co-located together. Examples of surface soil increment locations are presented below.

Surface soil increments were collected from each grid cell using a dedicated incremental sampling tool with plungers collecting soil approximately equivalent to a specified volume of soil. The depth of each increment of soil was approximately 6 in., which was the length of the incremental sampling tool's sampling plunger attachment. Each of the increments of soil for the 200 x 200 ft DUs (50 increments for 1 ISM sample) was approximately 20 grams, to provide a total weight of 1 kilogram of soil for 1 incremental sample. Each of the increments of soil for the 60 x 60 ft DUs (30 increments for 1 ISM sample) was approximately 33 grams, to provide a total weight of 1 kilogram of soil for 1 incremental sample.

Upon collection, increments for each ISM soil sample were placed into 5-gal buckets with sample-dedicated bucket liners. Following collection of the desired number of increments, the increments were combined into the "incremental sample." Surface soil from each onsite and background ISM sample was screened for pH in the field using a pH meter as detailed in Section 3.4.1 of this RI report.



A total of 90 onsite ISM surface soil samples (initial and replicates) and 8 background ISM surface soil samples were collected for offsite laboratory analysis of TAL metals, mercury, PAHs, PCBs, and/or explosives residues as detailed in the bulletized list below and presented in **Table 3-1**. Samples for offsite laboratory analysis were placed in individual labeled Ziploc bags, each containing approximately 1 kg of soil. Additional volume was included for QA/QC samples (matrix spike [MS]/ matrix spike duplicate [MSD]). Sample handling and management and offsite laboratory analysis are further detailed in Section 3.5 of this RI report.

- TAL metals (excluding mercury) by EPA Method 6010C/6020A from DU-1 through DU-7, DU-9 through DU-19, and BADU-1 through BADU-8
- Mercury by EPA Method 7471B from DU-1 through DU-5, DU-9, DU-11 through DU-19 and BADU-1 through BADU-8
- PAHs by EPA Method 8270D selected ion monitoring (SIM) from DU-1 through DU-5, DU-9, DU-11 through DU-13, DU-16 through DU-19, DU-20 through DU-22, and BADU-1 through BADU-8
- PCBs by EPA Method 8082A from DU-17 through DU-19, DU-23, and DU-25
- Explosives residues by Method 8330B from DU-17 through DU-19 and EXDU-1 through EXDU-7.

3.1.2.2.2 Subsurface Soil Sampling (6 to maximum 36 in. bgs)

Shallow subsurface soil samples (6 to maximum of 36 in. bgs) were collected from 5 DUs where soil depth was greater than 12 in. bgs (DU-17 through DU-21). Subsurface soil ISM samples were comprised of soil increments taken from separate sets of randomly located borings

advanced within each DU using a hand auger. Areas that inhibited collection advancement of the hand auger (concrete, exposed/shallow bedrock, and pavement) were avoided during sampling.

For each of the approximately 1-acre (200 x 200 ft) sized DUs (DU-17 through DU-19), a single incremental sample was comprised of 50 soil increments taken from a total of 5 borings (10 soil increments per boring). For each of the smaller 60 x 60 ft DUs (DU-20 and DU-21), a single incremental sample was comprised of 30 soil increments taken from a total of 3 borings (10 increments per boring). Increments for subsurface soil triplicate samples (initial ISM sample plus two additional samples) from each DU were not collected from the same borings or co-located together. Additional borings were advanced to collect each incremental sample. Therefore, a total of 15 borings were advanced and sampled in each approximately 1-acre (200 x 200 ft) sized DU (5 borings per each incremental sample) and 9 total borings were advanced and sampled within in each smaller 60 x 60 ft DU) (3 borings per each incremental sample).

Upon collection, increments for each ISM sample were placed into 5-gal buckets with sample-dedicated bucket liners. Following collection of the desired number of increments, the increments were combined into an "incremental sample." Subsurface soil from each ISM sample were screened for pH in the field using a pH meter as detailed in Section 3.4.1 of this RI report.

A total of 16 onsite ISM subsurface soil samples (initial and replicates) were collected for offsite laboratory analysis of TAL metals, mercury, PAHs, PCBs, explosives residues, and/or BTEX as detailed in the bulletized list below and presented in **Table 3-1**. Samples for offsite laboratory analysis of TAL metals, PAHs, PCBs, and explosives residues were placed in individual labeled Ziploc bags, each containing approximately 1 kg of soil. Additional volume was included for QA/QC samples (MS/MSD).

Samples for BTEX analysis were collected in the field using 5-gram Terra Core samplers. Increments for each ISM sample were combined into laboratory-preserved jars containing methanol. Increments for subsurface soil triplicate sample (initial ISM sample plus two additional samples) from each DU were not co-located together or combined in the same sample jars. Separate laboratory-preserved jars containing methanol were used for each triplicate sample. Additional volume was included for MS/MSD samples in separate laboratory-preserved jars containing methanol. QA/QC samples including methanol field blanks and trip blanks were submitted with BTEX samples. Sample handling and management and offsite laboratory analysis are further detailed in Section 3.5 of this RI report.

- TAL metals (excluding mercury) by EPA Method 6010C/6020A from DU-17 through DU-19
- Mercury by EPA Method 7471B from DU-17 through DU-19
- PAHs by EPA Method 8270D SIM from DU-17 through DU-21
- PCBs by EPA Method 8082A from DU-17 through DU-19

- Explosives residues by Method 8330B from DU-17 through DU-19

- BTEX by EPA Method 8260B from DU-20 and DU-21.

3.1.3 Shoreline Reconnaissance (EA 2020c)

A shoreline reconnaissance survey was conducted from 6 to 7 April 2020 (EA 2020c, **Appendix E**). The survey was conducted by EA field biologists, including a state certified forest professional and professional wetland scientist with 15 years of experience conducting habitat surveys, flora and fauna surveys, and similar assessments. EA field biologists documented potential upland and aquatic receptors and evaluated whether the benthos provides suitable habitat for aquatic organisms. The shoreline reconnaissance survey was conducted along four reconnaissance areas (**Figure 3-3**):

- Recon Area 1 – Hudson River Shoreline located on the east side of Iona Island

- Recon Area 2 – Iona Marsh Shoreline located along the west side of Iona Island and divided by a railroad embankment which supports the active River Subdivision (CSX Transportation) railroad tracks

- Recon Area 3 – Western Shoreline between Iona and Round Island (southwest side of Iona Island and western portion of Round Island) including the low portion of land between the two islands

- Recon Area 4 – River Subdivision (CSX Transportation) railroad track embankment (west and east side).

The extent of the reconnaissance areas along the Hudson River Shoreline (Recon Area 1) and the Iona Marsh Shoreline (Recon Area 2) was based off of the location of former buildings/structures and site topography, which would influence the direction of overland flow/transport of contaminants from Iona Island to the shoreline. The western FUDS boundary between Iona and Round Island was considered a separate recon area to evaluate potential overland transport from AOC #16 – Area D (Former Dump Area) and the presence of potential transport pathways (drainage swales, channels, outfalls, etc.) in this area. The FUDS boundary was evaluated in this area, rather than the Iona Marsh shoreline, as a non-DOD fill area is located southwest of the FUDs boundary along the Iona marsh shoreline; this area was filled by PIPC following transfer of the FUDS from the Navy in 1965, and therefore, was not subject to investigation under the FUDS program. The eastern and western sides of the active River Subdivision (CSX Transportation) railroad tracks was evaluated in order to identify potential pathways (i.e., conduits, channels, etc.) that could allow for overland transport from Iona Island to the shoreline beneath the railroad.

The shoreline reconnaissance survey in Recon Areas 1 through 4 was conducted on foot during low tide. In addition, reconnaissance along the shoreline in Recon Areas 1 and 2 included a

survey by boat during high tide. Potential transport pathways to the shoreline (e.g., swales, culverts, channels, outfalls, discharge pipes, etc.), and the type of material/environment encountered along the shoreline (i.e., man-made structures such as riprap or retaining walls; exposed bedrock; gravel, cobble, or boulder shorelines) was documented and photographed.

A receptor and resource inventory evaluation were conducted along the shoreline. Observed wetland plant species and aquatic receptors were documented and photographed during the shoreline reconnaissance. In addition, upland, avian, and aquatic wildlife was documented to determine potential ecological receptors at the site. Wildlife observations included incidental observations and did not include a formal survey for specific species.

3.1.4 Discrete Sediment Sampling

Discrete sediment grab samples were collected during the Phase I shoreline reconnaissance, with samples collected along the shoreline in Recon Areas 1, 2, and 3 as presented in the bulletized list below (**Figure 3-3**). Samples were not collected within Recon Area 4.

- Three sediment samples (SD-04, SD-05, and SD-06) along the Hudson River Shoreline in Recon Area 1
- Three sediment samples (SD-01, D-02, and SD-03 along the Iona Marsh shoreline in Recon Area 2
- One sediment sample (SD-07) along the Iona Marsh shoreline in Recon Area 3.

Each sediment sample was collected using disposable scoops and placed into individual laboratory supplied sample containers. New disposable scoops were used at each sample location so as to avoid cross-contamination. Used scoops were bagged and disposed of as general debris/trash.

The 7 discrete sediment samples were collected for offsite laboratory analysis of physical parameters as presented in the bulletized list below. Sample collection information is presented in **Table 3-1**. Sample handling and management and offsite laboratory analysis are further detailed in Section 3.5 of this RI report.

- TOC by Walkley-Black
- Grain size by ASTM International (ASTM) D422 (sieve and hydrometer).

3.2 PHASE I DATA GAPS

Phase I data and analytical results indicated widespread, elevated concentrations of metals and PAHs in soil throughout the upland area of Iona Island (see Section 6.3.1 of this RI report for more detail) and within AOC #16 – Area D (Former Dump Area) in the low-lying area between

Iona and Round Islands (see Section 6.3.2 of this RI report for more detail). In addition, surface water pathways were identified leading from AOC #16 – Area D (Former Dump Area) to the Hudson River and Iona Marsh shorelines (see Section 5.1.2 of this RI report for more detail). The following data gaps were identified following completion of Phase I:

- The bioavailability of metals and PAHs in onsite soil was not evaluated during Phase I. Although pH data were evaluated in soil during Phase I, additional physical parameter data (grain size, TOC, cation-exchange capacity [CEC]), and redox potential) were needed to evaluate bioavailability of metals and PAHs to terrestrial receptors as part of the RSLERA in the ERA.

- While contaminant migration pathways leading from the upland area to the Hudson River and Iona Marsh shorelines were not identified during Phase I, defined surface water and potential contaminant migration pathways were identified leading from AOC #16 – Area D (Former Dump Area) both shorelines. These pathways include transport to the Hudson River shoreline during high tide and storm events, and transport to the Iona Marsh shoreline via a riprap filled drainage swale and tidal wetland swale. These pathways and potential impacts to shoreline media (surface water and sediment) were not evaluated during Phase I. Additional data were needed to evaluate the surface water migration pathways, determine if metals in soil at AOC #16 – Area D (Former Dump Area) were present in shoreline media, and to evaluate risk to human health and ecological receptors.

- Background surface water and sediment data were not collected or analyzed during Phase I. Regional background/upstream concentrations of metals in surface water and sediment and statistical comparisons of onsite and background metals concentrations were critical to determine whether metals in shoreline media at Iona Island could be attributed to former DoD activities.

Multi-media sampling was needed to close data gaps identified after completion of Phase I. Phase II was planned and implemented to close data gaps identified after completion of Phase I and support decision making.

3.3 PHASE II FIELD ACTIVITIES

Phase II was conducted to further evaluate contaminant migration pathways to the shoreline environment, evaluate impacts to shoreline media, evaluate the subsequent risk to aquatic receptors, and support development of the HHRA and ERA. The Phase II investigation, including media to be sampled, sampling locations, and analytes to be sampled, was designed in 2021-2022 based on the Phase I results. A UFP-QAPP addendum was prepared to present Phase II investigative procedures and data collection activities, laboratory analytical and reporting procedures, and QA/QC measures and assessments that would be used to confirm that data are of known quality sufficient to meet project objectives for Phase II (EA 2022b).

Phase II field activities were conducted in accordance with the UFP-QAPP Addendum (EA 2022b) and consisted of onsite soil sampling and onsite and background sediment and surface water sampling. Specific goals for Phase II included the following:

- Evaluate bioavailability of metals and PAHs in onsite soil to further evaluate potential risk to terrestrial receptors and support development of the RSLERA in the ERA

- Confirm whether metals in soil at AOC #16 – Area D (Former Dump Area) related to historical DoD activities are being transported to the Hudson River and Iona Marsh shorelines via surface water migration pathways identified during Phase I

- Establish regional background metals concentration ranges in surface water and sediment

- Evaluate whether contaminant concentrations in surface water and/or sediment related to historical DoD activities present a potential risk to human health and/or aquatic ecological receptors

- Evaluate bioavailability of metals in sediment to support development of the RSLERA in the ERA

- Assess the potential for toxicity to sediment-dwelling organisms to support development of the ERA.

Phase II field activities were completed in April 2022. The Phase II investigation area at Iona Island included select Phase I DUs; the extent of AOC #16 – Area D (Former Dump Area); the Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area); and the outlets of two surface water migration pathways leading from AOC #16 – Area D (Former Dump Area) to Iona Marsh (including a riprap filled drainage swale and tidal wetland swale). Phase II investigation areas are presented on **Figure 3-4**, **Figure 3-5**, and **Figure 3-6.** Onsite field activities completed during Phase II are summarized in the bulletized list below. A copy of the Phase II field book/field notes and the Phase II photographic log is presented in **Appendix A**.

- Surface soil (0-6 in. bgs) sampling using ISM for analysis of physical parameter data (grain size, TOC, oxidation-reduction potential [ORP], and CEC to assess bioavailability of metals and PAHs across Iona Island and within each soil environment, and to support development of the ERA (**Figure 3-4**); note that soil ORP was determined in the field through field screening due to time restraints regarding sample holding times for ORP analysis

- Surface water sampling for metals and physical parameter data (hardness and water quality parameters including pH, temperature, specific conductance, dissolved oxygen [DO], ORP, turbidity, and salinity) to evaluate the migration pathways from AOC #16 – Area D (Former Dump Area) to the Hudson River and Iona Marsh shorelines, evaluate geochemistry, and support development of the risk assessments (**Figure 3-5**)

- Shoreline sediment sampling using ISM for analysis of metals and physical parameter data (grain size, TOC, pH, and ORP) to evaluate whether metals from AOC #16 – Area D (Former Dump Area) were present in sediment at the endpoints of surface water migration pathways at concentrations that may pose risk to human health and/or ecological receptors, assess bioavailability of metals in sediment, and support development of the ERA (**Figure 3-6**); note that sediment pH and ORP were determined in the field through field screening due to time restraints regarding sample holding times for pH and ORP analysis

- Collection of discrete sediment for analysis of acid volatile sulfide (AVS)/simultaneously extracted metals (SEM) to assess the potential for toxicity to sediment-dwelling organisms and support development of the ERA (**Figure 3-6**)

Several metals are naturally occurring in sediment and surface water. In addition, the shoreline of Iona Island is part of the Hudson River PCB Superfund Site which encompasses nearly 200 miles of the Hudson River from Hudson Falls, New York, to the Battery in New York City (EPA 2017a). Additionally, the Hudson River is impacted with contaminants from upstream sources, including industrial facilities, as well as other pollutants from urban and agricultural runoff, and sewage and stormwater discharge. Although industrial discharges have been reduced, pollution from urban and agricultural runoff and sewage and stormwater discharge continues, and a legacy of past pollution remains in river sediment. Therefore, it was understood that shoreline surface water and sediment at Iona Island are likely impacted by contamination from the Hudson River (non-DoD impacts).

Active River Subdivision (CSX Transportation) railroad tracks parallel the western shoreline of the Hudson River, and the Iona Marsh Shoreline located along the west side of Iona Island is divided by the railroad embankment. Contaminants associated with the railroad may include metals, PAHs, and pesticides associated with normal railroad operations; petroleum products dropped or spilled from trains including oil, lubricants, and diesel; coal ash from engines; creosote from railroad ties; and PAHs from exhaust. Areas along the railroad tracks are likely to have been affected by normal operation of the rail line, with residual levels of contamination in media adjoining the railroad right-of-way.

Due to the potential for metals to naturally occur in sediment, and due to the potential for shoreline media to be impacted by contaminants in the Hudson River and/or normal operations of the railroad that parallels the western shoreline of the river, a background surface water and sediment investigation was conducted to determine whether metals in shoreline media at Iona Island can be attributed to former DoD activities. Con Hook, located approximately 3 miles upstream of Iona Island on the western side of the Hudson River, was selected to represent background surface water and sediment concentrations. Con Hook has similar depositional environments to Iona Island, with approximately 7 acres of upland habitat and another 12 acres of a *Phragmites*-dominated tidal marsh (Con Hook Marsh) (**Figure 3-7**). The Active River Subdivision (CSX Transportation) railroad tracks parallels the western boundary of Con Hook Marsh. Similar to Iona Marsh, Con Hook Marsh adjoining the railroad right-of-way may be impacted by contaminants associated with normal operation of the rail line.

3.3.1 ISM Surface Soil Bioavailability Parameter Sampling

Phase II ISM surface soil sampling was conducted on 18-19 April 2022. Two separate terrestrial environments with different soil types were identified at Iona Island. These areas include the upland area (upland soil) and the low-lying marsh area between Iona and Round Islands (hydric soil) (**Figure 1-5**). Eight select Phase I soil DUs were targeted during Phase II for physical parameter sampling, with DUs selected to provide reasonable spatial coverage/ representation both within each terrestrial environment and across Iona Island. Five separate Phase I upland soil DUs (DU-4, DU-7, DU-9, DU-11, and DU-13) were selected to be representative of the upland area (**Figure 3-4**). Each of the three Phase I DUs within the marsh area between Round and Iona Island (DU-17, DU-18, and DU-19 encompassing AOC #16 – Area D [Former Dump Area]) were selected to be representative of hydric soil conditions (**Figure 3-4**). From a topographic and physical features point-of-view, the physical parameters within the 8 DUs selected for Phase II are representative of all conditions at Iona Island and can be used to represent conditions across the island. Physical parameter results would therefore be used to conduct a sitewide evaluation of bioavailability, as well as to conduct an evaluation on a DU-by-DU basis.

DU grid corners were located in the field with a hand-held global positioning system unit and marked with high-visibility flagging and stakes prior to sampling. ISM surface soil samples at each approximately 1-acre (e.g., 200 x 200 ft) sized DU were collected in triplicate (initial ISM sample plus two additional samples) for the purpose of calculating the 95UCLs using statistical tests. Each ISM surface soil sample was comprised of 50 increments of equal volume to estimate the reasonable unbiased estimate of concentrations across each DU, which is consistent with Phase I soil sampling. Surface soil increments were collected at a depth of 0–6 in. bgs using plungers capable of collecting sediment equivalent to approximately 20 g in volume, to produce a single sediment sample equivalent to approximately 1 kg.

Upon collection, increments for each ISM sample were placed into 5-gal buckets with sample-dedicated bucket liners. Following collection of the desired number of increments, the increments were combined into the "incremental sample." Onsite ISM soil samples were screened for ORP in the field as detailed in Section 3.4.2 of this RI report. Soil geological characteristics including color, moisture, texture, grain size, sorting, lithology, etc. were recorded for each DU.

A total of 24 onsite surface soil samples (initial and replicates), were collected for offsite laboratory analysis of physical parameters as presented in the bulletized list below. Sample collection information is presented in **Table 3-2**. Samples for offsite laboratory analysis were placed in individual labeled Ziploc bags, each containing approximately 1 kg of soil. Additional volume was included for QA/QC samples (MSMSD). Sample handling and management and offsite laboratory analysis are further detailed in Section 3.5 of this RI report.

- TOC by Walkley-Black
- Grain size by ASTM D422 (sieve and hydrometer)

- CEC by EPA SW-846 Method 9081

3.3.2 Surface Water Sampling

Phase II onsite surface water sampling was conducted on 19-20 April 2022. Onsite areas targeted for investigation during Phase II included the source area at AOC #16 – Area D (Former Dump Area) and surface water migration pathway endpoints (Hudson River shoreline adjacent to AOC #16 – Area D [Former Dump Area] and Iona Marsh at the outlets of the riprap filled drainage swale and tidal wetland swale) (**Figure 3-5**). Surface water sampling times were dependent on tidal fluctuations as follows:

- Source area (AOC #16 – Area D [Former Dump Area]): sampling during tidal inundation (rising or high tide) to capture potential metals leaching from soil to surface water

- Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area): sampling during high/receding tide to capture water flowing from AOC #16 – Area D (Former Dump Area) to the Hudson River

- Iona Marsh shoreline at the outlets of the riprap filled drainage swale and tidal wetland swale): sampling during receding tide to capture potential flow from AOC #16 – Area D (Former Dump Area) to the marsh.

Background surface water sampling was conducted at Con Hook upstream from Iona Island on 21 April 2022. A boat was required to access Con Hook; therefore, surface water sampling at Con Hook was conducted at low tide concurrent with background sediment sampling to limit the number of trips to and time spent at Con Hook.

Surface water samples were collected using discrete sampling methods. For discrete sampling, sample sizes of at least 20 are typically needed to compare mean site concentrations with mean background concentrations using hypothesis tests for centrality. Therefore, 20 discrete samples were collected from each onsite area targeted for investigation during Phase II (source area, Hudson River shoreline, and Iona Marsh shoreline) and for each background depositional environment (Hudson River and Con Hook Marsh shorelines) to ensure the sample sizes for discrete samples were adequate for normality tests (**Figure 3-5 and Figure 3-7**). Sample collection information is presented in **Table 3-2**. A total of 60 onsite and 40 background surface water samples were collected for offsite laboratory analysis as follows:

- 20 onsite samples within AOC #16 – Area D (Former Dump Area) (DUMP-SW-01 through DUMP-SW-20)

- 20 onsite samples along the Iona Island Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area) (IHRS-SW-01 through IHRS-SW-20)

- 20 onsite samples along the Iona Marsh shoreline at the outlets of the riprap filled drainage swale and tidal wetland swale (10 samples at each outlet location) (RRDS-SW-01 to RRDS-SW-10 and TWS-SW-01 through TWS-SW-10).

- 20 background samples at Con Hook along the Hudson River shoreline (CHHRS-SW-01 through CHHRS-SW-20)

- 20 background samples at Con Hook along the marsh shoreline (CHMS-SW-01 through CHMS-SW-20).

Surface water samples were collected within the middle of the surface water column at each sampling location. Surface water samples collected from within AOC #16 – Area D (Former Dump Area) (DUMP-SW-01 through DUMP-SW-20) varied from 3-4 inches below the water surface to approximately 1 foot below the water surface. Onsite and background samples collected along the Hudson River shoreline (Iona Island Hudson River shoreline samples IHRS-SW-01 through IHRS-SW-20 and Con Hook Hudson River shoreline samples CHHRS-SW-01 through CHHRS-SW-20) were collected from a depth of approximately 3-4 inches below the water surface. Onsite and background samples collected along the marsh shorelines (Iona Marsh shoreline samples RRDS-SW-01 through RRDS-SW-10 and TWS-SW-01 through TWS-SW-10 and Con Hook marsh shoreline samples CHMS-SW-01 through CHMS-SW-20) were collected from a depth of approximately 3-4 inches below the water surface.

Surface water samples from each location were collected for analysis of dissolved metals and hardness using a peristaltic pump (2001 GeoTech Geopump) and dedicated sample tubing. Samples were collected into pre-preserved bottles provided by the analytical laboratory. Dissolved metals samples were filtered in the field using 0.45-micron filters. New filters and tubing were used at each sample location so as to avoid cross-contamination. Used filters and tubing were bagged and disposed of as general debris/trash. Surface water quality parameters were recorded at each surface water sampling location following sample collection using a submersible water quality meter as detailed in Section 3.4.3 of this RI report.

Surface water samples were submitted for offsite laboratory analysis of dissolved metals and hardness. Analytical methods are presented in the bulletized list below. Additional volume was included for QA/QC samples (MS/MSD), and field duplicates were collected at a rate of 5 percent (1 per 20 samples) (**Table 3-2**). Sample handling and management and offsite laboratory analysis are further detailed in Section 3.5 of this RI report.

- Dissolved (field filtered) TAL metals by EPA Methods 6010C/6020A

- Dissolved (field filtered) mercury by EPA Method 7470A

- Hardness by SM2340B.

3.3.3 ISM Sediment Sampling Tasks

Onsite Phase II ISM sediment sampling was conducted on 19 April 2022. Onsite areas targeted for investigation during Phase II included the Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area) and the outlets of the riprap filled drainage swale and tidal wetland swale (**Figure 3-6**). ISM sediment sampling was conducted at low tide when shoreline sediment was exposed.

Background Phase II ISM sediment sampling was conducted on 21 April 2022 (background sampling) during low tide conditions. Background sampling locations are presented on **Figure 3-7**.

3.3.3.1 Establishment of Sediment Decision Units

Three sediment DUs, each sized at approximately 0.5-acre, were established for conducting sediment sampling at Iona Island, as presented below (**Figure 3-6**). DUs were located at the ends of preferential flow pathways from AOC #16 – Area D (Former Dump Area) to the Hudson River and Iona Marsh shorelines. The approximately 0.5-acre size of these DUs was established as this represents the smallest area for which ecological receptors may be exposed. The muskrat, which represents herbivorous aquatic mammals in the ERA, has an approximately 0.5-acre foraging range.

- IHRS-DU-01 along the Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area) to evaluate whether metals have been transported to the Hudson River shoreline and accumulated in shoreline sediment

- RRDS-DU-01 along the Iona Marsh shoreline at outlet of the riprap filled drainage swale to evaluate whether metals from AOC #16 – Area D (Former Dump Area) have been transported via the swale to the marsh shoreline and accumulated in marsh sediment

- TWS-DU-01 along the Iona Marsh shoreline at outlet of the tidal wetland swale to evaluate whether metals from AOC #16 – Area D (Former Dump Area) have been transported via the swale to the marsh shoreline and accumulated in marsh sediment.

Two background DUs were established at Con Hook, with one DU on the Con Hook Hudson River shoreline (CHHRS) and one DU on the Con Hook marsh shoreline (CHMS) to evaluate background concentrations in sediment from each depositional environment. Each background DU consisted of eight non-contiguous sampling units (SUs) (CHHRS-SU-01 through CHHRS-SU-08 and CHMS-01 through CHMS-08) (**Figure 3-7**). Due to spatial constraints along the shoreline at Con Hook, each SU was sized at 0.15 acres (162 x 40.5 ft along the CHHRS and 81 ft x 81 ft along the CHMS).

3.3.3.2 ISM Sediment Sampling Methods

ISM samples at each onsite sediment DU were collected in triplicate (initial ISM sample plus two additional samples) for the purpose of calculating 95UCLs for each DU using statistical tests. Single incremental samples were collected from each of the SUs, to provide a background dataset of 8 ISM samples for each sediment DU (8 from CHHRS and 8 from CHMS).

Sediment increments were collected at each onsite DU and each background SU using the simple random sampling approach (ITRC 2020). Each onsite and background ISM sediment sample consisted of 50 increments of equal volume of sediment to allow for sufficient estimation of the reasonable unbiased estimate of concentrations across each onsite DU and each background SU. Increments for each sediment ISM sample were collected at a depth of 0–6 in. bgs, which is representative of the biological active zone.

Increments of equal volume were collected using a dedicated incremental sampling tool with plungers collecting soil equivalent to approximately 33.3 g in volume, which provided a total weight of 1 kg of sediment. Triplicate incremental samples collected within each onsite DU were comprised of sediment increments taken from different, randomly selected locations. Increments for each individual sample were placed into 5-gal buckets with sample-dedicated bucket liners. Following collection of the desired number of increments, the increments were combined into an "incremental sample."

Onsite and background ISM sediment samples were screened for pH and ORP in the field as detailed in Sections 3.4.1 and 3.4.2 of this RI report. Sediment geological characteristics including color, moisture, texture, grain size, sorting, lithology, etc. were recorded for each sediment DU.

A total of 9 onsite ISM sediment samples (initial and replicates) and 16 background ISM sediment samples (8 from CHHRS and 8 from CHMS) were collected for offsite laboratory analysis of metals and physical parameters. Analytical methods are presented in the bulletized list below. Sample collection information is presented in **Table 3-2**. Samples for offsite laboratory analysis were placed in individual labeled Ziploc bags, each containing approximately 1 kg of soil. Additional volume was included for QA/QC samples (MS/MSD). Sample handling and management and offsite laboratory analysis are detailed in Section 3.5 of this RI report.

- TAL metals by EPA Methods 6010C/6020A
- Mercury by EPA Method 71471B
- TOC by Walkley-Black
- Grain size by ASTM D422 (sieve and hydrometer).

3.3.4 Discrete Sediment AVS/SEM Sampling Tasks

The AVS/SEM analytical method is predicated on maintaining anoxic conditions required to sustain metal sulfide concentrations. Exposure of sediment samples to oxygen during sample collection and analysis can result in false positive assertions of metal bioavailability. Samples must be placed in sample jars with zero headspace immediately upon collection. Therefore, sediment samples could not be collected using ISM, which would expose sediment to oxygen during collection.

Discrete sediment AVS/SEM sampling was conducted on 19 April 2022 at low tide when sediment was exposed. Three discrete sediment samples were collected from each onsite sediment DU established for ISM sediment sampling (**Figure 3-6**). Each discrete sediment sample was collected from 0-6 in. bgs using disposable scoops and immediately placed into individual laboratory supplied sample containers. New disposable scoops were used at each sample location to avoid cross-contamination. Used scoops were bagged and disposed of as general debris/trash.

A total of 9 onsite discrete sediment samples were collected for offsite laboratory analysis of AVS/SEM by SM 4500-S2D and EPA Method 6010D. Additional volume was included for QA/QC samples (MS/MSD), and field duplicates were collected at a rate of 5 percent (1 per 20 samples). Sample collection information is presented in **Table 3-2**. Sample handling and management and offsite laboratory analysis are detailed in Section 3.5 of this RI report.

3.4 FIELD SCREENING

The following subsections detail field screening methods for soil pH and ORP, sediment pH and ORP, and surface water quality parameters (pH, temperature, specific conductance, DO, ORP, turbidity, and salinity). Calibration forms for the pH, ORP, and water quality meters are provided in **Appendix A**. Phase I pH results pH results were recorded by hand in the field book. Phase II onsite soil ORP results, onsite and background sediment pH and ORP results, and background water quality parameters were recorded electronically and uploaded directly into a sample collection tracker (excel file). Copies of the field book and electronic sample collection tracker are provided in **Appendix A**.

3.4.1 Soil and Sediment pH

pH for each Phase I ISM surface and subsurface soil sample and each Phase II ISM sediment sample was determined in the field due to time restraints regarding sample holding times. pH was measured using a pH (Oakton pH 50) meter in accordance with EPA Method 9045D “Soil and Waste pH”. The pH meter was calibrated in accordance with the manufacturer’s guidance prior to field screening. To measure soil pH, approximately 20 grams of well composited sample was mixed with 20 milliliters (mL) of deionized water and thoroughly homogenized. The suspension was allowed to rest to allow most of the suspended clay to settle out from the suspension. The pH meter was then used to measure the pH of soil.

3.4.2 Soil and Sediment ORP

ORP for each Phase II ISM soil and sediment sample was determined in the field due to time restraints regarding holding times. ORP was measured with an ORP meter (Milwaukee MW500 PRO ORP Meter) equipped with a double junction ORP electrode probe with a platinum sensor. The ORP meter was calibrated in accordance with the manufacturer's guidance prior to field screening. To measure field ORP, approximately 20 grams of well composited sample was mixed with 20 mL of deionized water and thoroughly homogenized. The suspension was allowed to rest to allow most of the suspended clay to settle out from the suspension. The ORP probe was then used to measure the field ORP. Standard hydrogen electrode corrected values were calculated based on the field ORP values and ORP meter electrode/filling solution (silver/silver chloride with 3.5 molar potassium chloride gel electrolyte).

3.4.3 Surface Water Quality Parameters

Surface water quality parameters were recorded in the field following using a submersible water quality meter (2016 YSI ProDSS) capable of measuring pH, temperature, specific conductance, DO, ORP, turbidity, and salinity. The water quality meter was calibrated daily prior to sampling activities in accordance with the manufacturer's guidance prior. The water quality meter probe was submerged and water quality parameters were allowed to stabilize before parameters were recorded.

3.5 SAMPLE HANDLING AND MANAGEMENT

Each sample collected for offsite laboratory analysis was assigned a unique alpha-numeric code to assist in the tracking of samples and to facilitate retrieval of analytical results. Sample bags/containers were labeled with weatherproof sample labels and waterproof ink containing the following information:

- Sample identification
- Sampling date and time
- Name of sampler
- Analysis requested
- Preservation technique.

Samples collected for offsite laboratory analysis were packaged and shipped in a manner that ensured the safety and accountability of each sample, and the procedures implemented were in accordance with applicable federal and local requirements. Samples were placed in clean, bubble wrap lined coolers. Double-bagged ice was packed around the samples, and a temperature blank was included with samples as required to document laboratory receipt temperature. A completed

chain-of-custody form was placed in a sealed plastic bag and taped to the inside lid of one of the coolers for each shipment. Coolers were sealed with tape and a custody seal was attached to protect the integrity of the samples. Environmental samples were then shipped to the analytical laboratories via overnight delivery service. Chain of custody forms are included in laboratory analytical reports presented in **Appendix B**. **Table 3-1** includes the laboratory report identifier for each sample collected during Phase I. Table 3-2 includes the laboratory report identifier for each sample collected during Phase II.

3.6 OFFSITE LABORATORY ANALYSIS

Upon receipt of analytical samples, the laboratories logged the samples into their laboratory information management systems and sent the work orders to EA for review and correction of any issues, if there were any (e.g., typos in sample names). Laboratory data were generated in accordance with the UFP-QAPP (EA 2020a) and UFP-QAPP Addendum (EA 2022b). Separate laboratory analytical reports were provided for each sample delivery group. Laboratory reports are included in **Appendix B**.

3.6.1 Phase I Analytical Samples

Phase I laboratory analytical services for ISM soil sample processing; analysis of ISM soil samples for TAL metals by EPA Methods 6010C/6020A, mercury by EPA Method 7471B, PAHs by EPA Method 8270D SIM, PCBs by EPA Method 8082A, explosives residues by Method 8330B, and BTEX by EPA Method 8260B; and analysis of discrete sediment samples for TOC by Walkley-Black and grain size by ASTM D422 were provided by laboratories holding DoD ELAP accreditation for specific matrix and analysis as follows:

- Eurofins TestAmerica in St. Louis, Missouri: processing of ISM soil metals (including mercury), Aroclor PCBs, and explosives residue samples via air drying and grinding
- Eurofins Test America in Denver, CO: analysis of ISM soil metals (including mercury), Aroclor PCBs, and explosives residue samples
- Eurofins TestAmerica, Denver, CO: processing and analysis of ISM soil BTEX samples
- Katahdin Analytical Services, LLC, Scarborough, ME: analysis of discrete sediment TOC and grain size samples.

ISM soil samples collected for analysis of PAHs, TAL metals, PCBs, and explosives samples were shipped to TestAmerica St Louis for processing. Samples were first air dried and disaggregated and then a slabcake was created and subsampled to create subsamples for different grinding methods, consistent with ISM methodology, as described in the laboratory SOP for subsampling. A subsample for analysis of TAL metals, PAH, and PCBs samples was ground using a rolling ball mill with steel paint cans and ceramic cylinders (90 percent burundum) as grinding media. A subsample for analysis of explosives was ground using a puck mill. Milling

durations were consistent between samples and consistent with ITRC guidance (ITRC 2020). The ground subsamples were formed into slabcakes and subsampled again to create aliquots for specific analyses. Following completion of sample processing, PAHs, TAL metals, PCBs, and explosives samples were shipped to Eurofins TestAmerica Denver, CO for analysis by EPA Method 8270D, EPA Method 6010C/6020A, EPA Method 7471B, EPA Method 8082A, and Method 8330B.

ISM soil samples collected for analysis of BTEX were shipped directly to Eurofins TestAmerica Denver for processing and analysis by EPA Method 8260B. These samples were not air dried or ground.

Discrete sediment samples collected for analysis of TOC and grain size were shipped directly to Katahdin Analytical Services, LLC for analysis by Walkley-Black and ASTM D422 (sieve and hydrometer).

Phase I samples were logged as part of 10 sample delivery groups. Field QC samples for Phase I included ISM triplicate soil samples, one methanol field blank collected with BTEX samples, and one VOC trip blank shipped with BTEX samples. Extra volume for site-specific MS/MSDs was submitted and analyzed, and the laboratories analyzed QC samples consistent with the requirements of the UFP-QAPP (EA 2020a).

3.6.2 Phase II Analytical Samples

Phase II laboratory analytical services for analysis of TAL metals by EPA Methods 6010C/6020A, mercury by EPA Method 7470/7471B, AVS/SEM by SM 4500-S2D and EPA Method 6010D, TOC by Walkley-Black, and grain size by ASTM D422 were provided by laboratories holding DoD ELAP accreditation for specific matrix and analysis. Laboratory analytical services for ISM processing via ball milling, CEC by EPA SW-846 Method 9081, and hardness by Method 2340B were performed by laboratories approved by the USACE chemist as presented in the UFP QAPP Addendum (EA 2022b).

- Eurofins TestAmerica in Canton, OH: processing of ISM physical parameters (TOC, grain size, and CEC) samples; and processing of ISM sediment metals (including mercury) and physical parameter (TOC and grain size) samples

- Eurofins TestAmerica, Denver, CO: analysis of ISM sediment metals (including mercury) samples discrete surface water dissolved metals (including mercury) and hardness samples

- Eurofins TestAmerica, Corpus Christi, TX: analysis of ISM soil CEC samples

- Eurofins Lancaster Laboratories, Inc., PA: analysis of discrete sediment AVS/SEM samples

- Katahdin Analytical Services, LLC, Scarborough, ME: analysis of ISM soil and sediment TOC and grain size samples.

ISM soil samples collected for analysis of TOC, grain size, and CEC were shipped to Eurofins TestAmerica Canton for processing. Each ISM soil sample was air dried, disaggregated, formed into a slabcake, and sub-sampled in accordance with ISM methodology to create aliquots for analysis of TOC, grain size, and CEC. Aliquots for TOC analysis were ground using a rolling ball mill with steel paint cans and ceramic cylinders (90% burundum) as grinding media and sieved per the analytical method. Milling durations were consistent between samples and consistent with ITRC guidance (ITRC 2020). Aliquots for grain size and CEC were not ground/milled, as grinding would change sample grain size and adsorption capacity. Following completion of sample processing, grain size and TOC aliquots generated from sample preparation were shipped to Katahdin Analytical Services, LLC, Scarborough, ME for analysis by Walkley-Black and ASTM D422 (sieve and hydrometer). CEC aliquots were shipped to Eurofins TestAmerica, Corpus Christi, TX for analysis by EPA SW-846 Method 9081.

Discrete surface water samples collected for analysis of dissolved metals (including mercury) and hardness samples were shipped directly to Eurofins TestAmerica Denver for analysis by EPA Methods 6010C/6020A EPA Method 7470A, and SM2340.

ISM sediment samples collected for analysis of metals (including mercury), TOC, and grain size, were shipped to Eurofins TestAmerica Canton for processing. Each ISM soil sample was air dried, disaggregated, formed into a slabcake, and subsampled for a grain size aliquot. The remainder of the sample was sieved and ground using a rolling ball mill with steel paint cans and ceramic cylinders (90% burundum) as grinding media. Milling durations were consistent between samples and consistent with ITRC guidance (ITRC 2020). The ground sample was then formed into a slabcake and subsampled to create aliquots for metals/mercury and TOC analysis. Following completion of sample processing, aliquots for metals (including mercury) analysis were shipped to Eurofins TestAmerica Denver for analysis by EPA Methods 6010C/6020A and EPA Method 71471B. Grain size and TOC aliquots generated from sample preparation were shipped to Katahdin Analytical Services, LLC, Scarborough, ME for analysis by Walkley-Black and ASTM D422 (sieve and hydrometer).

Discrete sediment samples collected for analysis of AVS/SEM were shipped directly to Eurofins Lancaster Laboratories, Inc., PA for analysis by SM 4500-S2D and EPA Method 6010D.

Phase II samples were logged as part of 20 sample delivery groups. Field QC samples for Phase II included ISM triplicate soil and sediment samples and field duplicates for discrete samples collected at a rate of 1 per 20 samples for each media. Extra volume for site-specific MS/MSDs was submitted and analyzed, and the laboratories analyzed QC samples consistent with the requirements of the UFP-QAPP (EA 2020a).

3.7 ANALYTICAL DATA MANAGEMENT AND VALIDATION

Analytical data were managed in the FUDS Online Chemical Database (FUDSChem) per the requirements specified in the New England District Data Management Plan to ensure data deliverables follow Performance Work Statement data requirements (USACE New England District, 2016). Prior to each phase of field sampling, an eQAPP within FUDSChem was created; the eQAPPs were fully compliant with the project UFP-QAPP (EA 2020a) and UFP-QAPP Addendum (EA 2022b), incorporating methods, sample types, and quality specifications (limit of detection [LOD], limit of quantitation [LOQ], holding time, QC sample acceptance limits, etc.). The pre-population of sampling event information was performed prior to initiation of each phase of field activities to ensure accurate database field matching and status tracking within FUDSChem. Data uploaded to FUDSChem prior to initiation of each phase of field activities included spatial information pertaining to DUs (northing, easting, elevation of the center of each DU, and keyhole markup language files for each DU), discrete sample location information, sample identification information, sample type, matrix, methods, etc. Following completion of sampling, chain-of-custody documents (ChemFields) were entered within FUDSChem using pre-populated data and information contained in the eQAPPs.

Data reporting requirements included QA/QC reviews of the data by the laboratory prior to data upload into the FUDSChem database. When the laboratories loaded the staged electronic data deliverables (SEDD) files into FUDSChem, they were automatically checked against the sample chains-of-custody to ensure that the correct sample designations and analyses were included. If any non-conformances were found, the SEDD was corrected and re-checked before it was accepted into the FUDSChem database.

Grain size data were not uploaded via SEDD, but instead were included in the PDF laboratory reports uploaded to the FUDSChem library. These data did not undergo the validation procedures described below but were evaluated separately for usability in accordance with the UFP-QAPP (EA 2020a) and UFP-QAPP Addendum (EA 2022b) for non-chemical data. Field screening data were also evaluated for usability. Field equipment calibration information was checked for accuracy, results of field screening data were reviewed for reviewed for anomalous results, and QC checks of results tables were performed before upload to FUDSChem.

Stage 2B Validation Electronic and Manual (S2BVEM) was completed using the FUDSChem software as discussed below. Validation was performed in accordance with the DoD Quality Systems Manual (QSM) Version 5.3 (DoD and DOE 2019) and DoD General Data Validation Guidelines (DoD 2019) with associated modules where available at the time of validation.

Once a SEDD was successfully uploaded and certified by the analytical laboratories in FUDSChem, an Automated Data Review process was automatically initiated. The ADR performed a Stage 2A data validation by comparing the SEDD to the approved eQAPP, summarizing QC outliers in an ADR Report, and applying data validation qualifiers to associated results. The EA Project Chemist and Data Manager then performed a Stage 2B data validation, which included reviewing the Stage 2A validation report against the PDF laboratory report, verifying/modifying qualifiers applied during the Stage 2A review, and manually reviewing QC

elements that were not included in the Stage 2A review. Stage 2A validation evaluates sample specific information and Stage 2B evaluates instrument performance as described in the DoD General Data Validation Guidelines (DoD 2019).

Data validation reports were prepared to summarize the data validation findings. The data validation reports were uploaded to the FUDSChem library for USACE chemist-approval. Approved data validation reports are presented in **Appendix C**. Section 4 of this RI report summarizes the findings of the data validation. DUA Reports in **Appendix D** present an assessment of data quality in terms of precision, accuracy, representativeness, completeness, comparability, and sensitivity.

3.8 RISK ASSESSMENTS

The purpose of the RI is to characterize the site by analyzing site data; assess contaminant nature and extent; evaluate potential risks to human health and the environment; and, in light of those risks, identify and screen alternatives for long-term remedial actions. One of CERCLA's primary mandates for remedial action is to attain cleanup that provides protection of human health and the environment. Risk assessments are used as tools to evaluate potential human health or ecological risks posed by exposure to COPCs and contaminants of potential ecological concern (COPECs). Both an HHRA and ERA were prepared using data collected during this HTRW RI (**Section 8**). The HHRA was prepared using data collected during this RI to evaluate the potential for adverse effects to human health from exposure to site-related COPCs detected in media affected by past site use (**Section 8.3**). The ERA was prepared to evaluate the potential for adverse effects to ecological receptors exposed to site-related COPECs (**Section 8.4**).

CERCLA identifies a detailed process for assessing risk that includes the use of a human health risk range of 10^{-4} to 10^{-6} as acceptable exposure levels for carcinogenic risks and a hazard index (HI) of 1 for non-carcinogenic risks. A HQ of 1 is used as a prediction of potential ecological risks.

3.9 DEVIATIONS FROM THE UFP-QAPP

The following presents deviations from the UFP-QAPP (EA 2020a) and UFP QAPP Addendum (EA 2022b) that relate to the collection of validated data:

- Soil at DU-8 was not sampled during Phase I due to the presence of debris that was not related to historical DoD operations, including numerous rusted and deteriorating 55-gal drums, deteriorating pallets, piles of roofing shingles, and chain-link fencing.

- DU-24 was not sampled during Phase I as the majority of the area consists of exposed bedrock with little to no soil cover.

- Subsurface soil was not collected at the following DUs during Phase I, due to refusal at less than 12 in. bgs: DU-01, DU-02, DU-03, DU-04, DU-05, DU-06, DU-07, DU-09,

DU-10, DU-11, DU-12, DU-13, DU-14, DU-515, DU-16, DU-22, DU-23, and DU-25 (see Section 3.1.2.2 of this RI report for more detail). This change did not impact data quality or usability.

- Subsurface soil was not collected during Phase I at BADU-1 through BADU-8 as the depth to refusal was less than 12 in. bgs. Surface soil was used as a surrogate to subsurface soil for background comparison purposes. This change did not impact data quality or usability.

- During Phase I, the ISM soil preparation was sent to Eurofins TestAmerica in St. Louis, Missouri, instead of Eurofins TestAmerica in Denver, Colorado. The change occurred because Eurofins TestAmerica's ISM preparation laboratory in Denver, Colorado, was over capacity at the time of sample collection. This change did not impact data quality or usability.

- One Phase II triplicate sample collected from DU-11 (IINY-DU-11C) was screened in the field for pH and ORP. However, the sample was misplaced and was not shipped to the analytical laboratory for analysis of TOC, CEC, and grain size. Laboratory analytical results are not available for this triplicate sample. Results from the two other samples collected from DU-11 (IINY-DU-11A and IINY-DU-11B) were used to evaluate bioavailability of metals in soil at DU-11. This change did not impact data quality or usability.

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4. DATA VALIDATION

This section presents the results of the Phase I and Phase II data quality assessment. Sample collection information for Phase I is presented in **Table 3-1**. Sample collection information for Phase II is presented in **Table 3-2**. Field screening and offsite laboratory analytical data collected during this RI included the following:

- Phase I ISM soil pH field screening data
  - 90 onsite ISM surface soil samples (initial and replicate) collected from 30 DUs (DU-1 through DU-7, DU-9 through DU-23, DU-25, EXDU-1 through EXDU-7)
  - 15 onsite ISM subsurface soil samples (initial and replicate) collected from 5 DUs (DU-17 through DU-22)
  - 8 background ISM surface soil samples (initial samples only) collected from background DUs in Bear Mountain State Park (BADU-1 through BADU-8) (initial samples only)
- Phase I ISM soil analytical data for TAL metals by EPA Method 6010C/6020A and mercury by EPA Method 7471B
  - 54 onsite ISM surface soil samples (initial and replicate) from 18 DUs (DU-1 through DU-7 and DU-9 through DU-19)
  - 9 onsite ISM subsurface soil samples (initial and replicate) from 3 DUs (DU-17 through DU-19)
  - 8 background ISM surface soil samples (initial samples only) from background DUs in Bear Mountain State Park (BADU-1 through BADU-8)
- Phase I ISM soil analytical data for PAHs by 8270D SIM
  - 48 onsite ISM surface soil samples (initial and replicate) from 16 DUs (DU-1 through DU-5, DU-9, DU-11 through DU-13, DU-16 through DU-19, DU-20 through DU-22)
  - 15 onsite ISM subsurface soil samples (initial and replicate) from 5 DUs (DU-17 through DU-22)
  - 8 background ISM surface soil samples (initial samples only) from background DUs in Bear Mountain State Park (BADU-1 through BADU-8)
- Phase I ISM soil analytical data for PCBs by EPA Method 8082A

— 15 ISM surface soil samples (initial and replicate) from 5 DUs (DU-17 through DU-19, DU-23, and DU-25)

— 9 ISM subsurface soil samples (initial and replicate) from 3 DUs (DU-17 through DU-19)

- Phase I ISM soil analytical data for explosives residues by Method 8330B

  — 30 ISM surface soil samples (initial and replicate) from 10 DUs (DU-17 through DU-19 and EXDU-1 through EXDU-7)

  — 9 onsite ISM subsurface soil samples (initial and replicate) from 3 DUs (DU-17 through DU-19)

- Phase I ISM soil analytical data for BTEX by Method 8260B

  — 6 onsite ISM subsurface soil samples (initial and replicate) from 2 DUs (DU-21 and DU-22)

- Phase II ISM soil field screening data for ORP and analytical data for TOC by Walkley-Black, grain size by ASTM D422 (sieve and hydrometer), and CEC by EPA SW-846 Method 9081

  — 24 onsite samples (initial and replicate) from 8 DUs (DU-4, DU-7, DU-9, DU-11, DU-13, DU-17, DU-18, and DU-19)

- Phase II discrete surface water sample analytical data for dissolved TAL metals by EPA Methods 6010C/6020A, dissolved mercury by EPA Method 7470A, and hardness by (SM2340B and water quality parameter field screening data (including pH, temperature, specific conductance, DO, ORP, turbidity, and salinity)

  — 20 onsite samples from AOC #16 – Area D (Former Dump Area) (DUMP-SW-01 through DUMP-SW-20)

  — 20 onsite samples from the Iona Island Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area) (IHRS-SW-01 through IHRS-SW-20)

  — 10 onsite samples from Iona Marsh at the outlet of the riprap filled drainage swale (RRDS-SW-01 through RRDS-SW-10)

  — 10 onsite samples from Iona Marsh at the outlet of the tidal wetland swale (TWS-SW-01 through TWS-SW-10)

  - 20 background samples along the Con Hook Hudson River shoreline (CHHRS-SW-01 through CHHRS-SW-20)

  - 20 background samples along the Con Hook Marsh shoreline (CHHRS-SW-01 through CHHRS-SW-20)

- Phase I discrete sediment analytical data for TOC by Walkley-Black and grain size by ASTM D422 (sieve and hydrometer)

  - 7 onsite samples (SD-01 through SD-07)

- Phase II ISM sediment field screening data for pH and ORP and laboratory analytical data for TAL metals by EPA Method 6010C/6020A, mercury by EPA Method 7471B, TOC by Walkley-Black, and grain size by ASTM D422 (sieve and hydrometer)

  - 9 onsite ISM samples (initial and replicate) from 3 onsite DUs (IHRS-SED-01, RRDS-SED-01, and TWS-SED-010)

  - 8 background ISM samples (initial samples only) from the Con Hook Hudson River shoreline (CHHRS-SU-01 through CHHRS-SU-08)

  - 8 background samples collected from the Con Hook marsh shoreline (CHMS-SU-01 through CHMS-SU-08)

- Phase II discrete sediment laboratory analytical data for AVS/SEM by SM 4500-S2D and EPA Method 6010D

  - 9 sample locations from 3 onsite DUs (IHRS-SED-01, RRDS-SED-01, and TWS-SED-010).

Laboratory analytical reports for Phase I soil and sediment samples and Phase II surface water, and sediment samples are presented in **Appendix B**. Analytical data packages were validated as described in Section 3.7 of this RI report, to confirm that the required laboratory components were included, QA/QC requirements were performed, and DQOs were met. Data validation reports are presented in **Appendix C**. DUA reports for Phase I and Phase II are presented in **Appendix D**. Note that both a DUA report and a FUDSChem DUA were included for Phase II. A FUDSChem DUA was not included for Phase I as the requirement was instituted after Phase I was completed.

4.1 ANALYTICAL RESULTS DATA QUALIFIERS

The analytical data were qualified and appropriately flagged during data validation. The qualifications were made by assessing the results submitted by the laboratory in terms of the technical requirements of the analytical methods (including QA/QC criteria) and data validation

requirements. Qualifiers that were applied during data validation are discussed in detail in each data validation report. The DUA focused on results that were qualified due to QC issues. The following qualifiers were applied to the reported data:

- No qualifier: The analyte was positively identified at the specified numerical value exceeding the LOQ, and no data quality issues necessitating validation were identified
- U: The analyte was not detected at a level greater than or equal to the associated numerical value (LOD or LOQ)
- J: The analyte was positively identified, and the associated numerical value is the approximate concentration of the analyte in the sample
- UJ: The analyte was not detected; however, the associated numerical value (LOD or LOQ) is approximate and may be inaccurate or imprecise
- "-": Result may be biased low. May be applied to J or UJ qualified data
- "+": Result may be biased high. May be applied to J or UJ qualified data
- R: The data are unusable. The sample results are rejected due to serious deficiencies in meeting the QC criteria. The analyte may or may not be present in the sample.

U-qualified data were reported to either the LOQ or the LOD. The laboratory LOD is defined as the lowest concentration for reliable reporting of a non-detect of a specific analyte in a specific matrix with a specific method at 99 percent confidence (DoD 2017). The smallest concentration that produces a quantitative result with known and recorded precision and bias is known as the LOQ. Method detection limits (MDLs) (e.g., the smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration with 99 percent confidence, as provided for each analyte by the laboratory) are reported along with the LODs and LOQs in the laboratory analytical reports. Non-detect (U-qualified) data are typically reported to the LOD. Results that are reported to the LOQ are due to blank contamination, or due to the LOD and LOQ having the same value (e.g., for a few explosives residues). Note that under the QSM, it is acceptable that the LOD and LOQ are equal in some cases, because the definitions of these two limits yield potential overlap. Results were reported to the LOQ instead of the LOD due to blank contamination and are in accordance with the National Functional Guidelines as indicated on worksheet #36 of the UFP-QAPP (EA 2020a) and UFP-QAPP Addendum (EA 2022b). National Functional Guidelines guidance indicates to qualify results less than the LOQ to the LOQ and qualify them as "U".

Analytical results reported at estimated concentrations between the DL and LOQ were qualified as estimated (J) with a qualifier reason code of TR (trace). Various data were also qualified as estimated (J or UJ) during data validation due to minor QC issues that affect the precision and/or accuracy of the data, as follows:

- Precision
  - MS/MSD relative percent difference (RPD) outside control limits (qualifier reason code = D)
  - Laboratory replicate RPDs outside control limits (qualifier reason code = D1)
  - Field duplicate (FD) RPDs outside control limits (qualifier reason code = D3)
  - Dual column RPDs outside QC limits (qualifier reason code = P1).
- Accuracy/Bias
  - Serial dilutions outside QC limits (qualifier reason code = A)
  - Sample preservation/collection requirement not met (qualifier reason code = P)
  - Improper preparation/extraction (qualifier reason code = P2)
  - Percent recovery (%R) outside QC limits in LCSs (qualifier reason code = C)
  - %R outside QC limits in MS/MSDs (qualifier reason code = M)
  - %R outside QC limits in the post digestion spike (qualifier reason code = M2)
  - Surrogate %R outside QC limits (qualifier reason code = I)
  - Continuing calibration verification percent difference (%D) outside QC limits (qualifier reason code = V2)
  - Detections in the laboratory blank (blank contamination) (qualifier reason code = L)
  - Exceedance of test hold time (qualifier reason code = H1)
  - PAH Extraction outside of the maximum hold time (qualifier reason code = H2).

Analytical data that were qualified during data validation were considered during the interpretation of the data for the HHRA and SLERA/RSLERA, and potential impacts of the estimated values are addressed in the data uncertainty sections within the HHRA (**Appendix G**) and SLERA/RSLERA (**Appendix H**).

4.2 PHASE I ANALYTICAL RESULTS DATA QUALITY REVIEW

Data quality indicators of precision, accuracy/bias, representativeness, completeness, comparability, and sensitivity (PARCCS) were used to validate and assess project data. The DUA in **Appendix D** covers each of the PARCCS parameters in detail. Of the 3,848 Phase I results that were reported, 1,058 were qualified during validation as presented in the following insert.

Insert 4-1. Summary of Phase I Results Qualified During Validation

Analyte Group	Total Results	Rejected Results	Qualified Results	J Qualified Detected Results	Qualified Results Greater than LOQ	Bias of Qualified Results		
						Low Bias	High Bias	Unknown Bias
Metals	1,624	0	100	83	73	28	32	40
PAHs	1,278	1	660	652	544	632	14	14
Explosives	663	0	232	5	3	186	0	46
PCBs	240	0	67	17	5	7	0	60
BTEX	36	0	0	0	0	N/A	N/A	N/A
TOC	7	0	0	0	0	N/A	N/A	N/A

Overall, 27.5 percent of the Phase I dataset was qualified due to data quality issues and is considered usable. The PAH data were more heavily impacted during data validation than data for other analytes due to holding times associated with ISM preparation and surrogate recovery. One result (dibenz[a,h]anthracene at BADU-4) was qualified as R (rejected) due to a major QC issue affecting accuracy (0 percent recovery in the surrogate, qualifier reason code = I) and is not considered usable. The number of J qualified data in this dataset is relatively high due to the nature of the soil samples, which resulted in analytical interferences as well as ISM sample processing challenges. Reasons for qualification are discussed in detail in **Appendix D**. However, based on evaluation against the project DQOs specified in the UFP-QAPP (EA 2020a), the Phase I data, as qualified, with the exception of one rejected result for dibenz(a,h)anthracene at BADU-4, are usable for the intended purposes of the RI, including use in HHRA and SLERA/RSLERA. The sensitivity objectives set forth in the project UFP-QAPP were met (EA 2020a). Some metals and explosives were reported with LODs and/or LOQs greater than the project action limits, consistent with the UFP-QAPP (EA 2020a).

The single rejected result for dibenz(a,h)anthracene in the background dataset was R qualified (rejected) due to a major QC issue. Only the 7 usable background results for dibenz(a,h)anthracene were used to calculate a background 95UCL for dibenz(a,h)anthracene. The number of 7 usable background samples is larger than the minimum number of 3 samples recommended by ITRC to conduct a two-sample hypothesis test comparing the onsite mean to the background mean. The estimated minimum significant difference (i.e., gray region) of the hypothesis test is 0.4 standard deviations of the between increment error at the 95% confidence level with power of 90%. In addition, the rejected dibenz(a,h)anthracene result was not used in the background evaluation or in risk assessments. The potential impacts of data qualified as estimated values and of cases where the LODs and LOQs exceeded screening values are addressed in uncertainty discussions in the HHRA and ERA.

4.3 PHASE II ANALYTICALRESULTS DATA QUALITY REVIEW

Data quality indicators of precision, accuracy/bias, representativeness, completeness, comparability, and sensitivity (PARCCS) were used to validate and assess project data. The DUA in **Appendix D** covers each of the PARCCS parameters in detail. Of the 3,126 results that were reported, 200 were qualified as estimated (J or UJ) or non-detect (U) during validation due to QC issues as presented in the following insert. Of the results not qualified during validation, 2,315 results were reported with no data quality concerns, of which 1,169 results were non-detects and 1,146 results were detections. The remaining 611 results were qualified as estimated (J-qualified) due to trace concentrations reported between the MDL and LOQ.

Insert 4-2. Summary of Results Qualified During Validation

Method/Analyte Group	Total Results	Rejected Results	Qualified Results	J - Qualified Detected Results	Qualified Results Greater than LOQ	Bias of Qualified Results		
						Low Bias	High Bias	Unknown Bias
SM2340B/Water Hardness	105	0	1	1	1	0	0	1
AVS	10	0	10	0	0	0	0	10
SW6010C/Metals	680	0	85	5	12	0	7	78
SW6010D/SEM	50	0	11	11	10	4	0	7
SW6020A/Metals	2,080	0	53	32	27	16	4	33
SW7470A/SW7471B/ Mercury	130	0	0	0	0	0	0	0
SW9081/CEC	23	0	23	23	23	0	0	23
WBLACK/TOC	48	0	17	17	17	0	1	16

Overall, 6.4 percent of the dataset was qualified due to data quality issues and is considered usable. The metals data by SW6010C were more heavily impacted during data validation than data for other analytes. Iron was the most impacted metal due to laboratory blank contamination. Overall, the percentage of data qualified was substantially less for Phase II than for the Phase I dataset (6.4 percent versus 27.5 percent). Reasons for data qualification included sample preparation and handling issues encountered during analyses by multiple laboratories, matrix interferences, and detections of metals in laboratory blanks associated with surface water samples. The sensitivity objectives set forth in the project UFP-QAPP Addendum were met (EA 2022b). Some metals were reported with LOQs greater than the project action limits, consistent with the UFP-QAPP Addendum (EA 2022b).

Initial CEC analytical results for Phase II soil reported by the analytical laboratory (Eurofins TestAmerica, Corpus Christi, TX) ranged from 1,500 to 1,800 milliequivalents per 100 grams of soil (meq/100g). Typical values should be 0 to 100 meq/100g. These results were deemed abnormally high by several orders of magnitude by the EA ecological risk assessor. The analytical laboratory was informed of the issue with analytical results, which made the initial data unusable. The analytical laboratory conducted an internal audit and identified a discrepancy stemming from incorrect labeling for reagents used during the preparation of the samples. A corrective action was implemented, CEC samples were re-analyzed, and results were presented

in a revised laboratory report. CEC Results were qualified as estimated due to issues with sample handling and due to due to lab replicate RPDs outside QC limits. The results from the reanalysis were determined to be usable with J qualification. Despite the data qualifications and uncertainties, CEC results from the re-analysis were typical of the range of CEC observed in New York Soil (Cornell University 2007). In addition, CEC results were not used in any quantitative calculations. In the ERA, the CEC results were incorporated into a qualitative discussion about the site-specific bioavailability of metals.

No results were rejected during data validation. Based on valuation against the project DQOs specified in the UFP-QAPP Addendum (EA 2022b), the Phase II data are considered usable as qualified for the intended purposes of the RI, including use in HHRA and SLERA/RSLERA. The potential impacts of data qualification and of cases where the LODs and LOQs exceeded screening values are addressed in uncertainty discussions in the HHRA and ERA.

4.4 FIELD SCREENING DATA QUALITY REVIEW

Field calibration forms and field logs were reviewed and verified. Field calibration checks, including end-of-day checks, met criteria and indicated that instrument calibration was stable. There are no data quality issues based on field calibration records.

Field screening results (pH, ORP, and surface water quality parameters) were reviewed and verified to ensure correct reporting of information and completeness. No errors were noted, although two ORP measurements (one for soil and one for sediment) were noted to be anomalous relative to other results from the same DU. All data were determined to be usable for the intended purposes. Details are provided in **Appendix D2**.

5. SITE PHYSICAL CHARACTERISTICS AND PHYSICAL PARAMETER RESULTS DISCUSSION

This Section presents site physical characteristics as observed during implementation of Phase I and Phase II field activities, and physical parameter field screening and analytical results for onsite and background media as presented in the bulletized text below. Onsite physical characteristics and physical parameter field screening and analytical results supplement the physical setting information presented in Section 1.6 of this RI Report.

- Results of the Phase I shoreline reconnaissance
- Observations recorded during Phase I and Phase II sampling activities (for example, soil depth and soil and sediment physical characteristics including color, moisture, texture, grain size, sorting, lithology, etc.)
- Phase I and Phase II soil physical parameter field screening and analytical results (pH, ORP, TOC, grain size, and CEC)
- Phase II surface water parameter field screening and analytical results (temperature, pH, specific conductivity, DO, ORP, turbidity, salinity, and hardness)
- Phase II sediment physical parameter field screening and analytical results (pH, ORP, TOC, and grain size).

This section also presents an evaluation of background representativeness for soil samples collected from Bear Mountain State Park and surface water and sediment collected from Con Hook.

5.1 PHASE I SHORELINE RECONNAISSANCE

The Phase I shoreline reconnaissance was conducted to document potential upland and aquatic receptors and evaluate whether the benthos provides suitable habitat for aquatic organisms. The reconnaissance was conducted along four reconnaissance areas (**Figure 3-3**):

- Recon Area 1 – Hudson River Shoreline
- Recon Area 2 – Iona Marsh Shoreline
- Recon Area 3 – Western Shoreline between Iona and Round Island
- Recon Area 4 – River Subdivision (CSX Transportation) railroad track embankment (west and east side).

The following sections present a summary of observations from the Phase I shoreline reconnaissance. The results of the shoreline reconnaissance survey are detailed in the Final Iona Island Shoreline Reconnaissance Survey Technical Memorandum that was submitted to USACE on 15 April 2020 (**Appendix E**).

5.1.1 Shoreline Observations

The majority of Recon Area 1 along the Hudson River shoreline consists of a non-contiguous stone river wall approximately 1,100 ft in length and 6 ft in height (**Figure 5-1**). Three large breaks were identified where the wall had partially collapsed, and small gaps between the stones were also observed along the length of the wall where the Hudson River passes through the wall at high tide and forms pockets of water behind the wall. The majority of the area along the river wall consists of exposed bedrock and gravel with the exception of some small pockets of sediment deposition. Areas of cobble boulder-sized stone were observed at the northern and southern ends of the river wall as well as at the identified wall breaks. The large stones were mostly submerged during high tide but exposed during low tide. The majority of the substrate in these areas consisted of cobble and course-grained sand. A coarse sand and gravel beach area was observed along the shoreline of AOC #16 – Area D (Former Dump Area). Glass fragments and beach glass were observed throughout the sand and gravel beach area.

Recon Area 2 Iona Marsh shoreline was divided by a railroad embankment which supports the active River Subdivision (CSX Transportation) railroad tracks (**Figure 3-3**). The western side of the railroad tracks south of the entrance road to Iona Island consists of a tidal marsh dominated by cattails (Typha spp.), while the area north of the entrance road is dominated by common reed (*Phragmites australis*). The eastern side of the railroad tracks is dominated by an extremely dense monotypic stand of common reed (*Phragmites australis*). Fine-grained sediment bottom was observed within the marsh.

Recon Area 3 consisted of the shoreline area on the southwest side of Iona Island and western portion of Round Island, including the low-lying area between the two islands (**Figure 3-3**). The area has been altered with historic fill and disturbance. A mix of Phragmites tidal wetland was noted on the southern and western end of Recon Area 3 (**Figure 5-1**). A tidal wetland swale consisting of various plant species was observed at the northern edge of Recon Area 3, and a riprap filled drainage swale was observed at the southern end of Recon Area 3.

Recon Area 4 along the railroad track embankment primarily consists of riprap along an upland embankment. Scrub-shrub upland was observed along the edge of the riprap in the northern portion of Recon Area 4. A transition from riprap to existing marsh associated with Recon Area 2 was noted at the southern end of Recon Area 4.

5.1.2 Surface Water Drainage Pathways

Surface water drainages were not noted in Recon Area 1 (Hudson River Shoreline) or Recon Area 2 (Iona Marsh Shoreline) (**Figure 3-3**). In addition, no culverts were identified beneath the railroad embankment in Recon Area 4 (River Subdivision [CSX Transportation] railroad track

embankment [west and east side]) that could connect drainage from Iona Island on the east of the railroad embankment to the marsh on the western side of the railroad embankment. One hydrological connection through the railroad embankment was noted outside the project area at an embankment opening (i.e., shallow bridge) south of Round Island.

Preferential surface water drainage pathways were noted in Recon Area 3 (western shoreline between Iona and Round Island) (**Figure 5-1**). The southern end of Iona Island in Recon Area 3 appears to drain down towards a low point between Iona Island and Round Island. This area slopes slightly to the southeast to a riprap filled drainage swale that directs flow to the south, towards the tidal marsh associated with Recon Area 2. In addition, a tidal wetland swale identified along Recon Area 3 appears to convey flow to the west toward the tidal marsh associated with Recon Area 2. Metal debris (e.g., rebar, old fencing, and other metal pieces) were observed in the riprap filled drainage swale.

An isolated wetland depression was noted just north of Recon Area 3 on the north side of the Iona Island perimeter road (**Figure 5-1**). This depression appears to collect surface runoff from Iona Island; however, there was no culvert observed beneath the road that connected this depression to the tidal wetland swale within Recon Area 3.

5.1.3 Wildlife and Vegetation Observations

Wildlife and vegetation observed during the Phase I RI shoreline reconnaissance was documented to determine potential ecological receptors at the site. Only incidental observations were included. A formal survey for specific species was not conducted. In general, the observations made are consistent of what would be expected for the habitat areas described in Section 1.6.10 of this RI report. **Table 5-1** presents a list of wildlife observations along with the general recon area depicting where each species was identified. No stressed vegetation (terrestrial plant community) was observed during the shoreline reconnaissance. In addition, based on wildlife observations, Island has a thriving bird and mammal population (**Appendix E**).

Common reed *(Phragmites australis)* and cattail (*Typha angustifolia*) were the dominant aquatic vegetation. The upland habitat consists primarily of invasive species including Japanese barberry (*Berberis thunbergii*), multiflora rose (*Rosa multiflora*), wineberry (*Rubus phoenicolasius*), and Japanese honeysuckle (*Lonicera japonica*). Other dominant species located within the upland areas included maples (*Acer spp.*), *Forsythia spp*., devil's walking stick (*Aralia spinosa*), and red cedar (*Juniperus virginiana*). Milkweed (*Asclepias syriaca*) was also identified.

5.2 PHASE I AND PHASE II ONSITE SOIL PHYSICAL PARAMETERS

The Phase I and Phase II ISM onsite soil physical parameters results for each sample collected during this RI are presented in the following tables:

- **Table 5-2**: Soil observations (including soil depth to refusal and geologic description) and pH field screening results for each Phase I triplicate sample

- **Table 5-3**: ORP, TOC, CEC, and grain size analytical results for each Phase II triplicate sample collected.

Of the 32 onsite soil DUs established to evaluate soil at Iona Island, 29 were established in the upland terrestrial environment of Iona Island where upland soil is present (DU-1 through DU-16, DU-20 through DU-25, and EXDU-1 through EXDU-7). DU locations are presented in **Figure 3-1**. Note that DU-8 and DU-24 were not sampled during this RI, as discussed in Section 3.1.2.2 and summarized in Section 3.9 of this RI report. The remaining 3 DUs were established within the marsh area between Iona and Round Islands at AOC #16 – Area D (Former Dump Area) where hydric soil is present (DU-17, DU-18, and DU-19). Physical parameter results for each environment are discussed in the subsections below. Summary statistics (mean, median, and range) for upland soil, AOC #16 – Area D (Former Dump Area) surface soil, and sitewide surface soil physical parameters (pH, ORP, TOC, CEC, and grain size percentages) are presented in **Table 5-4**.

5.2.1 Upland Soil Physical Parameters

The subsections below present the soil physical characteristics for the upland area based on observations during Phase I and Phase II sampling, soil field screening sample results, and soil analytical results.

5.2.1.1 Physical Characteristics Observations

Soil encountered across the upland area of Iona Island during the Phase I investigation was shallow, with a depth to refusal ranging from 6 to 12 in. bgs (**Table 5-2**). Refusal in the majority of DUs was encountered at less than 8 in. bgs. Deeper soil in the upland portion of Iona Island was encountered at DU-20 and DU-21, where refusal was encountered at 18 and 24 in. bgs, respectively). DU locations are presented in **Figure 3-1**.

Surface soil in the upland area of Iona Island was described as brown, dry silt with varying amounts of organic material and trace amounts of coarser-grained material (ranging from very fine sand to coarse gravel). Based on physical observations, surface soil was classified as ML (silt) and OL (organic silt) using the Unified Soil Classification System (USCS) (ASTM 2006). Subsurface soil in upland DUs (i.e., DU-20 and DU-21) was described as brown, dry silt with trace fine- to coarse-grained sand and fine- to coarse-grained gravel. Surface soil was classified as ML (silt) using the USCS (ASTM 2006).

5.2.1.2 pH Field Screening Results

Surface soil pH in the upland area of Iona Island ranged from 5.4 to 7.5 (**Table 5-4**). The mean pH in upland surface soil for each DU is depicted on **Figure 5-2**.

5.2.1.3 ORP Field Screening Results

Upland surface soil field ORP results ranged from 225 to 402 mV, while calculated standard hydrogen electrode corrected ORP results ranged from 430 to 607 mV (**Table 5-4**). One upland surface soil ORP reading at DU-07 (field ORP of 402 mV and calculated standard hydrogen electrode corrected ORP of 607 mV) was elevated compared to the replicate samples at DU-07 (field readings of 307 and 310 mV and calculated standard hydrogen electrode corrected ORP values of 512 to 515 mV) (**Table 5-3**). This elevated reading was also outside the range of ORP values for the remaining 14 upland ORP field screening values (field readings of 225 to 322 mV and calculated standard hydrogen electrode corrected ORP values of 430 to 527 mV).

5.2.1.4 Grain Size Analytical Results

Surface soil grain size across the upland DUs sampled during Phase II (DU-04, DU-07, DU-09, DU-11, and DU-13) was characterized by silt, medium sand, and fine sand with lesser amounts of gravel, clay, and coarse sand (**Table 5-4**). Based on grain size analysis, surface soil is classified as silty sand (SM) to sandy silt (ML) using the USCS (ASTM 2006).

5.2.1.5 TOC Analytical Results

TOC concentrations in upland surface soil ranged from 13,000 to 46,000 mg/kg (**Table 5-4**).

5.2.1.6 CEC Analytical Results

CEC re-analysis results for upland soil ranged from 23 meq/100g at DU-11 to 39 meq/100g at DU-13 (**Table 5-4**). Analytical results were similar to estimated CEC in soils typical for New York State agricultural land (12-25 meq/100g) (Cornell University 2007).

5.2.2 AOC #16 – Area D (Former Dump Area) Soil Physical Parameters

The subsections below present the soil physical characteristics for AOC #16 – Area D (Former Dump Area) based on observations during Phase I and Phase II sampling, soil field screening sample results, and soil analytical results.

5.2.2.1 Physical Characteristics Observations

Refusal/bedrock was not encountered in AOC #16 – Area D (Former Dump Area) during this RI or during previous investigations (see Section 1.5 of this RI report). Test pits excavated in AOC #16 – Area D (Former Dump Area) during the MMRP intrusive investigation could not go beyond 3 to 4 ft bgs inches due to test pits filling with water (EA 2021). Borings advanced during this RI in DU-17, DU-18, and DU-19 within AOC #16 – Area D (Former Dump Area) were terminated at 3 ft bgs.

Surface soil in the marsh area between Iona and Round Islands (AOC #16 – Area D (Former Dump Area) was described as dark brown, moist, moderately to well sorted silt with organic

material and trace fine-grained sand. Based on physical observations, surface soil was classified as ML (silt) and OL (organic silt) using the USCS (ASTM 2006).

Subsurface soil consisted of fill material that varied from black, very moist, poorly sorted sand at DU-17 to dark brown to dark grey (with a bluish tint), well sorted silt with trace fine-grained sand (DU-18 and DU-19). Subsurface soil at DU-17 was classified as SW (well-graded sand) while subsurface soil at DU-18 and DU-19 was classified as ML (silt) using the USCS (ASTM 2006).

Burn pit material and debris (including ash and foundry sand) was noted in test pits excavated in AOC #16 – Area D (Former Dump Area) during the MMRP intrusive investigation (EA 2021). This material potentially originates from a former incinerator (Former Building 121) that was located near the Hudson River shoreline immediately north/northwest of AOC #16 – Area D (Former Dump Area) within DU-17.

5.2.2.2 pH Field Screening Results

pH of surface soil within AOC #16 – Area D (Former Dump Area) ranged from 7.1 to 8.0. pH in subsurface soil within AOC #16 – Area D (Former Dump Area) ranged from 7.0 to 8.1 (**Table 5-4**).

5.2.2.3 ORP Field Screening Results

Field ORP values for surface soil from AOC #16 – Area D (Former Dump Area) ranged from 275 to 300 mV, while calculated standard hydrogen electrode corrected ORP values ranged from 480 to 505 mV (**Table 5-4**).

5.2.2.4 Grain Size Analytical Results

Surface soil grain size in AOC #16 – Area D (Former Dump Area) was characterized primarily by silt, medium sand, and fine sand with lesser amounts of coarse sand, gravel, and clay. Surface soil at DU-18 was coarser-grained than that of DU-17 and DU-19, with higher percentages of medium sand and lower percentages of silt noted in two of the three triplicate samples (**Table 5-4**). Based on grain size analysis, soil at AOC #16 – Area D (Former Dump Area) was classified using the USCS (ASTM 2006) as follows:

- DU-17: SM/GM (silty sand and silty sand with gravel)
- DU-18: SM and SP-SM (silty sand and poorly graded sand with silt)
- DU-19: SM (silty sand).

5.2.2.5 TOC Results

TOC concentrations in AOC #16 – Area D (Former Dump Area) surface soil ranged from 25,000 to 300,000 mg/kg (**Table 5-4**). TOC concentrations at DU-18 (120,000 to 300,000 mg/kg) were an order of magnitude higher than those in DU-17, DU-19 mg/kg (25,000 to 47,000 mg/kg) (**Table 5-3**).

5.2.2.6 CEC Analytical Results

CEC results for surface soil within AOC #16 – Area D (Former Dump Area) ranged from 30 meq/100g at DU-18 to 91 meq/100g at DU-18. With the exception of DU-18, analytical results were similar to estimated CEC in soils typical for New York State agricultural land (12-25 meq/100g) (Cornell University 2007).

5.3 PHASE I AND PHASE II GROUNDWATER OBSERVATIONS

Groundwater was not encountered in upland areas during the Phase I and Phase II soil sampling. AOC #16 – Area D (Former Dump Area) is influenced by the Hudson River and inundated with water twice daily during high-tide and during storm events, with soil saturated to ground surface.

5.4 PHASE II SURFACE WATER PHYSICAL PARAMETERS

Surface water was collected from three onsite areas for field screening of water quality parameters (temperature, pH, specific conductivity, DO, ORP, turbidity, and salinity) and analysis of hardness. Onsite areas included the following (**Figure 3-5**):

- AOC #16 – Area D (Former Dump Area)
- Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area)
- Iona Marsh shoreline at the outlets of the riprap filled drainage swale and tidal wetland swale.

Water quality parameter results for each area are summarized in the lists below. Surface water quality parameters for each sample collected within each area are presented in **Table 5-5**. Summary statistics (mean, median, and range) of water quality parameters from each onsite area are presented in **Table 5-6** for comparison purposes.

- AOC #16 – Area D (Former Dump Area)
  - Temperature: 9.31 to 12.7 degrees Celsius
  - pH: 6.65 to 7.69

  - Specific Conductivity: 0.1849 to 0.3789 MilliSiemens per centimeter (mS/cm)
  - DO: 7.18 to 11.27 milligrams per liter (mg/L)
  - Field ORP: 58.9 to 236.5 mV
  - Standard Hydrogen Electrode ORP: 258.9 to 436.5 mV
  - Turbidity: 10.11 to 88.4 nephelometric turbidity units (NTU)
  - Salinity: 0.11 to 0.25 ppt
  - Hardness (as CaCO3): 53 to 75 mg/L.
- Hudson River adjacent to AOC #16 – Area D
  - Temperature: 9.6 to 10.3 degrees Celsius
  - pH: 7.68 to 7.78
  - Specific Conductivity: 0.1705 to 0.1804 mS/cm
  - DO: 11 to 11.9 mg/L
  - Field ORP: 149.1 to 172.3 mV
  - Standard Hydrogen Electrode ORP: 349.1 to 372.3 mV
  - Turbidity: 89.45 to 109.8 NTU
  - Salinity: 0.12 to 0.13 ppt
  - Hardness (as CaCO3): 59 to 82 mg/L
- Iona Marsh
  - Temperature: 11.7 to 13.6 degrees Celsius
  - pH: 7.57 to 8.01
  - Specific Conductivity: 0.181 to 0.3397 mS/cm
  - DO: 9.95 to 11.64 mg/L

— Field ORP: 154.8 to 228 mV

— Standard Hydrogen Electrode ORP: 354.8 to 428 mV

— Turbidity: 63.94 to 112.31 NTU

— Salinity: 0.12 to 0.21 ppt

— Hardness (as CaCO3): 67 to 93 mg/L.

5.5 PHASE I DISCRETE SEDIMENT GRAIN SIZE AND TOC RESULTS

Seven discrete sediment samples were collected along the Hudson River and Iona Marsh shorelines (SD-1 through SD-7) during Phase I analysis of TOC and grain to evaluate whether sediments could be a potential "sink" for site-related contaminants. Phase I discrete sediment sampling locations are presented in **Figure 5-1**. TOC and grain size results for each discrete sediment sample collected during Phase I, as well as summary statistics (mean, median, and range) for the Hudson River shoreline and Iona Marsh shoreline, are presented in **Table 5-7**. A summary of results for each shoreline is presented in the subsections below.

5.5.1 Hudson River Shoreline

Grain size results for discrete Hudson River shoreline samples (SD-04, SD-05, and SD-06) indicate that Hudson River shoreline sediment consists primarily of medium to fine sand with lesser amounts of gravel and coarse sand. Hudson River shoreline sediment samples were classified as SW (well-graded sand) using the USCS (ASTM 2006).

TOC in Hudson River shoreline sediment ranged from 960 to 31,000 mg/kg.

5.5.2 Iona Marsh Shoreline

Grain size results for discrete Iona Marsh shoreline samples (SD-01, SD-02, SD-03, and SD-07) indicate that marsh shoreline sediment consists of mostly silt. Iona Marsh shoreline sediment samples were classified as ML (silt) using the USCS (ASTM 2006).

TOC concentrations in marsh sediment ranged from 62,000 to 110,000 mg/kg).

5.6 PHASE II ISM SEDIMENT PHYSICAL PARAMETER RESULTS

pH, ORP, grain size, and TOC data was collected from the Hudson River and Iona Marsh shorelines as follows (**Figure 3-6):**

- Hudson River shoreline adjacent to the northeastern boundary of AOC #16 – Area D (Former Dump Area) (IHRS-DU-01)

- Iona Marsh shoreline at the outlets of the riprap filled drainage swale (RRDS-DU-01) and tidal wetland swale (TWS-DU-01).

Table 5-8 presents the Phase II onsite ISM sediment pH, ORP, grain size, and TOC results for each triplicate sample in each onsite sediment DU. **Table 5-9** presents summary statistics (mean, median, and range) of each physical parameter (pH, ORP, TOC, and grain size percentages) for sediment from each shoreline (Hudson River and Iona Marsh) for comparison purposes. A summary of Phase II ISM sediment physical parameters for each shoreline is presented in the subsections below. **Table 5-10** presents the AVS/SEM analytical results for each sample collected from each shoreline.

5.6.1 Hudson River Shoreline Sediment

The subsections below present the Hudson River Shoreline characteristics based on observations during Phase II sampling, sediment field screening sample results, and sediment analytical results.

5.6.1.1 Physical Characteristics Observations

A small sand and gravel beach encompassing approximately 0.2 acres is located along the Hudson River shoreline at the northeastern edge of AOC #16 – Area D (Former Dump Area). The beach area is exposed at low tide and inundated twice daily during high tide and during storm events. The northwestern edge of the beach area along AOC #16 – Area D (Former Dump Area) terminates at the river wall that extends northwestward along the Iona Island shoreline. The southeastern edge of the beach terminates along Round Island approximately 240 ft beyond downstream from AOC #16 – Area D (Former Dump Area).

5.6.1.2 pH Field Screening Results

pH in sediment along the Iona Island Hudson River shoreline ranged from 6.6 to 6.9 (**Table 5-8** and **Table 5-9**).

5.6.1.3 ORP Field Screening Results

Field ORP measurements from Iona Island Hudson River shoreline sediment were 493, 512, and 754 mV, while calculated standard hydrogen electrode corrected ORP results were 698, 717, and 959 mV (**Table 5-8** and **Table 5-9**). The 754-mV field screening value (959 mV calculated standard hydrogen electrode corrected ORP value) was elevated compared to the replicate readings and is likely anomalous.

5.6.1.4 Grain Size Analytical Results

Hudson River shoreline sediment grain size was characterized by medium sand with lesser amounts of coarse sand, fine sand, and gravel (**Table 5-8** and **Table 5-9**). Based on grain size analysis, sediment was classified as SP (poorly-graded sand) using the USCS (ASTM 2006).

This is consistent with sediment observed in the sand and gravel each area along the Hudson River shoreline at the northeastern edge of AOC #16 – Area D (Former Dump Area).

5.6.1.5 TOC Analytical Results

TOC concentrations in sediment along the Iona Island Hudson River shoreline ranged from 2,600 to 4,500 mg/kg (**Table 5-8** and **Table 5-9**).

5.6.1.6 AVS/SEM Analytical Results

AVS/SEM analytical results from the Hudson River Shoreline ranged from 25,747 to 55,778 micromoles per grams organic carbon (µmol/g_{oc}) (**Table 5-10**).

5.6.2 Iona Marsh Shoreline

The subsections below present the Iona Marsh Shoreline characteristics based on observations during Phase II sampling, sediment field screening sample results, and sediment analytical results.

5.6.2.1 Physical Characteristics Observations

Sediment along the Iona Marsh shoreline at the outlets of both the riprap filled drainage swale and tidal wetland swale was described as dark brown silt with organic material and very fine-grained sand. Based on physical observations, sediment was classified as ML (silt) using the USCS (ASTM 2006).

5.6.2.2 pH Field Screening Results

pH in Iona Marsh sediment ranged from 7.0 to 7.4 (**Table 5-9**), with similar pH sediment in sediment from both drainage outlet locations (7.1 to 7.3 at the outlet of the riprap filled drainage swale and 7.0 to 7.4 at the outlet of the tidal wetland swale; **Table 5-8)**.

5.6.2.3 ORP Field Screening Results

Field ORP in Iona Marsh sediment ranged from 296 to 342 mV, while calculated standard hydrogen electrode corrected ORP results ranged from 501 to 547 (**Table 5-9**). Field and calculated standard hydrogen electrode corrected ORP in sediment were similar at both drainage outlet locations (**Table 5-8**):

- Field ORP ranging from 310 to 342 mV at the outlet of the riprap filled drainage swale and from 296 to 333 mV at the outlet of the tidal wetland swale.

- Calculated standard hydrogen electrode corrected ORP results ranging from 515 to 547 mV at the outlet of the riprap filled drainage swale and from 501 to 538 mV at the outlet of the tidal wetland swale (**Table 5-8**).

5.6.2.4 Sediment Grain Size Analytical Results

Iona Marsh shoreline sediment grain size was characterized by silt and clay at each drainage outlet location (**Table 5-8** and **Table 5-9**). This is consistent with physical observations and the classification of Iona Marsh shoreline as ML (silt) using the USCS (ASTM 2006).

5.6.2.5 Sediment TOC

TOC concentrations in Iona Marsh shoreline sediment ranged from 60,000 to 88,000 mg/kg (**Table 5-8**). TOC concentrations at the outlet of the riprap filled drainage swale (73,000 to 88,000 mg/kg) were slightly higher than concentrations at the outlet of the riprap filled drainage swale (60,000 to 64,000 mg/kg) (**Table 5-8**).

5.6.2.6 Sediment AVS/SEM

AVS/SEM analytical results for Iona Marsh sediment ranged from -6 to 9 µmol/g_{oc} at the outlet of the riprap filled drainage swale and from -0.5 to 12 at the outlet of the tidal wetland swale (**Table 5-10**).

5.7 BACKGROUND SOIL REPRESENTATIVENESS

Background soil sampling was conducted to establish regional background metals and PAH concentration ranges in soil. Metals and PAH background concentrations were obtained from 8 DUs established in Bear Mountain State Park. Background DU locations are presented in **Figure 3-2**. A comparison of background and onsite soil physical properties (i.e., soil type, soil depth) and geochemical properties (i.e., soil pH and elemental ratios) was conducted to evaluate whether background soil was an accurate representative of onsite soil. The following subsections present the background physical and geochemical property results and comparisons to onsite soil.

5.7.1 Background Soil Physical Properties Comparisons

Depth to refusal and soil physical parameters for each background DU in Bear Mountain State Park are presented in **Table 5-2**. Depth to refusal in background sampling locations was less than 12 inches. Surface soil types in background DUs were described as brown, slightly moist silt with organics, trace clay and very fine-grained sand (OL USCS classification) (ASTM 2006).

Logged surface soil data from background DUs was directly compared with logged surface soil data from onsite DUs to determine if soil types were comparable. Soil depth and soil type in background DUs were similar to the soil depth and soil type observed in onsite upland DUs presented in Section 5.2.1.1 of this RI report (depth less than 12 inches and SM and OL

classification [ASTM 2006]). Soil depth and type differed from that at AOC #16 – Area D (Former Dump Area) (depth greater than 3 ft bgs, ML soil classification [ASTM 2006]).

5.7.2 Background Soil pH Comparisons

pH values in background surface soil ranged from 5.9 to 6.7 (**Table 5-2**). Background soil pH means, medians, and ranges were compared to onsite soil pH means, medians, and ranges. These values were consistent with pH values for onsite upland soil (**Table 5-4)**. However, background pH values were less than pH means, medians, and ranges for AOC #16 – Area D (Former Dump Area) soil.

5.7.3 Background Soil Elemental Ratios Comparisons

Elemental ratios (calcium to magnesium, aluminum to iron, and nickel to total chromium) were used to further compare background and onsite soil. The background and onsite elemental ratio ranges, means, and medians, as well as box plots visualizing the relationship between background and onsite soil, are presented in **Figure 5-3** (calcium to magnesium), **Figure 5-4** (aluminum to iron), and **Figure 5-5** (nickel to total chromium). Based on elemental ratios, background soil is similar to onsite upland soil. However, soil elemental ratios for background soil were not consistent with elemental ratios for AOC #16 – Area D (Former Dump Area) soil.

5.7.4 Background Soil Representativeness Conclusions

Based on soil background soil physical and geochemical properties comparisons, background soil was representative of onsite upland soil.

Physical soil properties, pH, and soil elemental ratios differed between background soil and AOC #16 – Area D (Former Dump Area) soil. AOC #16 – Area D (Former Dump Area) is a fill area with observed burn pit material and debris (including ash and foundry sand). It is not expected that background native soil would be consistent with or representative of fill material. However, comparisons could still be made to determine if metals and PAH concentrations in AOC #16 – Area D (Former Dump Area) soil were consistent or less than background.

5.8 BACKGROUND SURFACE WATER REPRESENTATIVENESS

Background surface water sampling was conducted to determine regional background metals concentrations. Metals concentrations in surface water were obtained from Con Hook along both the Hudson River and marsh shorelines. Background surface water sampling locations are presented in **Figure 3-7**.

Comparisons of background surface water quality parameters (pH, temperature, specific conductance, DO, ORP, turbidity, salinity, and hardness) was conducted to evaluate whether background shoreline environments at Con Hook were accurate representatives of onsite areas investigated during Phase II (Iona Island Hudson River shoreline adjacent to AOC #16 – Area D [Former Dump Area] and Iona Marsh shoreline at the outlets of the riprap filled drainage swale

and tidal wetland swale). A quantitative statistical approach (statistical hypothesis tests) was used to compare onsite and background water quality parameter data. Evaluations were conducted for each depositional environment. Water quality parameter means, medians, and ranges from the Con Hook Hudson River shoreline were compared those from the Iona Island Hudson River shoreline. Water quality parameter means, medians, and ranges from the Con Hook Marsh shoreline were compared to those from the Iona Marsh shoreline.

Table 5-5 presents surface water quality parameter data for each sample collected from the Con Hook Hudson River and Con Hook marsh shorelines. **Table 5-6** presents summary statistics of surface water quality parameters for each background shoreline, as compared to surface water quality parameters from the Iona Island Hudson River and Iona Marsh shorelines.

5.8.1 Con Hook Hudson River Shoreline Surface Water Representativeness

Surface water quality parameter results for the Con Hook Hudson River shoreline are summarized in the list below (**Table 5-5** and **Table 5-6**).

- Temperature: 9.6 to 10.9 degrees Celsius
- pH: 7.47 to 7.91
- Specific Conductivity: 0.125 to 0.2384 mS/cm
- DO: 11.06 to 11.69 mg/L
- Field ORP: 96.4 to 194.8 mV
- Standard Hydrogen Electrode ORP: 296.4 to 394.8 mV
- Turbidity: 42.7 to 237.1 NTU
- Salinity: 0.11 to 0.12 ppt
- Hardness (as CaCO3): 69 to 74 mg/L.

Box plots visualizing the relationship between onsite and background Hudson River shoreline surface water quality parameters are presented in **Figure 5-6**. Surface water quality parameters from the Iona Island Hudson River shoreline were either within the range of or similar to those from the Con Hook Hudson River shoreline. Therefore, Con Hook Hudson River shoreline background locations were representative of the Iona Island Hudson River shoreline.

5.8.2 Con Hook Marsh Shoreline Surface Water Representativeness

Surface water quality parameter results for the Con Hook marsh shoreline are summarized in the list below (**Table 5-5** and **Table 5-6**).

- Temperature: 10.5 to 14.8 degrees Celsius
- pH: 6.52 to 7.57
- Specific Conductivity: 0.1794 to 0.693 mS/cm
- DO: 2.67 to 10.85 mg/L
- Field ORP: 52.7 to 193.9 mV
- Standard Hydrogen Electrode ORP: 252.7 to 393.9 mV
- Turbidity: 8.8 to 639 NTU
- Salinity: 0.11 to 0.43 ppt
- Hardness (as CaCO3): 31 to 120 mg/L.

Box plots visualizing the relationship between background and onsite marsh shoreline surface water quality parameters are presented in **Figure 5-7**. Surface water quality parameters from the Iona Marsh shoreline were either within the range of or similar to those from the Con Hook marsh shoreline. Therefore, the Con Hook marsh surface water background locations were representative of onsite Iona Island shoreline.

5.9 BACKGROUND SEDIMENT REPRESENTATIVENESS

Background sediment sampling was conducted to determine regional background metals concentrations. Metals concentrations in sediment were obtained from DUs at Con Hook along both the Hudson River and marsh shorelines. Background sediment sampling locations are presented in **Figure 3-7**. Comparisons of background and onsite shoreline and sediment observations (shoreline conditions, vegetation, and sediment types) and sediment physical parameter data (pH, ORP, TOC, and grain size) was conducted to evaluate whether background shoreline environments at Con Hook were accurate representatives of onsite areas investigated during Phase II (Iona Island Hudson River shoreline adjacent to AOC #16 – Area D [Former Dump Area] and Iona Marsh shoreline at the outlets of the riprap filled drainage swale and tidal wetland swale).

Background representativeness was determined for each depositional environment. The Con Hook Hudson River shoreline was compared to the Iona Island Hudson River shoreline. The Con Hook marsh shoreline was compared to the Iona marsh shoreline. Shoreline conditions,

vegetation, and sediment types were directly compared between background and onsite locations. Additionally, a quantitative statistical approach (statistical hypothesis tests) was used to compare onsite and background sediment physical parameter data. Background and onsite sediment TOC, ORP, pH, and grain size percentage means, medians, and ranges were compared for each depositional environment.

Table 5-8 presents sediment physical parameters for each sample collected from the Con Hook Hudson River and Con Hook marsh shorelines. **Table 5-9** presents summary statistics of sediment physical parameters for each background shoreline, as compared to sediment physical parameters from the Iona Island Hudson River and Iona Marsh shorelines.

5.9.1 Con Hook Hudson River Shoreline

The Con Hook Hudson River shoreline was compared to the Iona Island Hudson River shoreline. The following subsections discuss comparisons between the Con Hook Hudson River shoreline and Iona Island Hudson River shoreline, as well the Con Hook Hudson River Shoreline Representativeness Conclusion.

5.9.1.1 Hudson River Shoreline and Sediment Observations

The Con Hook Hudson River Shoreline consisted of a rocky shoreline with large boulders along the upland and rocky beach like areas with cobble and large coarse sand. The water depth increased significantly off the shoreline. This is consistent with the Hudson River shoreline as based on observations during the site reconnaissance as presented in Section 5.1.1 of this RI report.

CHHRS-SU-06, CHHRS-SU-07 and CHHRS-SU-08 included rocky beach-like areas. Conditions within these DUs were similar to conditions observed along Iona Island Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area). Finer-grained sediment (silt and clay) was observed and sampled at CHHRS-SU-01 through CHHRS-SU-05.

5.9.1.2 Hudson River Sediment pH and ORP Comparisons

Con Hook Hudson River shoreline sediment pH (6.6 to 6.8), field ORP (448 to 612 mV), and calculated standard hydrogen electrode ORP (653 to 817 mV) was similar to sediment physical parameters measured in Iona Island Hudson River shoreline sediment as presented in Sections 5.6.1.2 and 5.6.1.3 of this RI report (pH of 6.6 to 6.9, field ORP of 493 to 754 mV, and calculated standard hydrogen electrode ORP of 698 to 959 mV) (**Table 5-9**).

5.9.1.3 Hudson River Sediment Grain Size Comparisons

Overall, grain size along the Con Hook Hudson River shoreline was characterized by silt and clay with lesser amounts of sand and gravel (**Table 5-9**). The overall grain size was driven the lower grain size from 5 of 8 SUs, including CHHRS-SU-01 through CHHRS-SU-05 (**Table 5-8**). Grain size at these SUs was characterized as silt and clay and classified as ML (silt) using the

USCS (ASTM 2006). This differs from the coarser-grained sediment in the sand and gravel beach area along the Iona Island Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area).

Sediment collected from CHHRS-SU-06, CHHRS-SU-07, and CHHRS-SU-08 was characterized by medium to coarse sand and gravel (**Table 5-8**). Based on grain size analysis, sediment at these SUs was classified as SW (well graded sand) using the USCS (ASTM 2006). This is similar to sediment along the Iona Island Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area) (primarily medium sand characterized as SP [poorly graded sand] using the USCS), as presented in Section 5.6.1.4 of this RI Report.

5.9.1.4 Hudson River Sediment TOC Comparisons

TOC in Con Hook Hudson River shoreline sediment ranged from 7,200 to 46,000 mg/kg (**Table 5-9**). TOC concentrations were lower in coarser-grained sediment collected from CHHRS-SU-06, CHHRS-SU-07, and CHHRS-SU-08 (7,200 to 25,000 mg/kg) and higher in finer-grained sediment collected from CHHRS-SU-01 through CHHRS-SU-05 (32,000 to 46,000 mg/kg) (**Table 5-8**). TOC sediment from the Con Hook Hudson River shoreline was higher than that in Iona Island Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area) (2,600 to 4,500 mg/kg). The TOC from CHHRS-SU-06 (7,200 mg/kg) was most similar to that of the Iona Island Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area).

5.9.1.5 Hudson River Shoreline Representativeness Conclusions

Shoreline observations and pH and ORP field screening results were consistent between the Con Hook Hudson River shoreline and Iona Island Hudson River shoreline. TOC and grain size results differed between onsite and background locations. Background sampling areas were variable, consisting of areas of rocky beach in CHHRS-SU-06, CHHRS-SU-07 and CHHRS-SU-08, and areas of finer-grained sediment in CHHRS-SU-01 through CHHRS-SU-05. TOC in background sediment was higher than TOC in onsite sediment.

Overall, sediment along the Con Hook Hudson River shoreline is finer-grained and has a higher TOC content than sediment collected from the Iona Island Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area). The shoreline of AOC #16 – Area D (Former Dump Area) consisted of a sand and gravel beach of limited extent. SUs along the Hudson River shoreline were more representative of the entire Iona Hudson River shoreline. Despite these differences, comparisons could still be made to determine if metals concentrations Hudson River shoreline sediment adjacent to AOC #16 – Area D (Former Dump Area) soil were consistent or less than background. The concentration of metals is expected to be higher in sediment with decreased grain size and increased TOC content, as these types of sediments tend to accumulate metals from natural and/or contaminant sources. Therefore, sediment along the Con Hook shoreline provides an accurate representation of background metals concentrations from upstream sources.

5.9.2 Con Hook Marsh Shoreline

The following subsections discuss comparisons between the Con Hook Hudson River shoreline and Iona Island Hudson River shoreline, as well the Con Hook Hudson River Shoreline Representativeness Conclusion.

5.9.2.1 Marsh Shoreline and Sediment Observations

The Con Hook marsh shoreline consisted primarily of a monotypic stand of common reed (*Phragmites australis*). This is similar to conditions observed along Iona Island Hudson River shoreline during the Phase I shoreline Reconnaissance, presented in Section 5.1.1 of this RI report.

5.9.2.2 Marsh Sediment pH and ORP Comparisons

The pH of Con Hook marsh shoreline sediment pH ranged from 6.5 to 7.0. This was slightly lower than the pH of Iona Island Marsh shoreline sediment (7.1 to 7.4) (**Table 5-9**). Con Hook Hudson River shoreline sediment field ORP ranged from 375 to 427 mV) and calculated standard hydrogen electrode ORP ranged from 580 to 632 mV. This was slightly greater than Iona Island Marsh shoreline sediment ORP values (field ORP of 296 to 342 mV and calculated standard hydrogen electrode ORP of 501 to 547 mV) (**Table 5-9**).

5.9.2.3 Marsh Sediment Grain Size Comparisons

Grain size analysis results for each ISM sediment sample collected from the Con Hook marsh shoreline are presented in **Table 5-8.** Similar to Iona Marsh sediment, grain size analysis of sediment collected from each SU along the Con Hook Marsh shoreline indicated primarily by silt and clay. Based on grain size analysis, sediment at these SUs was classified as SM (silt) using the USCS (ASTM 2006).

5.9.2.4 Marsh Sediment TOC Comparisons

Con Hook marsh sediment TOC ranged from 110,000 to 250,000 mg/kg. This was greater than Iona Island Marsh shoreline sediment TOC (60,000 to 88,000 mg/kg).

5.9.2.5 Marsh Sediment Representativeness Conclusions

Overall, Con Hook marsh shoreline background sampling locations were representative of the onsite Iona Marsh shoreline sampling locations. Observed background shoreline conditions and vegetation were similar to observed onsite conditions and sediment grain size results were similar between background and onsite. pH in background sediment was slightly but not significantly lower than pH in onsite sediment. ORP and TOC were higher in background sediment compared to onsite marsh sediment. However, ORP in background marsh sediment was lower than ORP in background Hudson River shoreline sediment. This is consistent with ORP in onsite marsh sediment, which was lower than ORP onsite Hudson River shoreline sediment.

Conversely, TOC in both the background and onsite marsh sediment was elevated when compared TOC in both background and onsite Hudson River shoreline sediment.

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6. NATURE AND EXTENT OF CONTAMINATION

This section presents the contaminant analytical results in each media sampled as part of this RI, as well as the results background evaluations conducted to determine if concentrations of metals and PAHs in onsite media were consistent or greater than background. The purpose of this section is to characterize the nature (type and magnitude) and extent of contamination in onsite media such that informed decisions can be made as to the level of risk presented by the site and the appropriate type(s) of remedial response.

This section is organized as follows:

- Discussion of Phase I TAL metals, PAH, BTEX, PCBs and explosives residue and Phase II metals analytical results in onsite media
- Results of the comparison of TAL metals and PAH concentrations in onsite media to background concentrations
- Discussion of site contaminants, including locations and concentrations of individual analytes in each onsite media
- Summary of the nature and extent of contamination in each media.

6.1 ONSITE SOIL, SURFACE WATER, AND SEDIMENT ANALYTICAL RESULTS

Phase I onsite soil TAL metals, PAH, BTEX, PCBs and explosives residue analytical results and Phase II onsite surface water and sediment analytical results are discussed in the subsections below. Note that there were some cases where a constituent was not detected at the LOD or LOQ, but the LOD exceeded a project action limit (PAL) (i.e., EPA screening value) presented in the UFP-QAPP (EA 2020a) or UFP-QAPP Addendum (EA 2022). In soil, the LOD of non-detect results for nitroglycerine were greater than their respective residential soil RSLs, while Aroclor-1221, Aroclor-1242, 3-nitrotoluene, 1,3-dinitrobenzene, and Tetryl were greater than their respective ecological screening levels. In surface water, the LODs for antimony, arsenic, mercury, and thallium were greater than their respective EPA tapwater RSLs. These not detected analytes are further discussed in the HHRA presented in **Appendix G** and ERA presented in **Appendix H**.

6.1.1 Upland Surface Soil TAL metals, PAHs, BTEX, PCBs, And Explosives Residue Detections

Onsite surface soil samples (0–6 in. bgs) were collected from 27 onsite upland DUs (DU-1 through DU-7, DU-9 through DU-16, DU-20 through DU-23, DU-25, and EXDU-1 through EXDU-7) for analysis of TAL metals, PAHs, PCBs, and/or explosives residues. DU locations are presented in **Figure 3-1**. Analyte groups sampled at each of the onsite DUs were based on

previous investigation results and contaminants identified for each AOC (**Table 1-1** and Section 3.1.2.1 of this RI report). Analyte groups included the following as presented in **Table 3-1**:

- TAL metals at 15 upland DUs (DU-01 through DU-07 and DU-09 through DU-15) (note mercury was only sampled at 12 of the 15 upland DUs including DU-01 through DU-05, DU-09, and DU-11 through DU-16)

- PAHs at 13 upland DUs (DU-01 through DU-05, DU-09, DU-11 through DU-13, DU-16, and DU-20 through DU-22)
- PCBs at 2 upland DUs (DU-23 and DU-25)

- Explosives residues at 7 upland DUs (EXDU-1 through EXDU-7).

Phase I onsite ISM soil analytical results are presented in the following tables:

- **Table 6-1**: DU-1 through DU-16 upland soil metals and PAH analytical results

- **Table 6-2**: Former UST areas (DU-20 through DU-22) BTEX and PAH analytical results

- **Table 6-3**: Former transformer locations (DU-23 and DU-25) PCB analytical results

- **Table 6-4**: Former explosives buildings (EXDU-1 through EXDU-7) explosives residue analytical results.

Analytes detected in surface soil samples collected from one or more upland DUs are presented in the list below. Summaries of onsite analytical results for upland surface soil including DUs where each analyte was detected, concentration ranges for each analyte, and DUs with minimum and maximum concentrations are presented in **Table 6-5**.

- Up to 23 metals analytes (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, total chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc) at each of the 15 onsite upland DUs (DU-1 through DU-7 and DU-9 through DU-16)

- 18 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-cd]pyrene, naphthalene, phenanthrene, and pyrene) at each of the 13 upland DUs sampled for PAHs

- 1 PCB analyte, Aroclor 1260, at both upland DUs sampled for PCBs (DU-23 and DU-25)

- 4 explosives residue analytes, including 1,3,5-trinitrobenzene, 1,3-dinitrobenzene, 2,4,6-trinitrotoluene, and 2,4-dinitrotoluene, at 1 of 7 upland DUs sampled for explosives residues (EXDU-1 only).

6.1.2 Upland Subsurface Soil TAL metals, PAHs, BTEX, PCBs, And Explosives Residue Detections

Soil encountered across most of the upland area during the Phase I investigation was shallow, with exposed/shallow bedrock and depth to refusal ranging from 6–12 in. bgs. Deeper soil in the upland area was encountered at DU-20 and DU-21 only, with refusal at 18 and 24 in. bgs, respectively. DU locations are presented in **Figure 3-1**. Onsite subsurface soil samples were collected from DU-20 (6–18 in. bgs) and DU-21 (6–24 in. bgs) for analysis of PAHs and BTEX. Subsurface soil was not sampled at additional upland DUs due to the shallow depth to refusal.

Analyte groups sampled at DU-20 and DU-21 were based on previous investigation results and contaminants identified for each AOC (**Table 1-1** and Section 3.1.2.1 of this RI report). Subsurface soil analytical results are presented in **Table 6-2.**

18 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-cd]pyrene, naphthalene, phenanthrene, and pyrene) were detected in subsurface soil samples collected from both DU-20 and DU-21. BTEX analytes were not detected in subsurface soil samples collected from either DU. Summaries of PAH analytical results for upland subsurface soil including concentration ranges for each analyte detected and DUs with minimum and maximum concentrations are presented in **Table 6-5**.

6.1.3 AOC #16 – Area D (Former Dump Area) Soil Detections

Onsite surface soil samples (0–6 in. bgs) and subsurface soil samples (6–36 in. bgs) were collected from 3 DUs encompassing AOC #16 – Area D [Former Dump Area]) (DU-17 through DU-19) for analysis of TAL metals, PAHs, PCBs, and explosives residues. DU locations are presented in **Figure 3-1**. Analytes sampled at AOC #16 – Area D [Former Dump Area]), as presented in **Table 3-1**, were based on previous investigation results and contaminants identified for each AOC (**Table 1-1** and Section 3.1.2.1 of this RI report).

Phase I onsite ISM soil analytical for AOC #16 – Area D (Former Dump Area (DU-17 through DU-19) are presented in **Table 6-6**. Metals, PAHs, and PCBs were detected in surface and subsurface soil at each of the DUs encompassing AOC #16 – Area D [Former Dump Area]) (DU-17 through DU-19). Explosives residues were not detected in any of the surface or subsurface soil samples collected from DU-17 through DU-19. Analytes detected in surface and subsurface soil samples are presented in the list below. A summary of analytical results in surface and subsurface soil, including DUs where each analyte was detected, concentration ranges for each analyte detected, and DUs with minimum and maximum concentrations, is presented in **Table 6-7**.

- 23 metals analytes (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, total chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc) detected in both surface and subsurface soil samples collected from each of the 3 DUs

- 18 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene) detected in both surface and subsurface soil samples collected from each of the 3 DUs

- 2 PCBs detected in surface soil samples collected from the 3 DUs (Aroclor-1248 at DU-17 and DU-18 and Aroclor-1260 at each of the 3 DUs)

- 2 PCBs detected in subsurface soil samples collected from the 3 DUs (Aroclor-1260 at DU-17 and DU-19 and Aroclor-1262 at DU-18 only).

6.1.4 Surface Water TAL Metals Detections

A total of 60 onsite discrete surface water samples were collected for analysis of TAL metals to evaluate the surface water migration pathways leading from AOC #16 – Area D (Former Dump Area) to the Hudson River and Iona Marsh shorelines, with 20 samples collected from each of the following areas (**Figure 3-5**):

- Source area at AOC #16 – Area D (Former Dump Area) (DUMP-SW-01 through DUMP-SW-20)

- Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area) (IHRS-SW-01 through IHRS-SW-20)

- Iona marsh at the outlets of the riprap filled drainage swale (RRDS-SW-01 through RRDS-SW-10) and tidal wetland swale (TWS-SW-01 through TWS-SW-10).

Phase II surface water metals analytical results are presented in the following tables:

- **Table 6-8**: AOC #16 – Area D (Former Dump Area)

- **Table 6-9**: Iona Island Hudson River Shoreline

- **Table 6-10** for the Iona Marsh shoreline.

Metals analytes detected in one or more surface water samples collected from each area are presented in the list below. A summary of metals analytical results for onsite surface water

including locations where each metals analyte was detected, concentration ranges for each metals analyte, and samples with minimum and maximum concentrations are presented in **Table 6-11**.

- AOC #16 – Area D (Former Dump Area): 19 metals analytes (aluminum, antimony, arsenic, barium, beryllium, calcium, total chromium, cobalt, copper, lead, magnesium, manganese, nickel, potassium, selenium, sodium, thallium, and zinc)

- Iona Island Hudson River shoreline: 19 metals analytes (aluminum, antimony, arsenic, barium, calcium, total chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, sodium, thallium, and zinc)

- Iona Marsh shoreline: 17 metals analytes (aluminum, antimony, arsenic, barium, beryllium [tidal wetland swale only], calcium, total chromium [tidal wetland swale only], cobalt, copper, magnesium, manganese, nickel, potassium, sodium, thallium [tidal wetland swale only], vanadium [riprap filled drainage swale only], and zinc [tidal wetland swale only]).

6.1.5 Sediment TAL Metals Detections

Metals samples were collected from three onsite sediment DUs established at the ends of preferential surface water migration pathways leading from AOC #16 – Area D (Former Dump Area) to the Hudson River and Iona Marsh shorelines as follows (**Figure 3-6**):

- IHRS-DU-01 along the Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area)

- RRDS-DU-01 along the Iona Marsh shoreline at the outlet of the riprap filled drainage swale

- TWS-DU-01 along the Iona Marsh shoreline at the outlet of the tidal wetland drainage swale.

Phase II ISM sediment metals analytical results are presented in **Table 6-12.** Metals analytes detected in sediment from each DU are presented in the list below. A summary of metals analytical results for onsite sediment including DUs where each metals analyte was detected, concentration ranges for each metals analyte, and samples with minimum and maximum concentrations are presented in **Table 6-13**.

- IHRS-DU-01: 17 metals analytes (aluminum, antimony, arsenic, barium, beryllium, cadmium, total chromium, cobalt, copper, iron, lead, manganese, nickel, silver, thallium, vanadium, and zinc)

- RRDS-DU-01 and TWS-DU-01: 18 metals analytes (aluminum, antimony, arsenic, barium, beryllium, cadmium, total chromium, cobalt, copper, iron, lead, manganese, nickel, selenium, silver, thallium, vanadium, and zinc).

6.2 BACKGROUND COMPARISON

Background sampling was conducted to establish regional background concentrations for TAL metals and PAHs in soil and for TAL metals in surface water and sediment for comparison to measured site concentrations. A comparison was conducted to determine whether metals and PAH concentrations in onsite soil and metals concentrations in onsite surface water and sediment were consistent with or above background concentrations. Background samples were collected from the following locations:

- ISM surface soil samples from 8 background DUs (BADU-1 through BADU-8), established in Bear Mountain State Park); subsurface soil samples were not collected due to the shallow depth to refusal (less than 12 in. bgs) in each DU (**Figure 3-2**)

- Discrete surface water samples from 40 locations at Con Hook, including 20 locations along the Con Hook Hudson River shoreline (CHHRS-SW-01 through CHHRS-SW-20) and 20 locations along the Con Hook marsh shoreline (CHMS-SW-01 through CHMS-SW-20) (**Figure 3-7**)

- ISM sediment samples from 2 sediment DUs established at Con Hook, each comprised of 8 SUs, including one DU along the Con Hook Hudson River shoreline (CHHRS-SU-01 through CHHRS-SU-08) and one DU along the Con Hook marsh shoreline (CHMS-SU-01 through CHMS-SU-08) (**Figure 3-7**).

Analytical results for background samples are presented in the following tables:

- **Table 6-14**: background soil metals and PAHs

- **Table 6-15**: background surface water metals

- **Table 6-16**: background surface water sediment.

A summary of analyte concentration ranges for each media is presented in **Table 6-17**.

6.2.1 Background Comparison Methods

Permutation test of means (Student t-Test with adjusted p-value) at the 95%UCLwas used to evaluate whether onsite soil metals and PAH concentrations and onsite sediment metals concentrations exceeded background concentration ranges. A quantitative statistical approach (statistical hypothesis tests) was used to evaluate whether onsite surface water metals concentrations exceeded background concentration ranges. The difference between mean onsite

and background concentrations of metals and PAHs in soil was evaluated with a permutation test. The null hypothesis that the onsite mean does not exceed the background mean was tested at the 95% significance level using p-values adjusted with the Benjamini-Hochberg procedure to control the false discovery error rate. These methods are detailed in the subsections below.

6.2.1.1 Permutation Test of Means (Soil and Sediment)

Permutation tests are a subset of nonparametric statistics. The two-sample permutation test of means is similar to a t-test in that it evaluates the difference between two group means, but in contrast to a t-test, the permutation test does not require that the data from each group follow a normal distribution or that the two groups have the same variance. For this reason, the permutation test is suitable for evaluating both small datasets and non-normal data distributions. Also, this permutation test does not require that the distribution of the two data groups have the same shape in order to be a central value test as does the commonly used Wilcoxon rank sum test.

The permutation test assumes only that the data from the two are "exchangeable" when the null hypothesis is true. For a two-sample permutation test of means, the test statistic is the observed difference in the two group means (i.e., site versus background). If the null hypothesis is true, the group assignment is arbitrary, as there is no difference in the means and the data in essence come from the same population. Therefore, the data are randomly rearranged regardless of group assignment to produce a different set of group means in each rearrangement. The difference in group means is computed and stored after each rearrangement, and this process is repeated for either all possible rearrangements (if possible) or several thousand permutations for larger data sets. The proportion of differences from the rearrangements that equal or exceed the one observed difference from the original data is the permutation p-value of the test (Helsel et al. 2020).

Metals and PAH concentrations in onsite surface and subsurface soil were compared to metals and PAH concentrations in background surface soil collected from Bear Mountain State Park (BADU-01 through BADU-08). Background comparisons for sediment were conducted for each depositional environment (Hudson River shoreline and marsh shoreline). Samples collected along the Hudson River shoreline at Iona Island (IHRS-DU-01) were compared to background samples collected along the Hudson River shoreline at Con Hook (CHHRS-SU-01 through CHHRS-SU-08). Samples collected along the Iona Marsh shoreline at the outlets of the riprap filled drainage swale (RRDS-DU-01) and tidal wetland swale (TWS-DU-01) were compared to background samples collected along the Con Hook Marsh shoreline (CHMS-SU-01 through CHMS-SU-08).

Concentrations for contaminants within each DU for soil and sediment were compared to background concentrations using a two-sample hypothesis test with the following null hypothesis. For each test, 10,000 permutation resamples were used to yield a stable p-value.

$$\text{Null hypothesis } (H_0)\text{: Site} \leq = \text{Background}$$
$$\text{Alternative hypothesis } (H_a)\text{: Site} > \text{Background.}$$

Permutation test data are presented in **Appendix F**. Results of permutation testing are discussed in Section 6.2.2 of this RI report.

6.2.1.2 Statistical Hypothesis Tests (Surface Water)

Statistical hypothesis tests using the two-sample hypothesis test described in Section 6.2.1.2 of this RI report was used to compare onsite and background metals concentrations in surface water. Mean concentrations from each onsite surface water area (AOC #16 – Area D [Former Dump Area], Iona Island Hudson River shoreline [IHRS], and Iona Marsh shoreline at the outlets of the riprap filled drainage swale [RRDS] and tidal wetland swale [TWS]) were compared to mean background concentrations from Con Hook (Con Hook Hudson River shoreline [CHHRS] and Con Hook Marsh shoreline [CHMS]) as follows:

- Mean concentrations for AOC #16 – Area D (Former Dump Area) (DUMP-SW-01 through DUMP-SW-20) were compared to mean concentrations from both the Con Hook Hudson River shoreline (CHHRS-SW-01 through CHHRS-SW-20) and Con Hook Marsh shoreline (CHMS-SW-01 through CHMS-SW-20)

- Mean concentrations for the Iona Island Hudson River shoreline (IHRS-SW-01 through IHRS-SW-20) were compared to mean concentrations for the Con Hook Hudson River shoreline (CHHRS-SW-01 through CHHRS-SW-20)

- Mean concentrations for the Iona Island Hudson River shoreline (IHRS-SW-01 through IHRS-SW-20) were compared to mean concentrations for the Con Hook Hudson River shoreline (CHHRS-SW-01 through CHHRS-SW-20).

Statistical hypothesis test data are presented in **Appendix F**. Results of statistical hypothesis test testing are discussed in Section 6.2.2.6 of this RI report.

6.2.2 Background Comparison Results

The results of the permutation tests for soil and sediment and the statistical hypothesis tests for surface water are presented the following tables:

- **Table 6-18**: onsite soil

- **Table 6-19**: onsite surface water

- **Table 6-20**: onsite sediment.

Each table presents the analytes detected in each soil and sediment DU and each surface water area at concentrations that exceeded background. A discussion of analytes exceeding background in each media is presented in the subsections below.

6.2.2.1 Upland Surface Soil TAL Metals Background Exceedances

Upland soil metals concentrations exceeded background at each of the 15 DUs sampled for metals (DU-1 through DU-7 and DU-9 through DU-16). DU locations are presented in **Figure 3-1**. Concentrations of 15 metals analytes exceeded background, including antimony, arsenic, barium, cadmium, calcium, cobalt, copper, iron, lead, magnesium, manganese, potassium, sodium, thallium, and zinc (**Table 6-18)**. The number and types of metals analytes exceeding background varied between DUs as presented in the list below.

- DU-1: 10 metals analytes (arsenic, barium, cadmium, calcium, cobalt, magnesium, manganese, potassium, sodium, zinc)
- DU-2: 12 metals analytes (arsenic, barium, calcium, cobalt, copper, iron, lead, magnesium, manganese, potassium, sodium, zinc)
- DU-3: 12 metals analytes (arsenic, barium, calcium, cobalt, copper, iron, lead, magnesium, manganese, potassium, sodium, zinc)
- DU-4: 13 metals analytes (antimony, arsenic, barium, cadmium, calcium, cobalt, copper, iron, lead, magnesium, manganese, potassium, sodium, zinc)
- DU-5: 11 metals analytes (arsenic, barium, calcium, cobalt, iron, lead, magnesium, manganese, potassium, sodium, zinc)
- DU-6: 12 metals analytes (arsenic, barium, cadmium, calcium, cobalt, copper, lead, magnesium, manganese, potassium, sodium, zinc)
- DU-7: 13 metals analytes (arsenic, barium, cadmium, calcium, copper, iron, lead, magnesium, manganese, potassium, sodium, thallium, zinc)
- DU-9: 9 metals analytes (barium, calcium, cobalt, copper, magnesium, manganese, potassium, sodium, zinc)
- DU-10: 8 metals analytes (barium, calcium, cobalt, copper, magnesium, manganese, potassium, sodium)
- DU-11: 13 metals analytes (arsenic, barium, cadmium, calcium, cobalt, copper, lead, magnesium, manganese, potassium, sodium, thallium, zinc)
- DU-12: 12 metals analytes (arsenic, barium, cadmium, calcium, cobalt, copper, lead, magnesium, manganese, potassium, sodium, zinc)
- DU-13: 14 metals analytes (antimony, arsenic, barium, cadmium, calcium, cobalt, copper, iron, lead, magnesium, manganese, potassium, sodium, zinc)

- DU-14: 11 metals analytes (arsenic, barium, cadmium, calcium, cobalt, lead, magnesium, manganese, potassium, sodium, zinc)

- DU-15: 12 metals analytes (barium, cadmium, calcium, cobalt, copper, iron, lead, magnesium, manganese, potassium, sodium, zinc)

- DU-16: 11 metals analytes (barium, cadmium, calcium, cobalt, copper, iron, magnesium, manganese, potassium, sodium, zinc).

6.2.2.2 Upland Surface Soil PAH Background Exceedances

Upland soil PAHs concentrations exceeded background at 7 of the 12 DUs sampled for PAHs (DU-2, DU-4, DU-11, DU-12, DU-13, DU-16, and DU-22). DU locations are presented in **Figure 3-1**. Concentrations of 18 PAHs exceeded background, including 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene (**Table 6-18**). The number and types of PAH analytes exceeding background varied between DUs as presented in the list below.

- DU-2: 18 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-c,d]pyrene, naphthalene, phenanthrene, pyrene)

- DU-4: 16 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, fluoranthene, indeno[1,2,3-c,d]pyrene, naphthalene, phenanthrene, pyrene)

- DU-11: 13 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, indeno[1,2,3-c,d]pyrene, naphthalene)

- DU-12: 17 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-c,d]pyrene, naphthalene, phenanthrene, pyrene)

- DU-13: 18 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-c,d]pyrene, naphthalene, phenanthrene, pyrene)

- DU-16: 11 metals analytes (barium, cadmium, calcium, cobalt, copper, iron, magnesium, manganese, potassium, sodium, zinc)

- DU-22: 18 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-c,d]pyrene, naphthalene, phenanthrene, pyrene).

6.2.2.3 Upland Subsurface Soil PAH Background Exceedances

Upland subsurface soil PAH concentrations were consistent with or below background at both DUs sampled for PAHs (DU-20 and DU-21) (**Table 6-18**).

6.2.2.4 AOC #16 – Area D (Former Dump Area) Soil TAL Metals Background Exceedances

Metals concentrations in surface and subsurface soil exceeded background at each of the three DUs encompassing AOC #16 – Area D (Former Dump Area) (DU-17, DU-18, and DU-19) (**Table 6-18)**. DU locations are presented in **Figure 3-1**. Concentrations of 18 metals analytes exceeded background in surface soil, while concentrations of 23 metals analytes exceeded background in subsurface soil as presented in the list below.

- Surface soil: aluminum, antimony, arsenic, barium, cadmium, calcium, total chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, potassium, silver, sodium, and zinc

- Subsurface soil: aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, total chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc.

The number and types of metals analytes exceeding background in surface and subsurface soil varied between DUs as presented in the list below.

- DU-17 surface soil: 13 metals analytes (antimony, barium, cadmium, calcium, copper, lead, magnesium, manganese, mercury, potassium, silver, sodium, zinc)

- DU-17 subsurface soil: 15 metals analytes (antimony, arsenic, barium, beryllium, cadmium, calcium, copper, iron, lead, magnesium, mercury, selenium, sodium, thallium, zinc)

- DU-18 surface soil: 17 metals analytes (antimony, arsenic, barium, cadmium, calcium, chromium [total], cobalt, copper, iron, lead, magnesium, manganese, mercury, potassium, silver, sodium, zinc)

- DU-18 subsurface soil: 17 metals analytes (antimony, arsenic, barium, cadmium, calcium, chromium [total], copper, iron, lead, magnesium, manganese, mercury, nickel, silver, sodium, thallium, zinc)

- DU-19 surface soil: 13 metals analytes (aluminum, arsenic, barium, cadmium, calcium, cobalt, copper, iron, magnesium, manganese, potassium, sodium, zinc)

- DU-19 subsurface soil: 13 metals analytes (aluminum, arsenic, barium, cadmium, calcium, cobalt, copper, iron, magnesium, manganese, potassium, sodium, zinc).

6.2.2.5 AOC #16 – Area D (Former Dump Area) Soil PAH Background Exceedances

PAH concentrations in surface soil exceeded background at each of the three DUs encompassing AOC #16 – Area D (Former Dump Area) (DU-17, DU-18, and DU-19). In addition, PAH concentrations in subsurface soil exceeded background at background two of the three DUs (DU-17 and DU-18; PAH concentrations at DU-19 were below background) (**Table 6-18)**. DU locations are presented in **Figure 3-1**.

Concentrations of 14 PAH analytes exceeded background in surface soil, while concentrations of 8 PAH analytes exceeded background in subsurface soil as follows:

- Surface soil: 1-methylnaphthalene, 2-methylnaphthalene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, and naphthalene

- Subsurface soil: 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, anthracene, chrysene, fluorene, naphthalene, and phenanthrene.

The types of PAH analytes exceeding background varied between DUs in surface and subsurface soil. PAH analytes exceeding background in surface soil were as follows:

- DU-17 surface soil: 5 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthylene, anthracene, naphthalene)

- DU-17 subsurface soil: 4 PAH analytes (2-methylnaphthalene, acenaphthene, anthracene, naphthalene)

- DU-18 surface soil: 9 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthylene, anthracene, benzo[a]pyrene, benzo[b]fluoranthene, chrysene, dibenz[a,h]anthracene, naphthalene)

- DU-18 subsurface soil: 8 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, anthracene, chrysene, fluorene, naphthalene, phenanthrene)

- DU-19 surface soil: 13 PAH analytes (2-methylnaphthalene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, fluoranthene, indeno[1,2,3-c,d]pyrene, naphthalene)

- DU-19 subsurface soil: PAH concentrations below background.

6.2.2.6 Surface Water TAL Metals Background Exceedances

Surface water sampling areas and individual sample locations are presented in **Figure 3-5**. Concentrations of 9 metals analytes exceeded background, including arsenic, barium, total chromium, copper, magnesium, potassium, sodium, zinc (**Table 6-19**). The number and types of metals analytes exceeding background varied between each sampling area DUs as presented in the list below.

- AOC #16 – Area D (Former Dump Area) (DUMP-SW-01 through DUMP-SW-20): 2 metals analytes (copper and zinc) exceeded background concentrations from both the Con Hook Hudson River shoreline (CHHRS-SW-01 through CHHRS-SW-20) and the Con Hook marsh shoreline (CHMS-SW-01 through CHMS-SW-20). While copper, magnesium, potassium, and sodium concentrations also exceeded background concentrations from the Con Hook Hudson River shoreline, concentrations were similar to or less than background concentrations from the Con Hook Marsh shoreline. As a result, the copper, magnesium, potassium, and sodium surface water concentrations are considered consistent with background.

- Iona Island Hudson River shoreline (IHRS-SW-01 through IHRS-SW-20): 6 metals analytes (arsenic, barium, copper, magnesium potassium, and sodium) exceeded background concentrations from the Con Hook Hudson River shoreline (CHHRS-SW-01 through CHHRS-SW-20).

- Iona Marsh shoreline at the outlet of the riprap filled drainage swale: (RRDS-SW-01 through RRDS-SW-20): 1 metals analyte (copper) exceeded background concentrations from the Con Hook marsh shoreline (CHMS-SW-01 through CHMS-SW-20).

- Iona Marsh shoreline at the outlet of the tidal wetland swale (TWS-SW-01 through TWS-SW-20: 2 metals analytes (total chromium and copper) exceeded background concentrations from the Con Hook marsh shoreline (CHMS-SW-01 through CHMS-SW-20).

6.2.2.7 Sediment TAL Metals Background Exceedances

Metals concentrations in sediment exceeded background each DU sampled (IHRS-DU-01, RRDS-DU-01, and TWS-DU-01) (**Table 6-20)**. Sediment background DU locations are presented in **Figure 3-6**. Concentrations of 14 metals analytes exceeded background, including

antimony, arsenic, barium, cadmium, total chromium, cobalt, copper, iron, lead, manganese, nickel, silver, vanadium, and zinc (**Table 6-20**). Metals analytes exceeding background in each onsite sediment DU were as follows:

- IHRS-DU-01: 12 metals analytes (antimony, arsenic, barium, cadmium, total chromium, copper, iron, lead, nickel, silver, vanadium, and zinc) exceeded background concentrations from the Con Hook Hudson River shoreline (CHHRS-DU-01)

- RRDS-DU-01: 11 metals analytes (arsenic, barium, cadmium, total chromium, cobalt, copper, iron, lead, manganese, nickel, and zinc) exceeded background concentrations from the Con Hook marsh shoreline (CHMS-DU-01)

- TWS-DU-01: 12 metals analytes (arsenic, barium, cadmium, total chromium, cobalt, copper, iron, lead, manganese, nickel, and zinc) exceeded background concentrations from the Con Hook marsh shoreline (CHMS-DU-01).

6.3 SITE CONTAMINANTS

Site contaminants include TAL metals and PAH analytes detected in onsite media at concentrations that exceed background, and PCBs and explosives residues in onsite soil detected during Phase I. These contaminants are assumed to be associated with former DoD activities. Site contaminants in each onsite media are presented in the following tables:

- **Table 6-21**: upland surface soil

- **Table 6-22**: AOC #16 – Area D (Former Dump Area) surface soil

- **Table 6-23**: AOC #16 – Area D (Former Dump Area) subsurface soil

- **Table 6-24**: surface water

- **Table 6-25**: sediment.

Site contaminants for each onsite soil and sediment DU and each surface water area are discussed in the subsections below. Note that types of contamination that may be eligible for DERP FUDS response include CERCLA hazardous substances or pollutants or contaminants, munitions constituent metals (lead, antimony, copper and zinc) and explosives residues.

Metals that are CERCLA hazardous substances under 40 CFR 302.4 include antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, sodium, thallium, and zinc (EPA 2024). Note that while sodium is considered a CERCLA hazardous metal (EPA 2024), sodium in environmental media at the Site is not assumed to be associated with historical DoD activities (i.e., not used or released during historical DoD use of the Site).

The full TAL metals list includes metals that are not listed as CERCLA hazardous substances in 40 CFR 302.4, including aluminum, barium, calcium, cobalt, iron, magnesium, manganese, potassium, and vanadium. These metals were included in the RI investigation to help evaluate geochemistry and support development of risk assessments. While these metals are presented in **Table 6-21** through **Table 6-25**, they are not discussed in the subsections below. Although aluminum, barium, cobalt, manganese, and vanadium are included on the EPA "List of Lists" as Emergency Planning and Community Right-to-Know Act (EPCRA) Section 313 Toxic Chemicals (aka Toxic Release Inventory Chemicals), these metals are not CERCLA hazardous substances therefore are not eligible for DERP FUDS response[5]. Calcium, magnesium, iron, and potassium, which are not included on the EPA "List of Lists", are essential nutrients for metabolic processes in organisms, which can regulate uptake and metabolism of these metals at naturally occurring concentrations.

6.3.1 Onsite Upland Surface Soil Contaminants

Upland surface soil contaminant groups include CERCLA hazardous metals, PAHs, PCBs and explosives residues as presented in **Figure 6-1** and discussed in the subsections below.

6.3.1.1 Upland Surface Soil CERCLA Hazardous Metals Contaminants

CERCLA hazardous metals contaminants present in upland surface soil include antimony, arsenic, cadmium, copper, lead, sodium, thallium, and zinc. Two or more CERCLA hazardous metals were identified as contaminants in surface soil at each of the 15 upland DUs sampled for metals (DU-1 through DU-7 and DU-9 through DU-16) (**Figure 6-1** and **Table 6-21)**. Locations and concentrations of each CERCLA hazardous metals in upland surface soil are presented in the list below.

- Antimony at 3 DUs, including DU-4 (1.5 to 2.1 mg/kg) and DU-13 (1.2 to 2.5 mg/kg)
- Arsenic at 11 DUs (DU-1 through DU-7 and DU-11 through DU-14), with concentrations ranging from 6.5 mg/kg at DU-10 to 43 mg/kg at DU-11
- Cadmium at 10 DUs (DU-1, DU-4, DU-6, DU-7, and DU-11 through DU-16), with concentrations ranging from 0.33 mg/kg at DU-12 to 1.1 mg/kg at DU-4

[5] The EPA "List of Lists" is a consolidated list of chemicals subject Emergency Planning and Community Right-to-Know Act (EPCRA); CERCLA); and Section 112(r) of the Clean Air Act. It was prepared to help facilities handling chemicals determine, for a specific chemical, whether they may be subject to certain reporting requirements. The "List of Lists" is used as a reference tool, not as a definitive source of compliance information.

- Copper at 11 DUs (DU-2, DU-3, DU-4, DU-6, DU-7, DU-9, DU-11, DU-12, DU-13, DU-15, and DU-16), with concentrations ranging from 5.6 mg/kg at DU-7 to 600 mg/kg at DU-13

- Lead at 11 DUs (DU-2 through DU-7 and DU-11 through DU-15), with concentrations ranging from 72 mg/kg at DU-6 to 2,000 mg/kg at DU-11

- Sodium at each of the 15 DUs exceeding background (34 to 63 mg/kg), with concentrations at onsite DUs ranging from 56 mg/kg at DU-11 to 440 mg/kg at DU-16

- Thallium at 2 DUs, including DU-7 (0.19 to 0.21 mg/kg) and DU-11 (0.19 to 0.22 mg/kg)

- Zinc at 14 DUs (DU-1 through DU-7, DU-9, and DU-11 through DU-16), with concentrations ranging from 56 mg/kg at DU-6 to 280 mg/kg at DU-4.

6.3.1.2 Upland Surface Soil PAH Contaminants

PAH contaminants present in upland surface soil include 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-c,d)pyrene, naphthalene, phenanthrene, and pyrene. Between 4 and 18 PAH analytes were identified as contaminants in surface soil at 7 of the 12 DUs sampled for PAHs (DU-2, DU-4, DU-11, DU-12, DU-13, DU-16, and DU-22). (**Figure 6-1** and **Table 6-21)**. Locations and concentrations of each PAH contaminant in upland surface soil are presented in the list below.

- 1-methylnaphthalene at 6 of the 7 DUs (DU-2, DU-4, DU-11, DU-12, DU-13, and DU-22), with concentrations ranging from 0.021 mg/kg at DU-2 to an estimated 0.45 mg/kg at DU-13

- 2-methylnaphthalene at each of the 7 DUs, with concentrations ranging from an estimated 0.0082 mg/kg at DU-16 to an estimated 0.45 mg/kg at DU-13

- Acenaphthene at 5 of the 7 DUs (DU-2, DU-12, DU-13, DU-16, and DU-22), with concentrations ranging from an estimated 0.036 mg/kg at DU-16 to an estimated 4.7 mg/kg at DU-13

- Acenaphthylene at 5 of the 7 DUs (DU-2, DU-4, DU-11, DU-13, and DU-22), with concentrations ranging from 0.09 mg/kg at DU-2 to an estimated 1.3 mg/kg at DU-13

- Anthracene at each of the 7 DUs, with concentrations ranging from 0.063 mg/kg at DU-16 to an estimated 8 mg/kg at DU-13

- Benzo(a)anthracene at 6 of the 7 DUs (DU-2, DU-4, DU-11, DU-12, DU-13, and DU-22), with concentrations ranging from an estimated 0.89 mg/kg at DU-4 to an estimated 17 mg/kg at DU-13

- Benzo(a)pyrene at 6 of the 7 DUs (DU-2, DU-4, DU-11, DU-12, DU-13, and DU-22), with concentrations ranging from an estimated 0.75 mg/kg at DU-11 to an estimated 13 mg/kg at DU-13

- Benzo(b)fluoranthene at 6 of the 7 DUs (DU-2, DU-4, DU-11, DU-12, DU-13, and DU-22), with concentrations ranging from an estimated 1.1 mg/kg at DU-17 to an estimated 13 mg/kg at DU-13

- Benzo(g,h,i)perylene at 6 of the 7 DUs (DU-2, DU-4, DU-11, DU-12, DU-13, and DU-22), with concentrations ranging from 0.64 mg/kg at DU-22 to an estimated 7.9 mg/kg at DU-13

- Benzo(k)fluoranthene at 6 of the 7 DUs (DU-2, DU-4, DU-11, DU-12, DU-13, and DU-22), with concentrations ranging from an estimated 0.36 mg/kg at DU-11 to an estimated 7.4 mg/kg at DU-13

- Chrysene at 6 of the 7 DUs (DU-2, DU-4, DU-11, DU-12, DU-13, and DU-22), with concentrations ranging from an estimated 0.75 mg/kg at DU-11 to an estimated 16 mg/kg at DU-13

- Dibenz(a,h)anthracene at 6 of the 7 DUs (DU-2, DU-4, DU-11, DU-12, DU-13, and DU-22), with concentrations ranging from an estimated 0.16 mg/kg at DU-11 to an estimated 2.4 mg/kg at DU-13

- Fluoranthene at 5 of the 7 DUs (DU-2, DU-4, DU-12, DU-13, and DU-22), with concentrations ranging from an estimated 1.3 mg/kg at DU-11 to an estimated 38 mg/kg at DU-13

- Fluorene at 4 of the 7 DUs (DU-2, DU-12, DU-13, and DU-22), with concentrations ranging from 0.069 mg/kg at DU-22 to an estimated 3.9 mg/kg at DU-13

- Indeno(1,2,3-c,d)pyrene at 6 of the 7 DUs (DU-2, DU-4, DU-11, DU-12, DU-13, and DU-22), with concentrations ranging from 0.73 mg/kg at DU-22 to an estimated 9.2 mg/kg at DU-13

- Naphthalene at each of the 7 DUs, with concentrations ranging from 0.012 mg/kg at DU-16 to an estimated 1.1 mg/kg at DU-13

- Phenanthrene at 5 of the 7 DUs (DU-2, DU-4, DU-12, DU-13, and DU-22), with concentrations ranging from an estimated 0.46 mg/kg at DU-4 to an estimated 27 mg/kg at DU-13
- Pyrene at 5 of the 7 DUs (DU-2, DU-4, DU-12, DU-13, and DU-22), with concentrations ranging from an estimated 1.3 mg/kg at DU-4 to an estimated 30 mg/kg at DU-13.

Note that DU-2 and DU-11 were investigated owing to former coal storage activities. Surface soil PAH detections within these DUs associated with former coal storage areas may be owing to coal particles. Coal particles were not observed in the soil from DU-2 and DU-11 during completion of RI field activities. However, onsite soil was significantly reworked and removed during demolition of former structures between November 1965 and December 1973 and excavation and regrading following demolition. Contaminants including particles of coal remaining from coal storage areas present in surface soil were likely spread over much of the operational area. PAH detections owing to particles of coal are not addressed under CERCLA as coal is considered a product rather than a hazardous waste. No remedial actions are warranted owing to PAH detections from coal particles. However, PAHs released from coal particles and absorbed on to (e.g., subsurface) soils would be actionable under CERCLA.

6.3.1.3 Upland Soil PCB Contaminants

PCB contaminants in upland surface soil include PCB-1260 and total PCBs at DU-23 and DU-25 (**Figure 6-1** and **Table 6-21**). Trace concentrations of PCB-1260 and total PCBs ranged from 0.019 to 0.034 mg/kg at DU-23 and 0.011 to 0.016 mg/kg at DU-25.

6.3.1.4 Upland Soil Explosives Residue Contaminants

Explosive residue contaminants in upland soil include 1,3,5-trinitrobenzene, 1,3-dinitrobenzene, 2,4,6-trinitrotoluene, and 2,4-dinitrotoluene at EXDU-1 only (**Figure 6-1 and Table 6-21**). Trace concentrations in surface soil at EXDU-1 are presented in the list below.

- 1,3,5-trinitrobenzene: estimated 0.029 mg/kg
- 1,3-dinitrobenzene: estimated 0.038 to 0.051 mg/kg
- 2,4,6-trinitrotoluene: estimated 0.21 to 0.37 mg/kg
- 2,4-dinitrotoluene: estimated 0.063 to 0.22 mg/kg.

6.3.2 AOC #16 – Area D (Former Dump Area) Soil Contaminants

Contaminant groups in surface and subsurface soil at AOC #16 – Area D (Former Dump Area) include the following:

- Surface soil: CERCLA hazardous metals, PAHs, and PCBs at each DU (DU-17, DU-18, and DU-19) (**Figure 6-1**)

- Subsurface soil: CERCLA hazardous metals at each DU, PAHs at 2 of 3 DUs (DU-17 and DU-18), and PCBs at 2 of 3 DUs (DU-18 and DU-19) (**Figure 6-2**).

The range of contaminant concentrations in surface soil at each DU encompassing AOC #16 – Area D (Former Dump Area) is presented in **Table 6-22** for surface soil **and Table 6-23** for subsurface soil.

6.3.2.1 AOC #16 – Area D (Former Dump Area) CERCLA Hazardous Metals Contaminants

CERCLA hazardous metals contaminants present in surface and subsurface soil at AOC #16 – Area D (Former Dump Area) include the following:

- Surface soil: antimony, arsenic, cadmium, total chromium, copper, lead, mercury, silver, sodium, and zinc

- Subsurface soil: antimony, arsenic, beryllium, cadmium, total chromium, copper, lead, mercury, nickel, silver, sodium, thallium, and zinc.

Between 6 and 10 CERCLA hazardous metals analytes were identified as contaminants in surface soil at each of the 3 DUs encompassing AOC #16 – Area D (Former Dump Area) (DU-17 through DU-19) (**Figure 6-1** and **Table 6-22**). Between 5 and 13 CERCLA hazardous metals analytes were identified as contaminants in subsurface soil at each of the 3 DUs encompassing AOC #16 – Area D (Former Dump Area) (DU-17 through DU-19) (**Figure 6-2** and **Table 6-23**). Locations and concentrations of each CERCLA hazardous metals contaminant in surface and subsurface soil are presented in the list below.

- Antimony in surface and subsurface soil from DU-17 and DU-18; concentrations in surface soil ranged from 6.2 to 9.9 mg/kg while concentrations in subsurface soil ranged from 4.4 to 13 mg/kg

- Arsenic in surface soil from DU-18 and DU-19 and in subsurface soil from DU-17 and DU-18; concentrations in surface soil ranged from 6.8 to 15 mg/kg while concentrations in subsurface soil ranged from 16 to 25 mg/kg

- Beryllium in subsurface soil from DU-17, with concentrations ranging from 1.2 to 1.5 mg/kg

- Cadmium in surface soil at each DU and in subsurface soil from DU-17 and DU-18; concentrations in surface soil ranged from 0.25 to 20 mg/kg while concentrations in subsurface soil ranged from 3.2 to 24 mg/kg

- Total chromium in surface and subsurface soil from DU-18; concentrations in surface soil ranged from 14 to 240 mg/kg while concentrations in subsurface soil ranged from 29 to 33 mg/kg

- Copper in surface and subsurface soil at each DU; concentrations in surface soil ranged from 83 to 1,700 mg/kg while concentrations in subsurface soil ranged from 130 to 5,600 mg/kg

- Lead in surface and subsurface soil from DU-17 and DU-18); concentrations in surface soil ranged from 1,200 to 2,900 mg/kg while concentrations in subsurface soil ranged from 820 to 2,900 mg/kg

- Mercury in surface and subsurface soil from DU-17 and DU-18; concentrations in surface soil ranged from 0.61 to 4.3 mg/kg while concentrations in subsurface soil ranged from 0.71 to 0.21 mg/kg

- Nickel in subsurface soil from DU-18, with concentrations ranging from 52 to 79 mg/kg

- Selenium in subsurface soil from DU-17, with concentrations ranging from 1.1 to 1.5 mg/kg

- Silver in surface soil from DU-17 and DU-18 and in subsurface soil from DU-18; concentrations in surface soil ranged from 0.56 to 0.92 mg/kg while concentrations in subsurface soil ranged from 0.83 to 2.1 mg/kg

- Sodium surface and subsurface soil at each DU; concentrations in surface soil ranged from 370 to 810 mg/kg, while concentrations in subsurface soil ranged from 420 to 3,400 mg/kg

- Thallium in subsurface soil from DU-17 and DU-18, with concentrations ranging from 0.27 to 0.8 mg/kg

- Zinc in surface and subsurface soil at each DU; concentrations in surface soil ranged from 83 to 8,200 mg/kg while concentrations in subsurface soil ranged from 60 to 5,600 mg/kg.

6.3.2.2 AOC #16 – Area D (Former Dump Area) PAH Contaminants

PAH contaminants present in surface and subsurface soil at AOC #16 – Area D (Former Dump Area) include the following:

- Surface soil: 1-methylnaphthalene, 2-methylnaphthalene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene,

benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, and naphthalene

- Subsurface soil: 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, anthracene, chrysene, fluorene, naphthalene, and phenanthrene.

Between 5 and 13 PAH analytes were identified as contaminants at each of the 3 DUs encompassing AOC #16 – Area D (Former Dump Area) (DU-17 through DU-19) (**Figure 6-1** and **Table 6-22**). The number of PAH analytes identified as contaminants in subsurface soil ranged from 4 analytes at DU-17 to 8 analytes at DU-18 (**Figure 6-2** and **Table 6-23**). No PAH analytes were identified as contaminants in subsurface soil at DU-19.

Locations and concentrations of each PAH contaminant in surface and subsurface soil are presented in the list below.

- 1-methylnaphthalene in surface and subsurface soil from DU-17 and DU-18; concentrations in surface soil ranged from 0.026 to 0.041 mg/kg while concentrations in subsurface soil ranged from 0.08 to 0.11 mg/kg

- 2-methylnaphthalene in surface soil at each DU and in subsurface soil from DU-17 and DU-18; concentrations in surface soil ranged from 0.018 to 0.072 mg/kg while concentrations in subsurface soil ranged from 0.095 to 0.16 mg/kg

- Acenaphthene in subsurface soil from DU-18, with concentrations ranging from 0.18 to 0.23 mg/kg

- Acenaphthylene in surface soil at each DU, with concentrations ranging from 0.059 to 0.27 mg/kg

- Anthracene in surface soil at each DU and in subsurface soil from DU-17 and DU-18; concentrations in surface soil ranged from 0.13 to 0.43 mg/kg while concentrations in subsurface soil ranged from 0.081 to 0.23 mg/kg

- Benzo(a)anthracene in surface soil from DU-19, with concentrations ranging from 1.1 to 2.5 mg/kg

- Benzo(a)pyrene in surface soil from DU-18 and DU-19, with concentrations ranging from 0.44 to 1.9 mg/kg

- Benzo(b)fluoranthene in surface soil from DU-18 and DU-19, with concentrations ranging from 0.86 to 3.4 mg/kg

- Benzo(g,h,i)perylene in surface soil from DU-19, with concentrations ranging from 0.55 to 1.1 mg/kg

- Benzo(k)fluoranthene in surface soil from DU-19, with concentrations ranging from 0.59 to 1.2 mg/kg

- Chrysene in surface soil from DU-18 and DU-19 and in subsurface soil from DU-18; concentrations in surface soil ranged from 0.86 to 2.3 mg/kg while concentrations in subsurface soil ranged from 0.65 to 1.7 mg/kg

- Dibenz(a,h)anthracene in surface soil from DU-18 and DU-19, with concentrations ranging from 0.11 to 0.41 mg/kg

- Fluoranthene in surface soil from DU-19, with concentrations ranging from 1.6 to 4 mg/kg

- Fluorene in subsurface soil from DU-18, with concentrations ranging from 0.14 to 0.16 mg/kg

- Indeno(1,2,3-c,d)pyrene in surface soil from DU-19, with concentrations ranging from 0.77 to 1.5 mg/kg

- Naphthalene in surface soil at each DU and in subsurface soil from DU-17 and DU-18; concentrations in surface soil ranged from 0.046 to 0.24 mg/kg while concentrations in subsurface soil ranged from 0.2 to 0.71 mg/kg

- Phenanthrene in subsurface soil from DU-18, with concentrations ranging from 0.66 to 1.4 mg/kg.

6.3.2.3 AOC #16 – Area D (Former Dump Area) PCB Contaminants

PCB contaminants in surface and subsurface soil at AOC #16 – Area D (Former Dump Area) include the following (**Figure 6-1** and **Figure 6-2**):

- Surface soil: Aroclor-1248 and Aroclor-1260

- Subsurface soil: Aroclor-1260 and Aroclor-1262.

Locations and concentrations of each PCB contaminant in surface and subsurface soil are presented in the list below (**Table 6-22** and **Table 6-23**).

- Aroclor-1248 in surface soil from DU-17 and DU-18, with concentrations ranging from 0.84 to an estimated 0.14 mg/kg

- Aroclor-1260 in surface soil at each DU and in subsurface soil from DU-19; estimated concentrations in surface soil ranged from 0.0022 to 0.25 mg/kg while estimated concentrations in subsurface soil ranged from 0.049 to 0.054 mg/kg

- Aroclor-1262 in subsurface soil from DU-18, with estimated concentrations ranging from 0.057 to 0.15 mg/kg.

6.3.3 Surface Water Contaminants

CERCLA hazardous metals contaminants in surface water include arsenic, total chromium, copper, sodium, zinc (EPA 2024). The number of CERCLA hazardous metals analytes identified as contaminants in each surface water area investigated during Phase II ranged from one analyte in surface water from Iona Marsh at the outlet of the riprap filled drainage swale to three analytes in surface water from the Hudson River shoreline adjacent to AOC #16 – Area D (**Table 6-24**). Locations and concentrations of each CERCLA hazardous metals in surface water are presented in the list below.

- Arsenic in surface water from the Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area), with concentrations in each of the 20 samples collected (estimated [trace] concentrations ranging from 0.4 to 0.64 µg/L) exceeding the background concentration range from the Con Hook Hudson River shoreline (0.33-0.46 µg/L); however, note that all concentrations were within the range of background from the Con Hook marsh shoreline (0.38 to 2.7 µg/L)

- Total chromium in surface water from Iona Marsh at the outlet of the tidal wetland swale, with the concentration at TWS-SW-7 (estimated 0.690 µg/L) exceeding the background concentration range from the Con Hook marsh shoreline (0.5-0.64 µg/L)

- Copper in surface water at each area

  — AOC #16 – Area D (Former Dump Area): while concentrations in 19 of the 20 samples collected (excluding DUMP-SW-06) (ranging from an estimated [trace] 1.60 to 7.10 µg/L) exceeded the background concentration range from the Con Hook marsh shoreline (0.61 to 1.3 µg/L), concentrations in only 4 samples (DUMP-SW-05, DUMP-SW-10, DUMP-SW-15, and DUMP-SW-20) (ranging from 3.60 to 7.10 µg/L) exceeded the background concentration range from both the Con Hook Hudson River shoreline (0.95 to 3.4 µg/L)

  — Hudson River shoreline: concentrations in only 14 of 20 samples collected (IHRS-SW-01, IHRS -SW-03 through IHRS-SW-05, IHRS-SW-10 through IHRS-SW-16, and IHRS-SW-18 through IHRS-SW-20 (ranging from 3.4 to 11 µg/L) exceeded the background concentration range from the Con Hook Hudson River shoreline (0.95 to 3.4 µg/L)

  — Iona Marsh shoreline at the outlet of the riprap filled drainage swale: estimated (trace) concentrations in only 2 of 10 samples collected (RRDS-SW-06, and RRDS-SW-09) (1.4 µg/L each) exceeded the background concentration range from the Con Hook marsh shoreline (0.61 to 1.3 µg/L)

— Iona Marsh shoreline at the outlet of the tidal wetland swale: estimated (trace) concentrations in only 3 of 10 samples collected TWS-SW-07, TWS-SW-09, and TWS-SW-10) (ranging from 1.4 to 1.5 µg/L) exceeded the background concentration range from the Con Hook marsh shoreline (0.61 to 1.3 µg/L)

- Sodium in surface water from the Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area), with concentrations in only 10 of 20 samples collected (IHRS-SW-01 and IHRS-SW-02 through IHRS-SW-20) (ranging from 19,000 to 34,000 µg/L) exceeded the background concentration range from the Con Hook Hudson River shoreline (15,000 to 18,000 µg/L); however, note that all concentrations were within or below the range of background concentrations from the Con Hook marsh shoreline (17,000 to 110,000 µg/L)

- Zinc in surface water from AOC #16 – Area D (Former Dump Area), with concentrations in only 4 of 20 samples collected (DUMP-SW-2, DUMP-SW-3, DUMP-SW-10, and DUMP-SW-20 (ranging from an estimated 11 to 44 µg/L) exceeding the background concentration range from the Con Hook marsh shoreline (2 to 8 µg/L); however, note that all concentrations were within the range of background concentrations from the Con Hook Hudson River shoreline (3 to 90 µg/L).

6.3.4 Sediment Contaminants

CERCLA hazardous metals contaminants present in sediment include antimony, arsenic, cadmium, total chromium, copper, lead, nickel, silver, and zinc (EPA 2024). The number of CERCLA hazardous metals analytes identified as contaminants in each sediment DU ranged from seven analytes in each DU established in Iona Marsh (RRDS-DU-01 and TWS-DU-01) to nine analytes in the DU established along the Hudson River shoreline adjacent to AOC #16 – Area D (IHRS-DU-01) (**Table 6-25**). Locations and concentrations of each CERCLA hazardous metals contaminant in sediment are presented in the list below.

- Antimony at IHRS-DU-01, with concentrations ranging from 89 to 110 mg/kg

- Arsenic at each DU, with concentrations ranging from 32 to 35 mg/kg in sediment collected from IHRS-DU-01; 9.4 to 9.7 in sediment collected from RRDS-DU-01, and 8 to 9.3 mg/kg in sediment collected from TWS-DU-01

- Cadmium at each DU, with concentrations ranging from 8.9 to 9.6 mg/kg in sediment collected from IHRS-DU-01; 0.91 to 0.96 in sediment collected from RRDS-DU-01, and 0.84 to 2.2 mg/kg in sediment collected from TWS-DU-01

- Total chromium at each DU, with concentrations ranging from 130 to 150 mg/kg in sediment collected from IHRS-DU-01; 40 to 43 in sediment collected from RRDS-DU-01, and 41 to 43 mg/kg in sediment collected from TWS-DU-01

- Copper at each DU, with concentrations ranging from 4,600 to 7,600 mg/kg in sediment collected from IHRS-DU-01; 51 to 58 in sediment collected from RRDS-DU-01, and 55 to 72 mg/kg in sediment collected from TWS-DU-01

- Lead at each DU, with concentrations ranging from 7,700 to 14,000 mg/kg in sediment collected from IHRS-DU-01; 56 to 67 in sediment collected from RRDS-DU-01, and 65 to 97 mg/kg in sediment collected from TWS-DU-01

- Nickel at each DU, with concentrations ranging from 69 to 110 mg/kg in sediment collected from IHRS-DU-01; 34 mg/kg in sediment collected from RRDS-DU-01, and 31 to 35 mg/kg in sediment collected from TWS-DU-01

- Silver at IHRS-DU-01, with concentrations ranging from 1 to 2 mg/kg

- Zinc at each DU, with concentrations ranging from 3,600 to 3,800 mg/kg in sediment collected from IHRS-DU-01; 190 to 200 mg/kg in sediment collected from RRDS-DU-01, and 230 to 990 mg/kg in sediment collected from TWS-DU-01

6.4 CONTAMINANT EXTENT IN ONSITE MEDIA

The extent of contaminants identified in each onsite media (upland surface soil, AOC #16 – Area D [Former Dump Area] surface and subsurface soil, surface water, and sediment) is discussed in the subsections below.

6.4.1 Contaminant Extent in Upland Soil

The upland terrestrial environment of Iona Island where upland soil is present was investigated through sampling of 27 DUs (DU-1 through DU-7, DU-9 through DU-16, DU-20 through DU-23, DU-25, and EXDU-1 through EXDU-7) encompassing approximately 25 acres. DU locations are presented in **Figure 3-1**. Surface soil at upland DUs was sampled for analysis of TAL metals, PAHs, PCBs, and/or explosives residue during previous investigation. Based on these previous studies contaminants were identified for each AOC (**Table 1-1** and Section 3.1.2.1 of this RI report). Site contaminants identified in upland surface soil included CERCLA hazardous metals, PAHs, PCBs, and explosives residues as presented in Section 6.3.1 of this RI report. The extent of contaminants identified in upland soil surface is further discussed in the subsections below.

The majority of soil cover across Iona Island is shallow (<12 inches depth). Exposed and shallow bedrock and hardscape was encountered across the majority of the site. Due to shallow soil cover and shallow depth to refusal, subsurface soils were only collected from two upland DUs (DU-20 and DU-21). Upland subsurface soil was sampled for BTEX and PAHs. No contaminants were identified in upland subsurface soil sampled during this RI.

6.4.1.1 Extent of CERCLA Hazardous Metals Extent in Upland Soil

Phase I results identified widespread, elevated concentrations of metals in surface soil (0–6 in. bgs) throughout the upland area of Iona Island, with 2 or more CERCLA hazardous metals in surface soil at each of the 15 upland DUs sampled for metals during this RI (**Figure 6-1** and **Table 6-21**). Each of the 15 upland DUs encompassed approximately 1 acre (200 x 200 ft) in area, for a total of 15 acres of metals-impacted soil. The depth to bedrock within these 15 upland DUs ranged from approximately 2 in. bgs at DU-13 to 12 in. bgs at DU-4, DU-11, DU-16, and DU-16. Subsurface soil was not sampled at these DUs due to the shallow depth to bedrock.

The highest concentrations of CERCLA hazardous metals in Phase I upland surface soil were detected at DU-4 (copper and zinc), DU-7 (lead), and DU-11 (arsenic). DU-4 and DU-7 were established to evaluate potential contamination in soil at previous SI sampling locations (II-EA-SD-02-01 at DU-4 and II-EA-SS-02-08 at DU-7), which had elevated concentrations of metals (Alion 2008) (which had elevated concentrations of antimony, copper, lead, mercury, and/or zinc) (**Figure 3-1**). DU-11 was established to evaluate potential contamination in soil at and in the vicinity of AOC #18 – Area F (Former Coal Storage Area).

6.4.1.2 Extent of PAHs in Upland Soil

Phase I results identified PAH impacts in upland surface soil at 7 upland DUs, including five DUs sized at approximately 1-acre each (200 ft x 200 ft) (DU-2, DU-4, DU-11, DU-12, DU-13, and DU-16), and one DU sized at 60 x 60 ft (DU-22) (**Figure 6-1** and **Table 6-21**). The highest concentrations of PAHs in upland surface soil were reported at DU-13, established to evaluate AOC #1 – Former Building 103 (Paint and Oil Storage. DU locations are presented in **Figure 3-1**.

Subsurface soil was not sampled at DU-2, DU-4, DU-11, DU-12, DU-13, and DU-16 due to the shallow depth to refusal. The depth to refusal within these DUs ranged from approximately 2 in. bgs at DU-12 to 12 in. bgs at DU-4 and DU-11. Upland subsurface soil was only collected from DU-20 and DU-21 during this RI. PAH concentrations in both surface and subsurface soil at these DUs were below background. In addition, PAH concentrations at these DUs decreased overall with depth (**Table 6-3**).

6.4.1.3 Extent of PCBs in Upland Soil

Phase I results identified PCB impacts (trace concentrations) in surface soil at DU-23 and DU-25 (**Table 6-21** and **Figure 6-1**). DU-23 was a 60 x 60-ft DUs established to evaluate the presence/absence of PCBs at former Transformer T1 located northwest of Building 406. DU-25 was a 60 x 60-ft DUs established to evaluate the presence/absence of PCBs at former Transformer T3 northeast of Building 220. Subsurface soil was not sampled at DU-23 and DU-25 due to the shallow depth to bedrock (approximately 6 in. bgs at DU-23 and 8 in. bgs at DU-25).

6.4.1.4 Extent of Explosives Residues in Upland Soil

Explosive residue detections in surface soil at former explosive storage and filling operations building locations were limited to EXDU-1 **(Table 6-21** and **Figure 3-1)**. This DU encompassed approximately one acre (200 ft x 200 ft) and was established to evaluate the presence or absence of residual explosives contamination in surface soil from Building 609 – Mine Loading Plant. Subsurface soil samples were collected from EXDU-1. Most of the DU consisted of exposed bedrock, with thin soil cover in the eastern portion of the DU only. The western portion of the DU consisted of a bedrock cliff.

6.4.2 Contaminant Extent in AOC #16 – Area D (Former Dump Area) Soil

AOC #16 – Area D (Former Dump Area) encompasses approximately 0.85 acres and is confined to the low-lying marsh area between Round Island to the southeast and Iona Island to the northwest that is inundated with water twice daily during high tide and during storm events (**Figure 6-3**). The northeastern boundary of AOC #16 – Area D (Former Dump Area) is the Hudson River shoreline. A small sand and gravel beach (sediment) is located along the Hudson River shoreline at the northeastern edge of AOC #16 – Area D (Former Dump Area). The area southwest of AOC #16 – Area D (Former Dump Area) consists of marshland and fill material emplaced by PIPC following transfer of the FUDS from the Navy in 1965.

Concrete slabs, pipes, burned metal debris, and ash were noted in test pits excavated in AOC #16 – Area D (Former Dump Area) during the MMRP intrusive investigation (EA 2021). Burn pit material and debris (including ash and foundry sand) observed in the test pits potentially originates from a former incinerator (AOC #2: Former Building 121 – Incinerator) that was located near the Hudson River shoreline on the western edge of AOC #16 – Area D (Former Dump Area).

AOC #16 – Area D (Former Dump Area) was investigated through sampling of three DUs (DU-17, 18, and 19) encompassing the entire areal extent of AOC #16 – Area D (Former Dump Area). DU-17, DU-18, and DU-19 were each established at approximately 1 acre (200 x 200 ft). DU-17 encompassed the northwestern portion of AOC #16 – Area D (Former Dump Area) adjacent to Iona Island and the Hudson River shoreline. This DU also covered AOC #2: Former Building 121 – Incinerator. DU-18 encompassed the northeastern portion of AOC #16 – Area D (Former Dump Area) adjacent to Round Island and the Hudson River shoreline. DU-19 encompassed the southern portion of AOC #16 – Area D (Former Dump Area). Surface and subsurface soil samples were collected from DU-17, DU-18, and DU-19 during this RI, with a total of 3 acres sampled for analysis of TAL metals, mercury, PAHs, PCBs, and explosives residues. Site contaminants identified in surface and subsurface soil at DU-17, DU-18, and DU-19 included CERCLA hazardous metals, PAHs, and PCBs as presented in Section 6.3.2 of this RI report.

Refusal/bedrock was not encountered in AOC #16 – Area D (Former Dump Area) during this RI or during previous investigations (as discussed in Section 1.5 of this RI report). Borings advanced during this RI in DU-17, DU-18, and DU-19 within AOC #16 – Area D (Former Dump Area) were terminated at 3 ft bgs in accordance with the UFP-QAPP (EA 2020a), and borings

advanced during the 1998 Data Collection Activities were terminated at 2 ft bgs (Greeley-Polhemus 1997). Test pits excavated in AOC #16 – Area D (Former Dump Area) during the MMRP intrusive investigation could not go beyond 3 to 4 ft bgs inches due to test pits filling with water (EA 2021). Intrusive data from the MMRP RI indicated that the depth of disposal in the Dump Area is greater than 3 ft bgs in certain areas.

Based on bathymetry data, a shallow bedrock shelf extends out from AOC #16 – Area D (Former Dump Area) into the Hudson River (USACE New York District 2018 and NOAA NCEI 2022) (**Figure 1-6**). The shelf extends 250 to 350 ft eastward into the Hudson River channel, with depths ranging from 0 ft along the shoreline to approximately 10 ft below the river surface at the eastern edge of the shelf. Based on the Hudson River bathymetry data (USACE New York District 2018 and NOAA NCEI 2022), AOC #16 – Area D (Former Dump Area), topography (EA 2020b), and field observations during the MMRP RI (EA 2021), the bedrock elevation at AOC #16 – Area D (Former Dump Area)is likely to be the same as the elevation of the near shore bedrock shelf (**Figure 1-6**). This elevation results in an estimated bedrock depth of 5 ft bgs, which would also be the maximum depth of AOC #16 − Area D (Former Dump Area) fill.
The extent of contaminants (CERCLA hazardous metals, PAHs, and PCBs) identified in AOC #16 – Area D (Former Dump Area) surface and subsurface soil is further discussed in the subsections below.

6.4.2.1 Extent of CERCLA Hazardous Metals in AOC #16 – Area D (Former Dump Area) Soil

Phase I results indicated that CERCLA hazardous metals are present throughout AOC #16 – Area D (Former Dump Area), with elevated concentrations of metals in surface and subsurface soil at each DU encompassing AOC #16 – Area D (Former Dump Area). Surface and subsurface soil in DU-17 and DU-18 are significantly impacted by lead (concentrations up to 2,900 mg/kg), mercury (concentrations up to 4.3 mg/kg), and copper (concentrations up to 5,600 mg/kg) as presented in **Table 6-2** and summarized in **Table 6-22** and **Table 6-23**. Except for arsenic in surface soil, sodium in surface and subsurface soil, and vanadium in subsurface soil, the concentration of CERCLA hazardous metals at DU-19 decrease significantly, with concentrations of several CERCLA hazardous metals below background (antimony, total chromium, lead, mercury, and silver in surface soil; and antimony, arsenic, beryllium, cadmium, total chromium, lead, mercury, nickel, silver, and thallium in subsurface soil).

6.4.2.2 Extent of PAHs in AOC #16 – Area D (Former Dump Area) Soil

Phase I results indicated PAH impacts in surface soil at each DU encompassing AOC #16 – Area D (Former Dump Area) as presented in **Table 6-22.** The majority of PAH analytes and the highest concentrations detected in surface soil from DU-18 and DU-19. Phase I results also indicated PAH impacts in subsurface soil at DU-17 and DU-18 as presented in **Table 6-23.** The highest concentrations in subsurface soil were primarily detected at DU-18 (**Table 6-23**). PAH concentrations in subsurface soil in DU-19 decreased to below background.

6.4.2.3 Extent of PCBs in AOC #16 – Area D (Former Dump Area) Soil

Phase I results indicated PCB impacts in surface soil at each DU encompassing AOC #16 – Area D (Former Dump Area) as presented in **Table 6-2** and summarized in **Table 6-22**. Total PCB concentrations in surface soil ranged from an estimated (trace) 0.0071 mg/kg at DU-19 to estimated 0.4 mg/kg at DU-18 (**Table 6-22**). Phase I results indicated PCB impacts in subsurface soil at DU-18 and DU-19 only. Total PCB concentrations in subsurface soil ranged from an estimated 0.057 mg/kg at DU-18 to an estimated (trace) 0.54 mg/kg at DU-19 (**Table 6-23**). The highest concentrations in surface soil were detected at DU-18, while the highest concentrations in subsurface soil were detected at DU-19.

6.4.3 Contaminant Extent in Surface Water and Sediment

Surface water migration pathways leading from AOC #16 – Area D (Former Dump Area) to the Hudson River and Iona Marsh shorelines were noted during the Phase I site reconnaissance. These pathways included tidal/stormwater flow to the Hudson River shoreline and two drainages leading to Iona Marsh (riprap filled drainage swale and tidal wetland swale). Following evaluation of Phase I data, further evaluation of these surface water pathways was recommended during Phase II (EA 2022).– Therefore, surface water samples during Phase II were collected within AOC #16 – Area D (Former Dump Area) and surface water and sediment samples were collected at the endpoints of surface water migration pathways identified during Phase I (Hudson River shoreline adjacent to AOC #16 – Area D [Former Dump Area] and Iona Marsh shoreline at the outlets of the riprap filled drainage swale and tidal wetland swale). Surface water and sediment samples were analyzed for TAL metals. The extent of CERCLA hazardous metals contaminants identified in surface water and sediment is further discussed in the subsections below.

No surface water migration pathways were noted leading from the upland area to the Hudson River and Iona Marsh shorelines. Therefore, additional investigation of surface water and sediment along the shorelines of the upland area was not conducted during this RI.

6.4.3.1 Extent of CERCLA Hazardous Metals in Surface Water

Phase II analytical results indicated CERCLA hazardous metals (arsenic, total chromium, copper, zinc, and/or sodium) in each surface water area sampled (**Table 6-24**). Sampling locations in each surface area with elevated concentrations of CERCLA hazardous metals were as follows:

- AOC #16 – Area D (Former Dump Area): copper at 4 of 20 sampling locations (DUMP-SW-05, DUMP-SW-10, DUMP-SW-15, and DUMP-SW-20); and zinc at 4 of 20 sampling locations (DUMP-SW-2, DUMP-SW-3, DUMP-SW-10, and DUMP-SW-20)

- Hudson River shoreline: arsenic throughout the entirety of the shoreline (each of the 20 sampling locations); copper at 14 of 20 sampling locations (IHRS-SW-01, IHRS-SW-03

through IHRS-SW-05, IHRS-SW-10 through IHRS-SW-16, and IHRS-SW-18 through IHRS-SW-20); and sodium at 19 of 20 sampling locations (IHRS-SW-01 and IHRS-SW-02 through IHRS-SW-20)

- Iona Marsh at the outlet of the riprap filled drainage swale: copper at 2 of 10 sampling locations (RRDS-SW-06 and RRDS-SW-09)

- Iona Marsh at the outlet of the tidal wetland swale: total chromium at 1 of 10 sampling locations (TWS-SW-7) and copper at 3 of 10 sampling locations (TWS-SW-07, TWS-SW-09, and TWS-SW-10).

6.4.3.2 Extent of CERCLA Hazardous Metals in Onsite Sediment

Sediment samples during Phase II were collected from one DU established along the Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area) (IHRS-DU-01) and two DUs established in Iona Marsh at the outlets of the riprap filled drainage swale (RRDS-DU-01) and tidal wetland swale (TWS-DU-01). Each DU was established at approximately 0.5-acre in size. These DUs are further discussed in the subsections below.

Phase II analytical results indicated that the Iona Island Hudson River shoreline is significantly impacted by CERCLA hazardous metals, particularly antimony, arsenic, cadmium, total chromium, copper, lead, nickel, silver, and zinc (**Table 6-25**). The Iona Marsh shoreline was less impacted, with significantly lower concentrations of CERCLA hazardous metals (arsenic, cadmium, total chromium, copper, lead, nickel, and zinc, with concentrations one to three orders of magnitude lower those detected in than Hudson River shoreline sediment).

6.4.3.2.1 Hudson River Shoreline (IHRS-DU-01)

IHRS-DU-01 was located on the Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area). The sediment DU included the approximately 0.1-acre sand and gravel beach area adjacent to DU-17 and DU-18 within the eastern portion of AOC #16 – Area D (Former Dump Area). The beach area is exposed at low tide and inundated with water twice daily during high tide and during storm events.

The northwestern edge of the beach area along AOC #16 – Area D (Former Dump Area) terminates at the river wall that extends northwestward along the Iona Island shoreline. Based on observations from the Phase I shoreline reconnaissance, most of the areas along the river wall consists of exposed bedrock and gravel except for some small pockets of sediment deposition.

The southeastern edge of the beach terminates along Round Island approximately 240 ft beyond downstream from AOC #16 – Area D (Former Dump Area). Historical installation layout maps from 1934 and 1947 (USAGC 2018) indicate that the shoreline east of AOC #16 – Area D (Former Dump Area) contains fill material associated with a 10-in. diameter discharge pipe. No discharge pipe was observed in this area during the shoreline reconnaissance or HTRW RI field activities.

The shallow bedrock shelf along the shoreline of AOC #16 – Area D (Former Dump Area) and the river wall to the northwest of AOC #16 – Area D (Former Dump Area) encompasses an area of approximately 9 acres. At the shoreline of AOC #16 – Area D (Former Dump Area) where Phase II sediment sampling was conducted, the shelf extends 250 to 350 ft into the Hudson River before the channel slopes steeply downward to a depth of approximately -95 ft below the river surface. The shelf thins to less than 100 ft along the river wall to the northwest of AOC #16 – Area D (Former Dump Area). Additionally, the shelf thins southwest of AOC #16 – Area D (Former Dump Area) and terminates along the shoreline of Round Island. While sediment may be present along the shelf beyond the limit of IHRS-DU-01, it is anticipated that elevated concentrations of metals in sediment associated with AOC #16 – Area D (Former Dump Area) would be limited to the nearshore area. Metals concentrations would decrease further offshore due to dispersion within the high energy river environment.

6.4.3.2.2 Iona Marsh Shoreline (RRDS-DU-01 and TWS-DU-01)

RRDS-DU-01 was located on the Iona Marsh shoreline at the outlet of the riprap filled drainage swale leading from the southwestern end of AOC #16 – Area D (Former Dump Area) (DU-19) south/southeast to Iona Marsh. TWS-DU-01 was located on the Iona Marsh shoreline at the outlet of the tidal wetland swale leading from the southwestern end of AOC #16 – Area D (Former Dump Area) west/southwest to Iona Marsh. The shoreline between RRDS-DU-01 and TWS-DU-01 was filled by PIPC following transfer of the FUDS from the Navy in 1965. Additionally, metal debris (e.g., rebar, old fencing, and other metal pieces) were observed in the riprap filled drainage swale.

6.5 SUMMARY

The findings of this HTRW RI have identified the following contaminants in onsite media:

- CERCLA hazardous metals, PAHs, PCBs, and explosives residues in onsite upland surface soil (**Figure 6-1 and Table 6-21**)

- CERCLA hazardous metals, PAHs, and PCBs in surface and subsurface soil within AOC #16 – Area D (Former Dump Area) (**Figure 6-1, Figure 6-2, Table 6-22, and Table 6-23**)

- CERCLA hazardous metals in surface water and sediment at the endpoints of surface water migration pathways leading from AOC #16 – Area D (Former Dump Area) to the Hudson River and Iona Marsh shorelines (**Table 6-24** and **Table 6-25**).

Phase I surface soil results indicated widespread, elevated concentrations of CERCLA hazardous metals and PAHs in surface soil (0–6 in. bgs) throughout the upland area of Iona Island, and elevated concentrations of PCBs and explosives residues in select Phase I DUs. CERCLA hazardous metals, PAHs, PCBs, and explosives residues analytes in each DU are presented in **Figure 6-21** and **Table 6-21**. Each of the 15 upland DUs sampled for metals (DU-01 through

DU-07 and DU-09 through DU-15) encompassing approximately 15 total acres contain elevated concentrations of CERCLA hazardous metals above background concentrations.

PAH impacted soil at 7 upland DUs (DU-2, DU-4, DU-11, DU-12, DU-13, DU-16, and DU-22) encompassing approximately 6 total acres. The highest concentrations of CERCLA hazardous metals in Phase I upland surface soil were detected at DU-4 (copper and zinc), DU-7 (lead), and DU-11 (arsenic). The highest concentrations PAHs were detected at DU-13. In addition to metals and PAHs, trace concentrations of PCB analytes were detected in upland surface soil were detected at DU-23 and DU-25 and explosives residues were detected in upland surface soil at EXDU-1.

Phase I soil results from AOC #16 – Area D (Former Dump Area) elevated concentrations of metals, PAHs, and PCBs in surface and subsurface soil at each of the 3 DUs encompassing the area (DU-17, DU-19, and DU-19). Surface and subsurface soil at DU-17 and DU-18 were significantly impacted by metals, particularly lead, mercury, and copper. The highest PAH concentrations were detected in soil from DU-18 and DU-19, while PCB impacts were noted in surface soil from DU-17 and DU-18 and in subsurface soil from DU-18 and DU-19.

Phase II metals results indicated elevated concentrations of CERCLA hazardous metals in both surface water and sediment at the endpoints of contaminant migration pathways leading from AOC #16 – Area D (Former Dump Area) to the Hudson River and Iona Marsh shorelines. While surface water impacts were limited to select metals (arsenic, total chromium, copper, sodium, and/or zine in each area investigated), sediment along the Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area) is significantly impacted with elevated concentrations of antimony, arsenic, cadmium, total chromium, copper, lead, nickel, silver, and zinc. While elevated concentrations of CERCLA hazardous metals including arsenic, cadmium, total chromium, copper, lead, nickel, and zinc were detected in Iona Marsh sediment at the outlets of the riprap filled drainage swale and tidal wetland swale, concentrations of each analyte were significantly lower (by at least an order of magnitude) than concentrations along the Hudson River shoreline.

7. CONTAMINANT FATE AND TRANSPORT

This section discusses the persistence and migration characteristics of site contaminants identified in Section 6 of this RI report. Contaminant fate refers to the expected final state that a contaminant will achieve following release to the environment. Contaminant transport refers to migration mechanisms and rate of contaminant movement from the source area. The fate of contaminants is affected by physical and chemical properties of the contaminants that govern partitioning of contaminants into environmental media, as well as transport processes and properties of the media through which the contaminants migrate.

Evaluation of environmental fate and transport mechanisms is necessary to determine the potential for continued presence of contaminants and offsite migration. The evaluation process assists in the determination of exposure pathways and potential exposure risks to current and future human populations and the environment. In addition, understanding of environmental fate and transport mechanisms is necessary to identify potential technologies that may be appropriate for remediation of the site.

7.1 SITE CONTAMINANTS SUMMARY

The following contaminant groups were identified in onsite media as discussed in Section 6.3 and summarized in Section 6.5 of this RI report:

- Upland surface soil: CERCLA hazardous metals widespread throughout the upland area; organic compounds (PAHs, PCBs, and explosives residues) in select DUs (**Table 6-21**)

- AOC #16 – Area D (Former Dump Area): CERCLA hazardous metals and organic compounds (PAHs, and PCBs) in surface and subsurface soil (**Figure 6-1, Figure 6-2, Table 6-22, and Table 6-23**)

- Surface water: CERCLA hazardous metals at AOC #16 – Area D (Former Dump Area) during tidal inundation and at the endpoints of surface water migration pathways leading from AOC #16 – Area D (Former Dump Area) to the Hudson River and Iona Marsh shorelines (**Table 6-24** and **Table 6-25**)

- Sediment: CERCLA hazardous metals at the endpoints of surface water migration pathways leading from AOC #16 – Area D (Former Dump Area) to the Hudson River and Iona Marsh shorelines (**Table 6-24** and **Table 6-25**).

7.2 SITE CONTAMINANT PHYSIOCHEMICAL CHARACTERISTICS

The chemical characteristics pertinent to the fate and transport of site contaminants are discussed in the following sections for the purpose of examining the mobility of contaminants within and between different media. The extent to which a contaminant moves or is transported through the environment is referred to as its mobility. In general, a contaminant that is water soluble will

move readily with water and is considered highly mobile. Conversely, a contaminant with movement that is strongly inhibited in the environment due to chemical and physical interactions with solid media is considered to have low mobility. The extent and rate at which a contaminant is transported through various media is based on the chemical and physical interactions of that contaminant with the media. During transport there are attenuation processes that can affect the rate of movement and the concentration of site contaminants in environmental media. Processes that can affect the site contaminants discussed include volatilization, adsorption, biodegradation, dissolution, photolysis, and precipitation.

A brief description of these processes is presented in the list below.

- Volatilization: The process by which a chemical is transferred from soil or water into a vapor phase or the atmosphere.

- Adsorption: The adherence of a chemical to the surface of a substance or another chemical. This interaction does not involve penetration of the chemical into, or changes in the structure of, the other substance. The process of adsorption typically results in retardation of contaminant movement.

- Biodegradation: The breaking down (degradation) of contaminants by microorganisms.

- Dissolution: The reaction which occurs when a contaminant comes into contact with and reacts with water. As a result, a hydroxyl group typically replaces a leaving group (such as a chloride) in the chemical structure.

- Photolysis: The breaking down (degradation) of contaminants by sunlight.

- Precipitation: The formation of a solid substance from a solution.

Properties specific to chemical contaminants or contaminant classes are discussed in the following subsections.

7.2.1 CERCLA Hazardous Metals

CERCLA hazardous metals listed in 40 CFR 302.4 include antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc (EPA 2024). The fate and transport for these metals is governed largely by the physical and chemical formation of metallic compounds, binding to the soil matrix, and speciation. Assessing the mobility of metals in environmental media is complicated because of the many organic and inorganic complexes and salts they form. The compounds and bonds formed by metals are determined by reduction and oxidation (redox) reactions, by the dominant pH in soil and sediment, and by the presence of organic carbon. These factors affect different metals in different ways.

CERCLA hazardous metals undergo a variety of processes in soil and water, which include dissolution, reduction, oxidation, and adsorption. These reactions are highly dependent on factors such as pH, salinity, ionic strength, particle-surface reactions, and the presence of anions and natural organic acids. Acidity increases the bioavailability of many cationic compounds, such as copper, lead, and zinc, which may become soluble at pHs below 5.

The CERCLA hazardous metals contaminants identified in onsite media are expected to be relatively insoluble when in metallic form or as inorganic complexes and salts but may become soluble in the presence of organic acids and reducing conditions. Adsorption of metals through cation exchange, specific adsorption, co-precipitation, or organic complexation by soil and sediment is the primary determinant of the mobility of metals in natural systems. Metals vary in the extent to which they are adsorbed by these mechanisms, and different adsorbents range in selectivity for metals.

Mobility of dissolved chemicals in surface water systems, relative to adsorption to solids, can be quantified by distribution coefficients (K_d). This is the primary relevant chemical characteristic for metals. The distribution coefficient represents the partitioning between liquids and solids (transfer by adsorption) assuming that the relationship is linear and reversible (a valid assumption for surface water/groundwater studies). Compounds with K_d values that are orders of magnitude greater than 1 liter per kilogram (L/kg) can be considered essentially immobile (Freeze and Cherry 1979). Distribution coefficients for CERCLA hazardous metals identified as contaminants in onsite media are presented in **Table 7-1** (EPA Office of Research and Development 2015).

7.2.2 Organic Constituents

The primary chemical characteristics for organic compounds include the following:

- Molecular weight: a measure of the weight/size of an organic contaminant molecule; is a factor in the Henry's Law Constant, biodegradation, and sorption.

- Organic-carbon partition coefficient (K_{oc}): measure of chemical partitioning between organic carbon and water. The higher the value, the more likely a chemical is to bind to soil or sediment rather than to remain dissolved in water

- N-octanol/water partition coefficient (K_{ow}): indicator of the environmental fate and bioavailability of a compound. Compounds with high values tend to accumulate in the fatty tissues of organisms.

- Aqueous solubility: the maximum concentration of chemical in the aqueous phase when the solution is in equilibrium. An indicator of a contaminant's ability to migrate in the environment.

- Melting and boiling points: temperatures at which a compound melts and boils.

- Vapor pressure: determines how quickly a compound will evaporate from surface soil or water into the air. Compounds with higher vapor pressure evaporate more quickly.

- Henry's Law Constant: the ratio of the concentration of a chemical in air to the concentration of a chemical in water. It reflects the volatility of a substance; substances with low values tend to persist in water and may be adsorbed onto soil or sediment.

Chemical characteristics for organic groups identified as site contaminants (PAHs, PCBs, and explosives residues) are discussed in the subsections below. Chemical characteristics for individual analytes identified as contaminants are presented in **Table 7-2**.

7.2.2.1 PAHs

The primary factors determining persistence, mobility, and fate of PAHs are degradation, volatilization, and binding to soil. PAHs may degrade over time into longer-lasting products by reacting with sunlight and other chemicals in the air, generally over a period of days to weeks. Breakdown in soil and water generally takes weeks to months and is caused primarily by the actions of microorganisms (ATSDR 1995). Volatilization is another factor that may affect PAHs, particularly low molecular weight (LMW) PAHs. Concentrations of these contaminants may decrease in soil over time due to transfer to and dispersion in the air. Therefore, volatilization is an important factor in eliminating these contaminants from soil. Perhaps the most important factor affecting fate of PAHs in soil is their affinity for binding to fine grained soils and organic matter. The soil organic carbon-water partition coefficients for PAHs vary depending on grain size, with the highest values in silt (fine particles) followed by sand and clay.

Sorption of PAHs to soil may limit biodegradation. Other factors that affect biodegradation include organic content, structure and particle size of the soil, presence of metals that are toxic to microorganisms, characteristics of the microbial population, and physical properties of the specific PAHs.

PAHs have low water solubility. In aquatic systems, PAHs are found primarily sorbed to particles that have settled to the bottom or are suspended in the water column.

7.2.2.2 PCBs

PCBs degrade over long periods of time due to weathering and do not readily break down in soil Therefore, they persist in soil with half-lives of months to years (ATSDR 2000). PCBs have low water solubility and adsorb strongly to sediment and soil, which decreases the mobility of these compounds, preventing them from dissolving in water. However, the hydrophobicity of these compounds increases the potential for uptake into the tissues of biota and the potential for bioaccumulation. Hydrophobic compounds may bioaccumulate and can biomagnify in fats and lipids within fish, invertebrates, or wildlife (EPA 2000). PCBs bioaccumulate in food chains and are stored in fatty tissues due to their stability and lipophilicity. Bioaccumulated PCBs are of particular relevance to human health because of their persistence in the body.

7.2.2.3 Explosives Residues

Adsorption rates for explosives residues identified in soil vary depending on the type of soil and sediment and the ionic strength of the surface and groundwater. Generally, explosives residues adsorb less than PCBs and metals. Explosives residues have a relatively high solubility and tend to be more stable in water and less likely to breakdown. The lower adsorption coefficients suggest explosives residues have a slight tendency to sorb to sediments, suspended solids, and biota, but are moderately mobile to highly mobile in soil.

7.3 BIOLOGICAL INTERACTIONS

The interactions between a contaminant and biota present at the site may also affect contaminant fate and transport within the environment. These interactions are described in the following subsections.

7.3.1 Bioconcentration

Bioconcentration is the accumulation of compounds by biota to greater concentrations than present in the aqueous phase. This is quantified using the bioconcentration factor which is the ratio of the compound concentration in the biota and in the water. Bioconcentration factors are typically expressed in units of L/kg. Higher values of partition coefficient indicate a preference of the compound for the non-aqueous phase (low solubility in water).

CERCLA hazardous metals analytes identified as contaminants in onsite soil and sediment and PAHs, PCBs, and explosives residues analytes identified as contaminants in onsite soil have high partition coefficients (**Table 7-1** and **Table 7-2**). This indicates that site contaminants are more persistent in onsite soil and biota.

7.3.2 Bioaccumulation

Bioaccumulation is the accumulation of compounds by biota from both aqueous phase and dietary phase exposure. The bioaccumulation factor, when related to aqueous phase concentrations, is larger than the actual bioconcentration factor.

A discussion of bioaccumulation for each contaminant group identified in the site is discussed in the subsections below.

7.3.2.1 Metals

CERCLA hazardous metals (particularly arsenic, copper, cadmium, lead, nickel, mercury, and zinc) have been known to accumulate in fish, birds, mammals, and/or plants (Garai 2021, Sanchari 2023, Wren 1986, Angulo-Bejarano et al. 2021). No biota samples were taken during this RI to confirm whether the site was serving as a source of compounds accumulating in biota.

7.3.2.2 PAHs

PAHs can accumulate in plants, aquatic organisms, and animals from intake of contaminated water, soil, and food; however, biomagnification of the compounds does not appear to be significant (ATSDR 1995). No biota samples were taken during this RI to confirm whether the site was serving as a source of compounds accumulating in biota.

7.3.2.3 PCBs

PCBs are particularly subject to bioaccumulation by biota because they are fat soluble and resistant to degradation. When PCBs are released into the environment and available for uptake through food, soil, and sediment ingested by biota, PCBs are stored in the fatty tissue. Even at low exposure levels, the concentration in biota can increase due to continued uptake of PCBs combined with slow degradation in tissue. Over time, this can accumulate to a high level. Additionally, concentrations of PCBs in biota higher on the food chain can be magnified through ingestion of organisms low in the food chain, which is known as biomagnification. No biota samples were taken during this RI to confirm whether the site was serving as a source of compounds accumulating in biota.

7.3.2.4 Explosives Residues

Explosives residues have limited persistence in surface soil and low K_{ow} values for explosives residues suggest limited potential for bioaccumulation.

7.4 TRANSPORT AND MECHANISMS OF MIGRATION

The primary release mechanism for contaminants identified during this HTRW RI includes spills, direct releases, and dumping, as presented in Section 2.3 of this RI report. Secondary release mechanisms include soil removal/reworking, infiltration/leaching, and runoff/erosion. In addition, contaminants may have been transported along the surface via overland runoff and erosion and ultimately deposited in shoreline sediments; these release mechanisms may be historically significant but are unlikely to contribute to current exposure pathways due to the vegetated nature of the soil. The most significant tertiary release mechanism for the Site is uptake of contaminants from abiotic media (e.g., soil) into prey tissue that is consumed by wildlife

Analytical results from the onsite soil and sediment sampling conducted under this HTRW RI indicate that contaminants from within AOC #16 – Area D (Former Dump Area) have been transported to the shoreline and deposited in shoreline sediment. The following sections present contaminant migration pathways to the shoreline.

7.4.1 Contaminant Migration and Transport from Upland Area Soil

Surface water migration pathways were not identified leading from the upland area to the shoreline. The upland area is extensively vegetated, which limits potential for contaminant migration via soil erosion and stormwater runoff.

7.4.2 Contaminant Migration and Transport from AOC #16—Area D (Former Dump Area) to the Hudson River Shoreline

Fill material and impacted soil at AOC #16 – Area D (Former Dump Area) is confined to the low-lying marsh area between Round and Iona Island. The northeastern boundary of AOC #16 – Area D (Former Dump Area) is the Hudson River shoreline. The surface elevation of AOC #16 – Area D (Former Dump Area) (0–2 ft amsl) is the same as the Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area).

AOC #16 – Area D (Former Dump Area) is tidally influenced and inundated with water twice daily during high tide and during storm events. Water was encountered at AOC #16 – Area D (Former Dump Area) during low tide at a depth of 3–4 ft bgs. This water rises during high tide and storm events and inundates AOC #16 – Area D (Former Dump Area) and provides a potential contaminant migration pathway to the Hudson River shoreline.

The types of contaminants detected in site soil at AOC #16 – Area D (Former Dump Area) would be bound to soil particles and unlikely to desorb (leach) from soil to water. In addition, the *Phragmites australis* root system would limit advective transport (bulk movement) of soil and contaminants. Phase II surface water analytical results did not indicate that contaminants within soil at AOC #16 – Area D (Former Dump Area) were being mobilized during tidal inundation and transported to the Hudson River shoreline. However, sediment along the Hudson River shoreline is impacted by metals including antimony, arsenic, cadmium, total chromium, copper, lead, nickel, silver, and zinc. Except for silver, elevated concentrations of these same metals were detected in Phase I soil samples from within AOC #16 – Area D (Former Dump Area).

The surface water migration pathway from AOC #16 – Area D (Former Dump Area) to the Hudson River shoreline may have been more historically significant before growth and development of the *Phragmites australis* stands. Additionally, metals contaminants at AOC #16 – Area D (Former Dump Area) may be mobilized during storm events when there is increased potential for soil erosion and advective transport of soil particles to the shoreline. Stormwater sampling was not conducted during this RI.

7.4.3 Contaminant Migration and Transport from AOC #16—Area D (Former Dump Area) to Iona Marsh

Potential pathways leading from AOC #16 – Area D (Former Dump Area) to Iona Marsh were observed during the shoreline reconnaissance, including a riprap filled drainage swale and tidal wetland swale. The headwaters of these swales are located at the western edge of AOC #16 – Area D (Former Dump Area). Although water was not observed in these drainages during the

shoreline reconnaissance, these drainages may be inundated with water during storm events and may provide an intermittent discharge pathway for flood water within AOC #16 – Area D (Former Dump Area) to Iona Marsh.

Elevated concentrations of CERCLA hazardous metals were detected in marsh sediment, including arsenic, copper, lead, nickel, and zinc at the outlet of the riprap filled drainage swale and arsenic, cadmium, copper, lead, nickel, and zinc at the outlet of the tidal wetland swale. Phase I analytical results from DU-19, which covers the western portion of AOC #16 – Area D (Former Dump Area), indicated elevated concentrations of arsenic, cadmium, copper, and zinc.

Phase II surface water analytical results from the outlets of the riprap filled drainage swale and tidal wetland swale did not indicate that contaminants in soil from AOC #16 – Area D (Former Dump Area) were being transported along these pathways to Iona Marsh. The types of contaminants detected in site soil at DU-19 would be bound to soil particles and unlikely to desorb (leach) from soil to water. In addition, the *Phragmites australis* root system within AOC #16 – Area D (Former Dump Area) and the vegetated nature of the tidal wetland swale would limit advective transport (bulk movement) of soil and contaminants.

The shoreline between RRDS-DU-01 and TWS-DU-01 was filled by PIPC following transfer of the FUDS from the Navy in 1965. This fill material was not sampled during Phase II, and the source and nature of the fill material is unknown. While arsenic, cadmium, copper, and zinc detected in Iona Marsh sediment is consistent with metals detected in DU-19 soil, there is also potential that metals within fill material soil may have contributed to elevated concentrations in marsh sediment. In addition, metal debris (e.g., rebar, old fencing, and other metal pieces) were observed in the riprap filled drainage swale and could contribute to metals concentrations in sediment detected at the outlet of the riprap filled drainage swale.

7.5 CONTAMINANT BIOAVAILABILITY

High levels of metals and PAHs in soil and sediment are not necessarily indicative of the adverse effects to human health and/or ecological receptors. The toxicity of a contaminant is related to bioavailability. Many contaminants may form complexes or compounds that bind them to soil and make them chemically inaccessible to ecological receptors. Alternatively, these elements and compounds may be present in forms that are easily dissolved and absorbed, or in forms that tend to bind to biological tissues. It is these forms of easily absorbed chemicals that are most toxic.

Once released into the liquid phase, a contaminant can move freely to a living organism. Contaminants that are bioaccumulated in plants or animals become available to the higher organisms that feed on them. Some toxic forms of metals (e.g., mercury) accumulate in animal tissue, while others (e.g., lead) accumulate in plants.

The fate and behavior of metals in soil and sediment are determined by retention/release processes, which regulate the concentration of metals in the soil solution and thus their bioavailability. The primary soil factors controlling the potential bioavailability of metals are soil pH; the availability and characteristics of sorption sites on soil surfaces; and the content of iron,

aluminum, soil organic matter, and clay mineral content. Natural processes such as adsorption, ion exchange, complexation, and precipitation can cause metals to become immobilized; and therefore, not bioavailable.

Onsite soil and sediment physical parameter data were used to qualitatively evaluate bioavailability of contaminants detected in onsite soil and sediment. The following subsections present parameters that were used to qualitatively evaluate bioavailability of contaminants detected in onsite soil and sediment.

7.5.1 Bioavailability Parameters

Grain size, TOC, ORP, and pH data were used as screening tools to make estimates of solubility and contaminant availability. CEC in soil were used in conjunction with grain size and TOC content to qualitatively evaluate the potential bioavailability of metals in soil. The impacts of physical parameters on contaminant bioavailability are discussed in the subsections below.

7.5.1.1 pH

pH influences the stability of existing metal phases, weathering, and incorporation of metals into mineral phases, as well as the degree and strength of adsorption of metals to soil and sediment. In general, metal mineral dissolution and solubility increase as soil pH decreases (i.e., in acidic soil), and metal solubilities increase as redox potential decreases.

In general, soil and sediment moisture pH values lower than 5 to 6 will result in greater metal solubility and bioavailability. Acidity increases the bioavailability of many cationic metals, such as barium, chromium, copper, lead, vanadium, and zinc, which may become more soluble at pH below 5. Increasing the pH increases the sorption of metals to soil and sediment particles, making the metal less bioavailable. Metal concentrations and bioavailability generally increase by an order of magnitude with each pH unit drop from neutrality. Above these pH levels most metals will precipitate as hydroxides and metal solubility and bioavailability decreases dramatically. However, oxyanion species of metals like arsenic and antimony have negative charge and become more soluble at higher than neutral pH.

7.5.1.2 ORP

In general, bioavailability of metals goes down with decreasing with redox potential (Eh) or ORP. At circumneutral pH, an Eh or ORP less than 0 volts results in reduced bioavailability especially in the presence of sulfur and sulfur compounds which precipitate metal sulfides. Some metals like iron and manganese are liberated at low Eh but these metals are not acutely toxic at low levels. Arsenic, however, can be liberated by the dissolution of iron and manganese oxides which tend to sorb the oxyanion form or arsenic and antimony.

7.5.1.3 Grain Size

Grain size provides an indication of the grain or particle surface area and can be used to estimate soil permeability and to better understand chemical release from the solid. Particle size provides screening information on the rate and magnitude of contaminant sorption/desorption, which can control bioavailability. Smaller particles have larger surface area to mass ratios and tend to demonstrate higher levels of solubility for metals, thereby decreasing their bioavailability in soil.

Soil particle size also can affect the solubility of chemicals such as metals from soil, and thus their bioavailability. In soil and sediment, very small clay particles (up to 0.004 mm) exhibit a strong influence from electrical charges on their surface, resulting in cohesive forces. Particle sizes between 0.004 mm and approximately 0.0625 mm are known as silt and are in a transition range. The silt particles are too large to feel much influence from the electromotive forces and too small to mobilize inertia against flowing water. When particle size exceeds 0.0625 mm, electromotive forces are insignificant. These particles are non-cohesive and are classified as sand, gravel, cobble.

Soil and sediment can generally be classified into two groups: coarse, with a grain size > 62 microns (μm), or fine, with a grain size < 62 μm. The coarse fraction is composed primarily of stable, inorganic silicate materials that are non-cohesive and generally not associated with chemical contamination. The fine fraction consists of particles with a relatively large surface area to volume ratio. Typically, surface electric charges cause the fine particles to be more chemically and biologically active, thereby increasing the likelihood of sorption and desorption of contaminants.

7.5.1.4 Total Organic Carbon

TOC is a measure of the organic carbon contained within soil. Metal cations sorb to soil organic matter, and strong adsorption to organic matter reduces the solubility of metals in soil. Increased organic content (TOC) is an indicator of potentially reduced bioavailability. Organic carbon content can be used to obtain a reasonably accurate estimate of the sorption distribution coefficient for hydrophobic organic compounds in soil or sediment samples that have ≥ 0.5 percent carbon (wt/wt).

7.5.1.5 Cation Exchange Capacity

CEC is the total capacity of a soil to hold exchangeable cations (i.e., essential nutrients) and provides a buffer against soil acidification. Soils with a higher clay fraction and organic matter tend to have a higher CEC than sandy soils. Toxicity to plants and earthworms from metals (particularly lead, cobalt, nickel, copper, and zinc) has been shown to increase with decreasing CEC of the soil (Organisation for Economic Co-operation and Development 2016, Oorts et al. 2021).

The CEC of a soil is expressed in centimol positive charge per kilogram of soil ($cmol_c/kg$) or meq/100g of soil. Note that expressions are numerically identical (10 $cmol_c/kg$ = 10 meq/100 g).

In general, if the CEC value is low, few cations are able to bind to the soil particles; if the CEC value is high, a larger number of cations can bind to the soil. Sandy soils low in organic matter have a very low CEC (i.e., less than 3 meq/100g) while heavier clay soils or soils high in organic matter generally have a much higher CEC (i.e., greater than 20 meq/100g) (Cornell University 2007). Soils with clays containing high CEC of 50 milliequivalents per 100 g or more are more bioavailable than rocky or poorly weathered soils. Organic rich soils often have CEC of 100 milliequivalents per 100 g and organic matter can increase bioavailability in general depending on soil pH.

The following table, prepared by the U.S. Navy (2000) presents a general overview of how different physical parameters in soil impact bioavailability potential of metals.

	Bioavailability		
Site History	**Low**	**Medium**	**High**
Metal Forms:			
Sulfides	X		
Elemental (metallic)	X		
Sulfates		X	
Carbonates			X
Oxides			X (except Ni)
Particle Size (of metal-bearing grains):			
Small			X
Large	X		
Weathering/Aging Time:			
Sulfides	X →		
Elemental	X →		
Carbonates		←	X
Oxides		←	X
Soil Chemistry			
pH:			
Acidic		X	
Basic			X (Cd, Hg, Pb, Ni)
Alkaline soils			X (Cd, Hg, Pb, Ni)
High TOC			X (Hg, Pb)
High Fe and Mn		X (As)	
Sulfide-producing soil		X (Cd, Hg, Pb, Ni)	

7.5.2 Bioavailability Assessment of Onsite Soil

Soil physical parameters are discussed in Section 5.2 of this RI report and presented in **Table 5-2** and **Table 5-3**. Soil in the upland area primarily consists of silt and sand. Clay content ranged from 1.7 to 9.64 percent. Overall, onsite upland soil is high in organic matter, with TOC values ranging from 13,000 to 46,000 mg/kg. pH results (ranging from 5.4 to 7.5) indicate that metals in soil are less soluble and more likely to sorb to onsite soil particles. In addition, soil ORP results (field ORP greater than 400 mV and calculated standard hydrogen electrode corrected ORP ranging greater than 512 mV) indicate reduced bioavailability. Overall, the CEC across the upland area (23 to 39 meq/100g) indicates a high organic matter content and a high number of cations for binding to metals. The high organic matter content will restrict mobilization of metals

and, therefore, the soil will tend to accumulate metals. Since the metals will be sorbed tightly to soil particles they will be less bioavailable.

Soil in AOC #16 – Area D (Former Dump Area) primarily consists of silt and sand. Clay content ranged from clay 0.43 to 3.14 percent. Overall, the soil is high in organic matter, with TOC values ranging from 25,000 300,000 mg/kg. pH results (ranging from 7.0 to 8.1) indicate that metals in soil are less soluble and more likely to sorb to onsite soil particles. In addition, soil ORP results (field ORP greater than 275 mV and calculated standard hydrogen electrode corrected ORP ranging greater than 480 mV) indicate reduced bioavailability. Overall, the CEC across AOC #16 – Area D (Former Dump Area) (30 to 91 meq/100g) indicates a high organic matter content and a high number of cations for binding to metals. The high organic matter content will restrict mobilization of metals and, therefore, the soil will tend to accumulate metals. Since the metals will be sorbed tightly to soil particles they will be less bioavailable.

7.5.3 Sediment Bioavailability Assessment of Iona Island Hudson River Sediment

In sediment, sulfides, grain size, and TOC content play a significant role in the bioavailability, and ultimately, toxicity of metals. Sediment consisting of fine-grained particles and high organic matter (i.e., TOC) are more likely to bind historical contaminants making them less bioavailable. Coarser-grained particles (e.g., sand and gravel) with low TOC are less likely to bind historical contaminants making them more bioavailable.

Grain size and TOC analytical results indicate that sediment along the Iona Island Hudson River Shoreline differs from sediment along the Iona Marsh shoreline at the outlets of the riprap filled drainage swale and tidal wetland swale. Grain size results indicated that sediment along the Hudson River shoreline consists primarily of medium to coarse sand, with clay content of 1.78 to 8.2 percent. TOC in Hudson River shoreline sediment ranged from 2,600 to 4,500 mg/kg. Grain size results for marsh sediment indicated primarily silt and clay, with clay content of 25.33 to 37.17 percent. TOC in Iona Marsh sediment ranged from 60,000 to 88,000 mg/kg. Observations during the reconnaissance confirmed the differences in sediments on either side of the island. The marsh shoreline areas consisted of soft, mucky marsh sediments; whereas the Hudson River side of the island had higher sand content and had much less organic matter. The Hudson River side of the island was subject to higher energy thus leaving behind coarser/inert particles and depositing finer materials downstream. Based on the coarser grain size and low TOC content of Hudson River shoreline sediment samples, these sediments are less likely to bind historical contaminants making them more bioavailable. Grain size and TOC sediment results for Iona Marsh indicated that Iona Marsh sediment is conducive for binding historical contaminants making them less bioavailable.

7.5.4 Sediment AVS/SEM Evaluation

Sediment with similar concentrations of metals may have different toxic effects, depending on the amount of organic carbon and/or sulfide available to bind and render the metals non-bioavailable. The AVS/SEM approach developed by EPA (2005) was used to conduct a screening level evaluation of toxicity to sediment-dwelling organisms. AVS/SEM is an

approximation parameter used to account for differences in sulfide and refine predictions of heavy metal toxicity in sediment for the following divalent metals: copper, cadmium, nickel, lead, and zinc.

In the laboratory, sulfide is volatilized from sediments by the addition of acid and SEM are the metals extracted during the AVS procedure. One mole of SEM will react with one mole of AVS in sediments. The reaction forms an insoluble metal sulfide that is not available for uptake by benthic organisms. Therefore, the amount of AVS present in sediments serves a critical role in setting limits to metal availability and toxicity. The AVS/SEM method gives a better indication of sediment toxicity to benthic organisms than measurements of "total" metals by measuring only the "bioavailable" fraction of metals present. The difference between the sum of the molar concentrations of SEM and the molar concentration of AVS, normalized to the fraction of organic carbon (f_{oc}) predicts which sediments are toxic. The equation is $(\sum SEM\text{-}AVS)/f_{oc}$ and the toxicity thresholds are as follows:

- If $(\Sigma SEM\text{-}AVS)/f_{oc} < 130\ \mu mol/g_{oc}$, metals are unlikely to be bioavailable/toxic and there is no ecological risk.

- If $130\ \mu mol/g_{oc} < (\Sigma SEM\text{-}AVS)/foc < 3000\ \mu mol/g_{oc}$, metals may be bioavailable/toxic and additional evaluation (i.e., toxicity testing) is recommended; ecological risk is unknown.

- If $(\Sigma SEM\text{-}AVS)/foc > 3000\ \mu mol/g_{oc}$, metals are likely bioavailable/toxic; however additional evaluations (i.e., toxicity testing) should be conducted to confirm that ecological risks exist.

AVS/SEM results for the Iona Island Hudson River shoreline were over 25,000 $\mu mol/g_{oc}$, which indicates that the metals are likely to be bioavailable and cause toxicity. The low TOC concentrations along the Hudson River Shoreline (2,600 to 4,500 mg/kg) indicate that there is much less TOC along the Hudson River sediments for metals to bind to reduce their bioavailability potential.

AVS/SEM results from Iona Marsh sediment at the outlets of the riprap filled drainage swale and tidal wetland swale were less than 130 $\mu mol/g_{oc}$. This indicates that the metals in sediment along Iona Marsh are unlikely to be bioavailable; therefore, they are unlikely to cause toxicity to sediment-dwelling organisms.

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8. HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENTS

This section presents a summary of the HHRA and ERA prepared to evaluate potential risk to human and ecological receptors exposed to onsite soil, surface water, and sediment at the Iona Island Naval Ammunition Depot Formerly FUDS. The complete HHRA is presented in **Appendix G**. The ERA (including the SLERA and RSLERA) is presented in **Appendix H**.

8.1 CALCULATION OF THE 95% UPPER CONFIDENCE LIMIT

The 95UCL was used to represent the exposure point concentration (EPC) in the risk assessments and was directly compared with appropriate risk screening criteria in the risk assessments. An EPC is defined as the concentration of a COPC or COPEC in site media to which a receptor may be exposed. The 95UCL is defined as a value that, when calculated repeatedly for randomly drawn subsets of site data, equals or exceeds the true mean 95 percent of the time. The 95UCL provides a conservative estimate of the average (or mean) concentration and a reasonable confidence that the true site average will not be underestimated and that chemicals will not be missed as COPCs to human health or COPECs to ecological receptors.

The 95UCL was calculated for the following analytical data sets. Analytical results that were rejected during data validation (dibenz[a,h]anthracene at BADU-4 as presented in Section 4.2 of this RI report) were excluded when calculating the 95UCL.

- Metals, PAH, BTEX, PCB, and/or explosives analytical results for each onsite soil DU based upon the results of the ISM soil triplicate samples collected during Phase I and Phase II

- Metals analytical results for each onsite surface water area investigated (AOC #16 – Area D [Former Dump Area], Iona Hudson River shoreline, and Iona Marsh shoreline) based on the results of 20 discrete samples collected from each area

- Metals analytical results for each onsite sediment DU based upon the results of the ISM sediment triplicate samples collected during Phase II

- Background soil metals and PAH analytical results based upon the 8 ISM samples collected in Bear Mountain State Park

- Background surface water metals analytical results for the Con Hook Hudson River shoreline and Con Hook marsh shoreline based upon the 20 discrete samples collected in each depositional environment

- Background sediment metals analytical results for the Con Hook Hudson River shoreline and Con Hook marsh shoreline based upon the 8 ISM samples collected in each depositional environment.

8.1.1 Phase I Soil 95UCL Calculations

95UCLs for Phase I soil DUs were calculated using the ITRC calculator[8] (ITRC 2012) as discussed in Worksheets #11 and #14 of the UFP-QAPP (EA 2020a). Two candidate UCL equations that can accommodate ISM data sets were evaluated using Phase I soil analytical data, including the Student's-t and Chebyshev. The Student's-t UCL is expected to provide valid 95UCL values when the distribution of means is approximately normal. The Chebyshev is generally considered to be a more conservative estimate of the UCL because it generally achieves or exceeds the desired coverage rates, even for non-normal distribution (ITRC 2012). For Phase I analytical data, in almost all cases, the Chebyshev 95UCL for Phase I analytical data was higher than the Student's-t. The actual difference between the 95UCLs for both methods was relatively small, generally less than 2 mg/kg for analytical results. The Chebyshev 95UCL was selected to represent the EPC 95UCL because it represents a more conservative estimate of the 95UCL.

8.1.2 Phase II Surface Water 95UCL Calculations

95UCLs for Phase II discrete surface water analytical results were calculated for each surface water area investigated (AOC #16 – Area D [Former Dump Area], Iona Hudson River shoreline, Iona Marsh shoreline, Con Hook Hudson River shoreline, and Con Hook Marsh shoreline) using EPA's ProUCL 5.2 (June 2022) software. Calculations were completed using analytical results from the 20 surface water samples collected within each area.

8.1.3 Phase II Sediment 95UCL Calculations

95UCLs Phase II metals results for each sediment DUs were calculated using the updated ITRC Calculator (ITRC 2020). The 2020 ITRC Calculator recommended either the Student's-t or Chebyshev 95UCLs based upon coefficient of variation (CV) of increments. The CV of increments was estimated based on summary statistics of replicates. The calculator recommended the Student's-t 95UCL for data sets where the CV of increments was low (defined as CV < 1.5). The calculator recommended the Chebyshev 95UCL for data sets where the CV was medium (defined as 1.5 < CV < 3) or high (defined as CV > 3) (ITRC 2020). The 95UCL for Phase II metals results was selected as either the Students-t or Chebyshev 95UCL based upon the recommendation from the ITRC calculator.

8.1.4 95UCL Results

The 95UCLs for each Phase I soil DU, Phase II surface water area, and Phase II sediment DU are included in the analytical results tables presented in Section 6 of this RI report as follows:

- **Table 6-1** through **Table 6-4**: onsite upland soil

[8] The ITRC calculator was updated in 2020. The 2012 version is no longer available.

- **Table 6-6**: AOC #16 – Area D (Former Dump Area) soil
- **Table 6-8** through **Table 6-10**: onsite surface water
- **Table 6-12**: onsite sediment
- **Table 6-14**: background soil
- **Table 6-15**: background surface water
- **Table 6-16**: background sediment.

The 95UCLs for ISM samples are often greater than the maximum detected concentration in the individual triplicate samples. Per the ITRC ISM guidance, with ISM data, the calculated 95UCL value should always be used as the EPC even if it is higher than any of the individual ISM results. This situation is not uncommon, particularly when the number of replicates is small. This was the case for each onsite Phase I soil and Phase II sediment DU sampled during this RI. With three replicates in each DU, the UCL for a DU always exceeded the highest individual ISM result in that DU.

8.2 SCREENING CRITERIA COMPARISON

As part of the HHRA and ERA, analytical data generated during the HTRW RI were evaluated to determine whether concentrations of detected contaminants were greater than applicable screening criteria. Screening criteria are risk-based concentrations derived from standardized equations, combining exposure information assumptions and EPA toxicity data. Screening criteria are not cleanup standards and are not applied as such. Screening criteria exceedances do not automatically designate an area as contaminated or indicate a response action is necessary. Rather, screening criteria exceedances suggest that further evaluation of the potential risks posed by site-related contaminants may be necessary.

8.2.1 Human Health Screening Criteria

The following human health screening criteria were used for Phase I and II analytical data (**Table 8-1**):

- EPA residential soil RSLs (updated November 2023) (EPA 2023a). A restrictive clause is in place for the island that it shall only be used for recreational/park purposes only; therefore, residential development is unlikely to occur at the site (USACE 1995). However, EPA residential Soil RSLs are included to assess for potential child receptors at the site, including site visitation for nature walks and potential camping. Soil and sediment results were compared to the residential soil RSLs.

- EPA Safe Drinking Water Act maximum contaminant levels (MCLs) and tapwater RSLs (updated November 2023) were used as screening criteria for surface water results (EPA 2023a).

- Background concentrations for soil, sediment, and surface water were also used as screening criteria.

8.2.2 Ecological Screening Criteria

The following ecological screening criteria were used for Phase I and Phase II analytical data:

- EPA Region 4 ecological screening values for soil, as presented in the EPA Region 4 ERA Supplemental Guidance, Scientific Support Section Superfund Division EPA Region 4, March 2018 (EPA 2018) (**Table 8-2**). The selection hierarchy in the guidance sourced values from EPA EcoSSL documents first for the select metals and PAHs for which they are available.

- Currently available National Recommended Water Quality Criteria (NRWQC) for aquatic life, chronic freshwater (updated October 2023) (EPA 2023b). For analytes without currently available NRWQC, additional values were selected from EPA compilations. Due to a lack of compiled EPA surface water screening values for Region 2 (the State of New York's EPA region), screening values from EPA Regions 3 and 4 were compared and are presented in **Table 8-3**. These values include compilations from outdated NRWQC, the Great Lakes Initiative Clearinghouse resources Tier II criteria (EPA 2024), revised in 2013, and Suter and Tsao 1996. The hierarchy for selection of screening values was: NRWQC (current values), Great Lakes Initiative (2013), and Suter and Tsao (1996). Bold values in **Table 8-3** indicate the selected screening values for each analyte.

- EPA Region 4 (March 2018) ecological screening values for sediment (EPA 2018). Due to a lack of EPA sediment screening values for Region 2 (the State of New York's EPA region), EPA's most recent (i.e., 2018) compilation of sediment screening values for Region 4 were used, since values are the same (or lower) than those presented by Region 3. Freshwater sediment screening values (ecological sediment screening values [ESV]) were compared to sediment data for the SLERA. EPA's less conservative Region 4 Refinement Screening Values (RSVs) were incorporated into the RSLERA. Values are presented in **Table 8-4**. These values include the following sources of peer-reviewed, scientific literature:

  — Long et al. 1991. The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program. NOAA Technical Memorandum NOS OMA 52. Effects range low (ER-L) for chronic and effects range medium (ER-M) for acute.

- MacDonald et al. 2003. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters. Florida Department of Environmental Protection, Tallahassee, FL. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters. Threshold effect concentration for the ESV and probable effect concentration for the RSV.

- MacDonald, D.D. 1994. Approach to the Assessment of Sediment Quality in Florida Coastal Waters. Florida Department of Environmental Protection. 1994 Florida Sediment Quality Assessment Guidelines for Florida Coastal Waters.

- Persaud et al. 1993. Guidelines for the protection and management of aquatic sediment quality in Ontario. Ontario Ministry of the Environment. Queen's Printer of Ontario.

- Washington State Sediment Management Standards, Cleanup Objectives (Washington State Department of Ecology 2013)

- Los Alamos National Laboratory ECORISK Database. September 2017.

The full TAL metals list for soil, surface water, and sediment samples was reported to help evaluate geochemistry and support development of the risk assessments. Note that types of contamination that may be eligible for DERP FUDS response include CERCLA hazardous substances or pollutants or contaminants. Metals that are CERCLA hazardous substances listed in 40 CFR 302.4 include antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc (EPA 2024). While there are no EPA screening criteria for nutrient metals in soil and sediment, and while nutrient metals (calcium, magnesium, and potassium) are not CERCLA hazardous substances and are ineligible for DERP FUDS response, nutrient metals were included in the soil, surface water, and sediment metals analyte lists to help evaluate soil and sediment geochemistry and ultimately bioavailability.

EPA surface water screening criteria for metals are hardness dependent. The lower confidence limit (LCL) of the mean hardness values was used as the hardness adjuster for water quality criteria. The use of the LCL addresses variation and uncertainty in hardness data. One value was used for Iona Island (LCL of the 60 onsite hardness samples) and one value was used for Con Hook (LCL of the 40 background hardness samples).

8.3 HUMAN HEALTH RISK ASSESSMENT

The HHRA is a qualitative or quantitative process that characterizes site conditions and determines applicable risk to human health, based on potential exposure scenarios to contaminants at the Iona Island Naval Ammunition Depot FUDS. The HHRA was conducted in accordance with CERCLA, as amended by Title 42 of the U.S. Code Sections 9601 through 9675 and followed the procedures and methodologies set forth by the EPA and USACE.

The objectives of the HHRA included the following:

- Outline the regulatory basis and guidance for conducting the HHRA
- Outline the methods for determining COPCs in site media
- Present the exposure setting that details land use, nearby human populations, and potential site activities
- Develop a CSM that characterizes relevant complete contaminant exposure pathways and receptors of concern
- Calculate potential carcinogenic and non-carcinogenic risk to receptors of concern (e.g., any human contact at the site under current or future scenarios)
- Identify areas that pose no unacceptable risks to human health and require no further action
- Determine contaminants of concern in site media that contribute significantly to potential risk concerns, which will be used to evaluate risk management decisions.

8.3.1 Identification of Contaminants of Potential Concern

Risk-based screening and background evaluations were conducted to identify COPCs in each media at the site. Risk-based screening was conducted by comparing detected analyte concentrations within each DU to risk-based screening concentrations. Any analyte in any medium for which the measured concentration exceeded the risk-based screening concentration was retained as an initial COPC. EPA's most recent (November 2023) RSLs were used for risk-based screening purposes in the HHRA (**Table 8-1**). For soil and sediment ISM results, the 95UCL for each DU was compared to EPA residential soil RSLs. While a restrictive clause is in place for the island that it shall be used for recreational purposes only, and while residential development is unlikely to occur at the site (USACE 1995), EPA residential soil RSLs were included to evaluate potential child receptors at the site. For surface water results, the maximum detected concentration was compared to the screening criteria (EPA Tapwater RSLs and EPA MCLs).

Background comparisons for onsite soil metals and PAH results and onsite surface water and sediment metals results were conducted using permutation test of means (Student t-Test with adjusted p-value), as presented in Section 6.2.1.1 of this RI report. The results of permutation testing are presented in **Appendix F** of this HTRW RI Report. Background comparisons for onsite surface water results were conducted using a quantitative statistical approach (statistical hypothesis tests), as presented in Section 6.2.1.2 of this RI report. Only analytes that exceeded both the risk-based screening criteria and background concentrations were selected as COPCs for quantitative evaluation in the HHRA.

8.3.1.1 Upland Soil

COPCs were identified as those analytes exceeding both EPA RSLs and background concentrations. COPCs in soil samples included five CERCLA hazardous metals (antimony, arsenic, copper, lead, and thallium) and five PAHs (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenz[a,h]anthracene, and indeno[1,2,3-c,d]pyrene) as presented in **Table 8-5** and summarized in the list below.

- Antimony at DU-13
- Arsenic at DU-01, DU-02, DU-03, DU-4, DU-5, DU-6, DU-7 DU-11, DU-12, DU-13, and DU-14
- Copper at DU-13
- Lead at DU-7
- Thallium at DU-7 and DU-11
- Benzo(a)anthracene at DU-02, DU-4, DU-11, DU-12, DU-13, and DU-22
- Benzo(a)pyrene at DU-02, DU-4, DU-11, DU-12, DU-13, and DU-22
- Benzo(b)fluoranthene at DU-02, DU-4, DU-11, DU-12, DU-13, and DU-22
- Dibenz(a,h)anthracene at DU-02, DU-4, DU-11, DU-12, DU-13, and DU-22
- Indeno(1,2,3-c,d)pyrene at DU-02, DU-4, DU-11, DU-12, DU-13, and DU-22.

While cobalt, iron, and manganese were also identified in the HHRA as COPCs, these metals are not CERCLA hazardous substances and are not eligible for DERP FUDS response; therefore, these metals are not presented on **Table 8-5**. COPCs were not identified for upland surface soil at DU-20, DU-21, DU-23, DU-25, or EXDU-1 through EXDU-7. Additionally, COPCs were not identified for subsurface soil at DU-20 or DU-21.

8.3.1.2 AOC #16 – Area D (Former Dump Area) Soil

COPCs identified in surface soil at AOC #16 – Area D (Former Dump Area) included eight CERCLA hazardous metals (antimony, arsenic, cadmium, copper, lead, mercury, thallium, and zinc), five PAHs (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenz[a,h]anthracene, and indeno[1,2,3-c,d]pyrene), and one PCB (Aroclor 1260). COPCs identified in subsurface soil included seven CERCLA hazardous metals (antimony, arsenic, copper, lead, mercury, thallium, and zinc) and three PAHs (benzo[a]pyrene, benzo[b]fluoranthene, and dibenz[a,h]anthracene). While aluminum, cobalt, iron, manganese,

and vanadium were also identified in the HHRA as COPCs, these metals are not CERCLA hazardous substances and are not eligible for DERP FUDS response.

COPCs in AOC #16 – Area D (Former Dump Area) soil are presented in **Table 8-5** and summarized in the list below.

- Antimony: DU-17 (surface and subsurface soil) and DU-18 (surface and subsurface soil)
- Arsenic: DU-17 (surface and subsurface soil), DU-18 (surface and subsurface soil), and DU-19 (surface soil only)
- Cadmium: DU-17 (surface soil only)
- Copper: DU-17 (surface soil only) and DU-18 (surface and subsurface soil)
- Lead: DU-17 (surface and subsurface soil) and DU-18 (surface and subsurface soil)
- Mercury: DU-18 (surface and subsurface soil)
- Thallium: DU-17 (surface and subsurface soil) and DU-18 (surface and subsurface soil)
- Zinc: DU-17 (surface and subsurface soil) and DU-18 (surface and subsurface soil)
- Benzo(a)anthracene: DU-19 (surface soil only)
- Benzo(a)pyrene: DU-18 (surface soil only) and DU-19 (surface soil only)
- Benzo(b)fluoranthene: DU-18 (surface soil only) and DU-19 (surface soil only)
- Dibenz(a,h)anthracene: DU-18 (surface soil only) and DU-19 (surface soil only)
- Indeno(1,2,3-c,d)pyrene: DU-18 (surface soil only)
- Aroclor 1260: DU-18 (surface soil only).

8.3.1.3 Surface Water

No COPCs were identified for surface water (**Table 8-6**).

8.3.1.4 Sediment

COPCs identified in sediment included metals six CERCLA hazardous metals (antimony, arsenic, cadmium, copper, lead, and thallium) as presented in **Table 8-7** and summarized in the

list below. While cobalt, iron, and manganese were also identified in the HHRA as COPCs, these metals are not CERCLA hazardous substances and are not eligible for DERP FUDS response.

- Antimony: IHRS-DU-01
- Arsenic: IHRS-DU-01, RRDS-DU-01, TWS-DU-01
- Cadmium: IHRS-DU-01, TWS-DU-01
- Copper: IHRS-DU-01
- Lead: IHRS-DU-01
- Thallium: IHRS-DU-01.

8.3.2 Human Health Exposure Assessment

Following identification of COPCs, the human health exposure assessment was conducted to identify persons or receptors that are or may be exposed to the site, the pathways through which they are potentially exposed, and the magnitude of these potential exposures. The exposure assessment included several steps:

- Evaluating the exposure setting, which includes a description of the land use and the potentially exposed human populations
- Developing the CSM, identifying the source of contamination, the contamination transport and release mechanisms, the exposure media, the exposure routes, and the potentially exposed populations
- Calculating EPCs for each COPC for each of the complete exposure pathways identified in the CSM
- Identifying the exposure models and parameters with which to calculate the exposure intakes
- Calculating exposure intakes.

Soil was identified as the primary medium of concern. Evaluation of Phase I soil analytical results revealed potential concern for the migration of chemicals from AOC#16 – Area D (Former Dump Area) to surface water and sediment. Migration pathways include tidal flow to the Hudson River shoreline and defined surface water channels leading to Iona Marsh (riprap-filled drainage swale and tidal wetland swale). No COPCs were determined for surface water. Therefore, only sediment was considered a potential medium of concern.

Current receptors identified for evaluation in the HHRA included park personnel, researchers, adult recreators, adolescent recreators, child recreators, adolescent trespassers, and Boy Scouts/campers as presented in Section 2.5 of this RI report. Potential future site users identified for evaluation included each of the current users as well as construction workers.

Human health exposure pathways presented in Section 2.5 of this RI report were evaluated and updated during development of the HHRA to identify complete, potentially complete, or incomplete exposure pathways to receptors as based upon site history, current and anticipated site use, and identification of COPCs in onsite media. The updated Human Health CSM is presented in **Figure 8-1**.

The following surface soil exposure pathways are considered potentially complete for all current and potential future receptors (park personnel, researchers, construction workers, recreational users, trespassers, and Boy Scouts/campers):

- Incidental ingestion of surface soil
- Dermal contact with surface soil
- Inhalation of windblown particulates from surface soil.

Additionally, the following sediment exposure pathways are considered complete for current and future recreational users, park personnel, and trespassers:

- Incidental ingestion of sediment
- Dermal contact with sediment.

The subsurface soil exposure pathway (incidental ingestion with, direct contact with, and inhalation of windblown particulates from subsurface soil) was considered potentially complete for future construction workers.

The HHRA quantitatively evaluated each DU at the site that revealed potential COPCs in onsite soil and sediment. The 95UCLs calculated from the triplicate results within each soil and sediment DU were used to represent the EPC for each COPC within each soil and sediment DU. Calculation of 95UCLs is discussed in Section 8.1 of this RI report.

In addition, two separate soil exposure areas were evaluated to represent expected receptor exposure to the upland portions of the entire island. All receptors are likely to visit various areas of the upland portion of the island while onsite. No specific upland areas were identified as presenting an attractive area for any of the receptors to spend a majority of their time. The first exposure area, identified as the Island Exposure Area, encompassed all soil DUs except DU-17 through DU-19 within AOC #16 – Area D (Former Dump Area). The second exposure area, identified as the Dump Area Exposure Area, includes the three soil DUs covering AOC #16 –

Area D (Former Dump Area) (DU-17 through DU-19). EPCs for each exposure area were represented by the combined 95UCL for each COPC from each DU within the exposure area. This 95UCL for each exposure area was calculated using the ITRC (2020) area weighted calculator. The sediment DUs, IHRS, RRDS, and TWS, were not evaluated within an exposure area. The physical condition and location of these DUs differ from the exposure areas.

8.3.3 Human Health Risk Characterization

The characterization of human health risk was conducted by combining information from the exposure assessment with that from the toxicity assessment. Chemical intakes for each receptor and each exposure pathway were combined with toxicity information to derive cumulative excess lifetime cancer risks (ELCRs) and cumulative non-cancer HIs for each DU and each exposure area. Potential human health risk concerns were identified if the non-cancer HIs >1.0 or cancer risks were above the acceptable risk range of 10^{-4} to 10^{-6}.

For lead in soil and sediment, lead risks were modeled using *Recommendations of the Technical Review Workgroup for Lead, An Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil* (EPA 2003, 2009, 2017d). Potential concerns for construction workers (soil only) park personnel (soil and sediment), recreational adults and adolescents (soil and sediment) were evaluated with the EPA Adult Lead Model (ALM). The ALM evaluates the percentage of a target population that will have blood-lead levels above a reference concentration of 5 micrograms lead per deciliter (µg/dL). To achieve a specific level of protectiveness, EPA has established a limit to exposure to soil lead levels such that a typical (or hypothetical) child would have an estimated risk of no more than 5 percent exceeding the reference blood-lead level.

8.3.4 Human Health Risk Assessment Results

Potential receptors evaluated in the HHRA included park personnel, researcher, construction workers, recreational users (adult, adolescent, and child), adolescent trespasser, and camper/Boy Scout. Each receptor was evaluated for exposure to each individual DUs. The evaluation of DU analytical results was performed on a DU-basis to inform potential decisions that relate to the DU. Carcinogenic risks for all receptors exposures to the individual DUs were either below or within the EPA's acceptable risk range of $1x10^{-6}$ to $1x10^{-4}$. The non-cancer HI thresholds for all receptors exposure to the individual DUs were below the acceptable threshold of 1.0, except the construction worker exposure to DU-13 and DU-18. However, a breakdown by target organ did not reveal any target organs above the acceptable threshold of 1.0 for the construction workers exposure to DU-13 and DU-18. Therefore, the HHRA did not reveal potential concerns for carcinogenic risks or non-cancer hazards for any receptor's exposure to each DU.
Additionally, the HHRA noted that all potential site receptors may not remain within one DU because none of the DUs present an attractive area for any of the receptors to spend a majority of time while onsite. It is likely that all receptors may visit various areas of Iona island during their visit. Therefore, the HHRA evaluated all potential receptors for exposure to two exposure areas: Iona Island Exposure Area and the Former Dump Area Exposure Area. The Iona Island Exposure Area is an upland area that includes all DUs, except DU-17 through DU-19 within AOC #16 – Area D (Former Dump Area). The second exposure area, identified as the Former

Dump Area Exposure Area, includes only DUs 17 through 19. DU-17 through DU-19 within AOC #16 – Area D (Former Dump Area) were considered different from the remainder of the Iona Island DUs because the area is a marshy that is covered with vegetation and subject to tidal influence from the Hudson River. These constraints make access difficult. The marsh area between Iona Island and Round Island where AOC #16 – Area D (Former Dump Area) located is also identified as a future nature preserve/wetland area. No construction or other activities are expected in this area and actual contact with this area is likely minimal due to vegetation and tidal influences. It is noted that the sediment DUs (i.e., IHRS, RRDS, and TWS), were not evaluated within an exposure area and were only evaluated as individual DUs. For both the Iona Island and Former Dump Area Exposure Areas, the HHRA indicated all carcinogenic risks were either below or within the EPA's acceptable risk range of $1x10^{-6}$ to $1x10^{-4}$. The non-cancer HI thresholds were below the acceptable threshold of 1.0 for all receptors evaluated, except the construction worker exposure to the Former Dump Area Exposure Area. A breakdown by target organ did not reveal any target organs above the acceptable threshold of 1.0 for the construction workers exposure to the Former Dump Area Exposure Area. Therefore, the HHRA did not reveal potential concerns for carcinogenic risks or non-cancer hazards for any receptor's exposure to each exposure area.

Lead was evaluated separately from the carcinogenic risks and non-cancer hazards discussed above. Lead was evaluated through the use of the EPA's adult lead model (ALM). To achieve a specific level of protectiveness, EPA has established that a typical (or hypothetical) child would have an estimated risk of no more than 5 percent exceeding the reference blood-lead level of 5 µg/dL. The results of the ALM revealed soil within DU-7, DU-17 and DU-18, the Former Dump Area Exposure Area, and sediment within the IHRS DU revealed greater than 5 percent of the population would exceed the reference blood-lead level of 5 µg/dL. DU-7 only revealed potential concerns for a construction worker exposure. DUs 17 and 18 revealed potential concerns for the construction worker and park personnel, and the IHRS DU revealed potential concerns for all receptors evaluated for lead exposures (construction worker, park personnel and recreational users).

It is noted that the Former Dump Area Exposure Area, which includes DU-17 and DU-18, is a marshy area that is covered with vegetation and subject to tidal influence that makes access difficult. The Dump Area is also identified as a future nature preserve/wetland area. No construction or other activities are expected in this area and actual contact with this area is minimal and unlikely to result in human health concerns. Additionally, construction worker exposure represents exposures that are usually controlled using standard health and safety protocols and personal protective equipment. Potential lead risk concerns identified for the construction worker do not warrant further evaluation or risk management decisions.
Park personnel potential exposure to one specific DU for an entire year is not an expected scenario. The park personnel are more likely to be exposed to environmental media over the entire island for activities such as grass mowing, site inspections, and general maintenance. For this reason, the exposure to the entire island is better represented by an average (or mean) concentration across the DUs, which includes all DUs sampled (i.e., DU-1 through DU-7, DU-9 through DU-19, IHRS, RRDS, and TWS). It is noted that determining a mean concentration using just the DU lead concentrations likely results in a overestimate of the mean lead

concentration across the entire Iona Island. The DUs only represent approximately 25 acres out of the 124 acres of the Iona Island Naval Ammunition Depot FUDS. The determination of the lead DU mean concentration is similar to method used to determine EPCs for the combined exposure areas (i.e., the Former Dump Exposure Area and the Iona Island Exposure Area). The use of only the DU lead results provides a protective evaluation of potential contact. The mean soil lead concentration across all DUs is 667 mg/kg, which reveals less than 5% of the population exceeds the target blood-lead level (**Table 8-9**). The results of the ALM modeling for the mean lead concentration across the DUs show no potential concerns for the park personnel exposure to lead based upon expected exposure across the entire island. Therefore, the park personnel exposure to Iona Island does not warrant further evaluation or risk management decisions.

The recreational user exposure to lead within the IHRS DU did reveal significant exceedance of the acceptable blood-lead threshold. Unlike the park personnel expected exposure, the recreational user may spend a significant amount of time at the IHRS DU. This DU is located along the Hudson River and is a flat area where boaters may visit, and the recreational user exposure is an exposure that is difficult to control on the island. While sediments in this area are generally sandy with larger grain size that is difficult to adhere to the skin surface, there is a potential for contact, sample results from the IHRS DU reveal potential transport of contaminants from AOC #16 – Area D (Former Dump Area) along the surface via overland runoff and erosion and into shoreline sediments. As a result, there are sufficient potential concerns for a recreational user exposure to the IHRS DU to warrant additional evaluation and/or risk management decisions.

8.3.5 Human Health Risk Assessment Uncertainties

Uncertainties in the risk characterization can stem from the inherent uncertainties in the data evaluation, the exposure assessment process (including any modeling of EPCs in secondary media from primary media), and the toxicity assessment process. For each step of the risk assessment process, conservative assumptions were made that are intended to be protective of human health and to ensure that risks are not underestimated. The overestimation of potential risks from exposure to the site would not change the overall conclusions of the HHRA, except for lead. For all chemicals, except lead, the HHRA revealed no potential risk concerns for any receptors' exposure to the site.

Potential receptor exposure to environmental media within the Iona Island does not adhere to "typical" default exposure scenarios that are modeled for a recreational area. The site is remote, and use of the site is intermittent. While the site is used by PIPC and there is evidence of local residents visiting the site, the actual exposure and contact with the site media is difficult to quantify. Additionally, a majority of the exposure parameters determined for each receptor were based upon professional judgement and EPA guidance. The exposure parameter that presents the most uncertainty is the exposure frequency (EF), or number of days a receptor visits/contacts the site. Conservative EFs were determined for each receptor to provide a protective evaluation. However, the EFs are likely overestimated, especially when evaluating a long-term exposure to the site.

8.4 ECOLOGICAL RISK ASSESSMENT

The ERA is provided in **Appendix H**. It evaluated the potential for adverse effects to ecological receptors exposed to site-related COPECs. The overall objective of the ERA was to quantitatively and qualitatively evaluate exposure and risks to ecological receptors, and to provide risk managers with information necessary to achieve management goals and evaluate remedial decisions, if necessary.

The ERA followed the procedures and methodologies set forth by the U.S. Environmental Protection Agency (EPA) and USACE as documented in Section 1.1. of the ERA (**Appendix H**).

Both a SLERA and RSLERA were completed as part of the ERA, which identified exposure pathways and COPECs by eliminating those contaminants and exposure pathways that pose negligible risks to receptor groups.

The SLERA was conducted using Phase I and Phase II analytical data to evaluate if contaminant concentrations presented a potential risk to terrestrial and aquatic ecological receptors. The SLERA process was conservative and was based on no observed adverse effect levels (NOAELs). These represent the most conservative endpoint, in that no adverse effects were observed for the test organisms from which the NOAELS were derived at a given concentration or dose. The SLERA concluded with a list of COPECs for each media evaluated (soil, sediment, surface water).

Based on the results of the SLERA, the RSLERA refined the potential exposure and risks using more site-specific information and less conservative assumptions. Exposure modeling conducted as part of the RSLERA used appropriate literature-based, receptor-specific exposure parameters that are more realistic of exposures that are possible at the site. The RSLERA also considered spatial distribution of the data, statistical evaluations (e.g., outlier analysis), bioavailability, background, and other potential explanatory factors (e.g., pH, grain size, total organic carbon) to be incorporated into the evaluation.

8.4.1 Ecological Conceptual Site Model

The first step in the ERA consisted of developing the ecological CSM. Media of concern and ecological receptors were evaluated to identify potential exposure routes linking the two and to determine which pathways are complete and significant. Terrestrial and aquatic ecological receptor groups identified for the site and potential exposure routes for each receptor group are presented in Section 2.6 of this RI report.

The preliminary ecological CSM from the UFP-QAPP (EA 2020a) was evaluated and updated following the Phase I Investigation to refine complete, potentially complete, or incomplete exposure pathways to receptors based on site history, ecological setting, results from the Phase I Shoreline Reconnaissance, and observations during Phase I field activities. The combined terrestrial and aquatic CSM is presented in **Figure 8-2.**

8.4.2 Ecological Receptors

Terrestrial receptor groups included plants, invertebrates, mammals (herbivorous, insectivorous, and predatory), birds (insectivorous and predatory), and herptiles. Aquatic receptor groups included plants, benthic invertebrates, zooplankton, fish (demersal and pelagic), mammals (herbivorous and piscivorous), and birds (herbivorous, insectivorous, and piscivorous). For each of the protected species identified in Section 1.6.11 Threatened and Endangered Species, a suitable surrogate receptor was identified for the evaluation of risk to the protected species. See Section 6.4.2 of the ERA (**Appendix H**) for the uncertainties associated with the evaluation of risk via surrogate receptors. Representative receptor species were selected based on feeding guilds and availability of wildlife exposure models. The following list identifies receptor species as well as any protected species that were evaluated via the surrogate receptors:

- Terrestrial plant community
    - Small whorled pogonia (*Isotria medeoloides*)
- Terrestrial invertebrate community, as represented by earthworms (*Lumbricus terrestris*)
- Populations of herbivorous mammals, as represented by meadow vole (*Microtus pennsylvanicus*)
- Populations of insectivorous mammals, as represented by short-tailed shrew (*Blarina brevicauda*)
    - Indiana bat (*Myotis sodalis*) and northern long-eared bat (*Myotis septentrionalis*)
- Populations of insectivorous birds, as represented by American robin (*Turdus migratorius*)
    - Cerulean warbler (*Setophaga cerulea*) and the golden-winged warbler (*Vermivora chrysoptera*)
- Populations of predatory (carnivorous) mammals, as represented by red fox (*Vulpes vulpes*)
- Populations of predatory (carnivorous) birds, as represented by red-tailed hawk (*Buteo jamaicensis*)
    - Northern harrier (*Circus cyaneus*)
- Populations of herptiles (i.e., amphibians and reptiles)
    - Bog turtle *(Clemmys muhlenbergii*)

- Aquatic plant community
- Benthic invertebrate community
- Aquatic life (zooplankton, demersal fish, and large pelagic fish)
    - Shortnose sturgeon (*Acipenser brevirostrum*) and Atlantic sturgeon (*Acipenser oxyrhynchus*)
- Populations of herbivorous mammals, as represented by muskrat (*Ondatra zibethicus*)
- Populations of herbivorous birds, as represented by mallard duck (*Anas platyrhynchos*)
- Populations of insectivorous birds, as represented by lesser scaup (*Aythya affinis*)
    - Pied-billed grebe (*Podilymbus podiceps*)
- Populations of piscivorous mammals, as represented by river otter (*Lontra canadensis*)
- Populations of piscivorous birds, as represented by great blue heron (*Ardea herodias*)
    - Least bittern (*Ixobrychus exilis*)
    - Bald eagle (*Haliaeetus leucocephalus*)
    - Osprey (*Pandion haliaetus*).

Herptiles (reptiles and amphibians) could inhabit terrestrial areas and aquatic (marsh) areas at the site as detailed above in Sections 2.6.2 and 2.6.4. However, due to the lack of toxicological information, exposure factors, and ecological screening values for these species, only a qualitative evaluation of potential risks is possible. Risks to reptiles and amphibians are assumed to be similar to other receptors such as birds based on studies comparing toxic thresholds between the two groups (Salice et al. 2009).

8.4.3 Screening-Level Ecological Risk Assessment

The SLERA consisted of a preliminary screen of contaminant concentrations against generic, conservative ecological screening values. The SLERA concluded with a list of COPECs to be further evaluated in the RSLERA.

Overall, the following COPECs were retained for further evaluation in soil since the most conservative ecological soil screening level was exceeded in at least one DU **(Appendix H, Table 4-4)**: antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium (subsurface only) thallium, zinc, HMW and LMW PAHs, total PCBs, and 1,3-dinitrobenzene

(surface only). With the exception of DU-20, DU-21, and DU-25, each DU had at least one COPEC in soil.

The following COPECs were retained for further evaluation in sediment **(Appendix H, Table 4-5)**: antimony, arsenic, cadmium, chromium, copper, lead, nickel, silver, and zinc. Identification as a COPEC indicates potential for ecological risk, and the COPECs were carried through the RSLERA process for receptor-specific evaluations.

No COPECs were identified in surface water **(Appendix H, Table 4-6)**.

8.4.4 Assessment and Measurement Endpoints

Assessment and measurement endpoints were identified for each representative receptor species evaluated at the site. Assessment endpoints included protection of ecological communities and protection and maintenance (i.e., survival, growth, and reproduction) of populations of receptors from exposure to COPECs in environmental media. Measurement endpoints are measurable ecological characteristics that are related to the assessment endpoints (EPA 1998). Measurement endpoints are used to assess the potential for effects on the assessment endpoints through their comparison to screening-level concentrations or toxicity values. Measurement endpoints selected for use in the ERA included chemistry data for environmental media sampled during Phase I and Phase II, modeled doses of COPECs, and quantitative measurements of physical parameters in site media.

8.4.5 Refined Screening-Level Ecological Risk Assessment

The RSLERA further evaluated the COPECs selected during the SLERA and refined the conservative assumptions to be more site-specific, based on quantifiable effects to apical endpoints rather than no observed adverse effects levels (NOAELs).

Though the SLERA was evaluated on a DU basis, for the terrestrial component of the RSLERA the DUs have been grouped into the Former Dump Area (DU-17 through DU-19) and the Iona Island (all other DUs) exposure areas. These two areas were grouped on the basis of the Former Dump Area representing a potential source area for the site. The three one-acre DUs grouped as the Former Dump Area incorporate and extend beyond the boundary of the approximately 0.85-acre AOC #16 – Area D designated previously as the Former Dump Area.

Due to the shallow depth of refusal, subsurface soil from Iona Island was only collected from DU-20 and DU-21 and those samples did not exceed screening levels. Therefore, the 95UCL EPCs calculated for the Iona Island exposure area include surface soil results only from all DUs analyzed (except DU-17 through DU-19).

Surface and subsurface soil samples in the Former Dump Area (DU-17 through DU-19) were collected from 0 to 6 inches and 6 to 36 inches, respectively. Ecological receptors are generally assumed to be exposed to surface soil only as that is the biologically active zone. Ecological receptors are generally assumed to be exposed to surface soil only as that is the biologically

active zone and the depth of this zone varies based on site conditions. EPA has quantified soil biological activity in forests and grasslands as a function of depth and recommends that soil samples for assessment of ecological risk include the top 25 to 30 centimeters (approximately 10 to 12 inches) (EPA 2015). The surface soil interval collected was relatively shallow (6 inches) and ecological receptors may be exposed to soil deeper than the surface soil interval in the Former Dump Area (EPA 2015). Since the subsurface sample results had exceedances of the screening levels and relatively high concentrations of COCs, as a conservative measure, the 95UCL EPCs calculated for the Former Dump Area were based on surface soil and subsurface soil from DU-17 through DU-19.

The aquatic component of the RSLERA evaluated risk on a DU basis (Iona Island Hudson River Shoreline, Riprap Drainage Swale, and Tidal Wetland Swale).

Assumptions refined for the list of COPEC/receptor combinations determined in the SLERA included the following:

1. Refinement of screening levels. See **Appendix H, Section 5.2.3 Toxicity Reference Values and Refinement Screening Valsues**. For lower-trophic level receptors (i.e., aquatic plants benthic invertebrates, and demersal fish), less conservative sediment screening benchmarks/toxicity reference values were used, notably EPA's Region 4 RSVs for sediment. EPCs were compared to RSVs.

2. Refinement of exposure assumptions to reflect realistic, site-specific exposure and effects for the representative receptors presented in Section 2.6 of this RI report. Each of these representative species consumes different food items, ingests different quantities of incidental soil due to their feeding habits, have different ingestion rates, and require varying habitat ranges. Area use factors (AUFs) were calculated based on the habitat range of a given receptor and account for the amount of time receptors are likely to be in the site area and exposed to COPECs. Contaminant doses to these receptors were calculated based on their species-specific characteristics such that all representative receptors were assessed.

3. Refinement of accumulation/uptake factors to estimate tissue concentrations for food web models. Literature-based uptake factors and exposure parameters were used in the food web models to estimate a daily dose of COPEC to each receptor.

4. Site- and receptor-specific benchmarks. See **Appendix H, Section 5.2.3 Toxicity Reference Values and Refinement Screening Values**. LOAEL exceedances were the primary focus in the RSLERA. The geometric mean of the LOAELs provided by EPA in the EcoSSL documents for survival, growth, and reproduction were used to develop LOAELs for each COPEC. In the absence of LOAEL data for a specific receptor/COPEC, it was assumed that the LOAEL was 10 times the value of the NOAEL. LOAELs were used as toxicity reference values (TRVs).

The ecological exposure evaluation was conducted to evaluate potential risks to ecological communities and receptor group populations. The exposure evaluation for ecological communities was conducted as follows:

- Terrestrial Plants and Soil Invertebrates: Surface and subsurface soil datasets were combined and EPCs for the grouped DUs (Former Dump Area and Iona Is.) were compared to TRVs for terrestrial plants and soil invertebrates

- Aquatic plants, benthic invertebrates, and demersal fish: EPCs for the aquatic DUs (Iona Island Hudson River Shoreline, Riprap Drainage Swale, and Tidal Wetland Swale) were compared to RSVs for sediment

- Populations of birds and mammals: EPCs for the terrestrial and aquatic exposure areas were used in food web modeling to derive dose-based exposure estimates for wildlife (i.e., populations of birds and mammals), which were then compared to TRVs to evaluate if adverse effects were possible from exposure to COPECs in food and soil/sediment.

The HQ approach was used to estimate risk by comparing TRVs to EPCs by dividing the EPC by the TRV. HQs greater than 1 indicate potential for adverse effects.

8.4.6 Uncertainty Assessment

There are inherent uncertainties with any risk assessment that have the potential to over- or under-estimate risks including uncertainties in the analytical data, input parameters used in the food web models, and TRVs. A brief summary of potential sources of uncertainty associated with the RSLERA are included below, refer to Section 6 of the ERA (**Appendix H**) for more information:

- Environmental sampling:
  - Study design could miss areas where constituents are present or miss other constituents that were not analyzed in a specific sample.

- Analytical data:
  - The 95UCL was used as an upper estimate of mean exposures and this value was typically higher than the replicate sample results.
  - There are some cases where a constituent is not detected at the LOD or LOQ, but the LOD or LOQ exceeds a screening value.
  - There were minor data quality issues including matrix interference, trace contamination in blank samples, and/or exceeding holding times.

- Estimated exposure and toxicity data:
  - Generally, food web models represent a worst-case scenario of possible risks to the receptor groups.
  - The exposure parameters used in the food web models are not site-specific and literature-based values are not available for all species.
- Toxicity Reference Values
  - The assessment of risks was primarily based on the comparison of estimated doses to TRVs from the literature.
  - TRVs are typically generated using the most bioavailable/toxic form of the metal, which may not be present on-site.
  - There is a paucity of toxicological data in the literature for soil invertebrates and plants, and TRVs are generally developed to be conservative.
    The evaluation of risk to aquatic plants and demersal fish relied on RSVs, which are based on statistical evaluations of toxicological data for a few benthic invertebrate species.
- Assessment of risks:
  - Few methods are available to extrapolate the potential for adverse effects from the individual level to the population level.
  - With the exception of the osprey, the presence of protected species on-site is not known.
  - Surrogate receptor species were used to estimate risk to protected species but every species is unique, and special status species often have unique features of their life histories that have made them vulnerable to population declines which would not be reflected in the exposure parameters of the selected surrogate species.
  - Lack of receptor-specific chemical benchmarks, uptake data, and bioconcentration rates for reptiles and amphibians pose challenge to the assessment and characterization of risks to herptiles.
  - There are limitations associated with the use of HQs to determine the potential for risk to ecological receptors.

The uncertainties were considered as part of the Ecological Risk Characterization and conclusions.

8.4.7 RSLERA Results and Risk Characterization

The quantitative results of the RSLERA and additional characterization that interprets the potential risk for each receptor group is provided in the sections below. Consistent with ERA guidance (EPA 1997), results of the RSLERA are designed to estimate an upper-bound potential for adverse effects to the selected representative receptor species. Therefore, exceedance of a TRV indicates the potential for adverse effects; however, it does not indicate that an adverse effect is occurring from the COPEC (Tannenbaum et al. 2003). It does, however, indicate that additional evaluation may be necessary. The magnitude of the HQ indicates the potential for risk, with higher HQs indicating a higher potential for adverse effects. Risks are evaluated with the context of uncertainties and site-specific information to result in overall characterization. Results of the RSLERA for each of the receptors are summarized below, see **Appendix H** for tables of all results.

8.4.7.1 Terrestrial Plants

When the 95UCL EPCs for surface soil (Iona Island) and surface and subsurface soil (Former Dump Area) were compared to EcoSSLs (i.e., TRVs) for plants, the following COPECs had HQs greater than 1:

Insert 8-1. Risk Characterization for Terrestrial Plants.

Receptor	Exposure Area	COPEC	HQ	Bioavailability Adjusted HQ	Risk Characterization Conclusions
Terrestrial Plants	Iona Island	Lead	3	1	No risk due to adjusted HQ≤1
		Thallium	3	-	No risk due to qualitative bioavailability assessment
		HMW PAHs	2	-	No risk due to qualitative bioavailability assessment
	Former Dump Area	Chromium	82	-	Potential for risk
		Copper	22	9	Potential for risk
		Lead	15	6	Potential for risk
		Mercury	6	-	Potential for risk
		Selenium	2	-	No risk due to low magnitude of exceedance
		Thallium	6	-	No risk due to low effect level HQ<1
		Zinc	21	9	Potential for risk

- Not calculated; bioavailability adjustment method was not developed for these analytes (EPA 2020).

In the Iona Island exposure area, though there are concentrations of metals in exceedance of plant TRVs (i.e., arsenic, chromium, copper, lead, mercury, selenium, thallium, and zinc) in individual DUs, the HQs for the combined 95UCL EPC are all 3 or less. Using the EPA's soil bioavailability classification procedure, Iona Island and the Former Dump Area soil can be classified as 'Medium-Low' metal bioavailability, based on pH levels > 6.5 in all soils and

percent clay < 26 percent (EPA 2020). The corresponding percent bioavailability is 41 percent, which decreases the lead HQ to 1 for the Iona Island area. The soil bioavailability classification was not developed for thallium and HMW PAHs, which also showed exceedances at Iona Island; however, the high CEC values and organic carbon content are likely to reduce bioavailability of these compounds (Huang et al. 2018; Wick et al. 2020). Thus site-wide concentrations of COPECs are not expected to pose risk to terrestrial plants.

In the Former Dump Area, the HQ for the combined 95UCL EPC for selenium is 2. Due to the low magnitude of exceedance of the EcoSSL, site-wide concentrations of selenium in the Former Dump Area soil are not expected to pose risk to terrestrial plants. The HQs for the remaining COPECs range from 6 to 82, indicating risk may be more likely. To evaluate the potential magnitude of risk, a weight of evidence evaluation was conducted that incorporates multiple lines of evidence into the determination of risk.

Adjusting for an assumed 41 percent bioavailability of copper, lead, and zinc (EPA 2020), HQs remain above 1 for terrestrial plants in the Former Dump Area; thus, there is potential risk to terrestrial plants from these compounds at the Former Dump Area. Though the soil bioavailability method was not developed based on literature for mercury, chromium, or thallium, pH and percent clay are major factors driving bioavailability of these compounds (Hussain et al. 2022; Huang et al. 2018; Wick et al. 2020; Reijonen and Hartikainen 2016; Sewart et al. 2003). Consequently, assuming a similar percent bioavailability for these compounds (i.e., 41 percent), HQs would still be above 1 for all compounds, indicating risk from chromium, mercury, and thallium to terrestrial plants at the Former Dump Area.

Importantly, significant uncertainty exists regarding the TRV used for thallium of 0.05 mg/kg. The TRV is lower than the mean background concentration of thallium measured in this assessment of 0.13 mg/kg (Table 4-4 of **Appendix H**). When using the corresponding low effect level for thallium of 0.5 mg/kg (Los Alamos National Laboratory 2018), the HQ falls below 1. Consequently, risk to populations of terrestrial plants from thallium at the Former Dump Area is unlikely; however, risk from chromium, copper, lead, mercury, and zinc is potentially present.

As discussed in Section 2.1.6.1 of the ERA (**Appendix H)**, the small whorled pogonia, which is federally listed as threatened and state listed as endangered, is not known to occur on the site but is believed to occur in Rockland County, New York, and could be present at upland forested portions of the site. The small whorled pogonia is a terrestrial plant that is sensitive to competition with other species. Therefore, this species would not use the frequently flooded Former Dump Area as habitat due to its moisture regime and predominance of *Phragmites australis* coverage. The risks to terrestrial plants from chromium, copper, lead, mercury, and zinc in the Former Dump Area are not expected to impact small whorled pogonia plants.

8.4.7.2 Soil Invertebrates

When the 95UCL EPCs for surface soil (Iona Island) and surface and subsurface soil (Former Dump Area) were compared to EcoSSLs (i.e., TRVs) for soil invertebrates, the following COPECs had HQs greater than 1:

Insert 8-2. Risk Characterization for Soil Invertebrates.

Receptor	Exposure Area	COPEC	HQ	Bioavailability Adjusted HQ	Risk Characterization Conclusions
Soil Invertebrates	Iona Island	Arsenic	2	-	No risk due to qualitative bioavailability assessment
		HMW PAHs	2	-	No risk due to qualitative bioavailability assessment
	Former Dump Area	Arsenic	2	-	No risk due to qualitative bioavailability assessment
		Chromium	205	-	Potential for risk
		Copper	19	8	Potential for risk
		Mercury	34	-	Potential for risk
		Zinc	28	12	Potential for risk

- Not calculated; bioavailability adjustment method was not developed for these analytes (EPA 2020).

In the Iona Island exposure area, though there are concentrations of metals in exceedance of soil invertebrate TRVs (i.e., arsenic, chromium, copper, lead, mercury, and zinc) in individual DUs, the HQs for the combined 95UCL EPC are all 2 or less. The high CEC values and organic carbon content of the soil are likely to reduce bioavailability of these compounds (EPA 2020); thus, site-wide concentrations of COPECs in the Iona Island exposure area surface soil are not expected to pose risk to soil invertebrates.

In the Former Dump Area, the HQ for the combined 95UCL EPCs for arsenic is 2. Due to the low magnitude of exceedance of the EcoSSL and likely reduced bioavailability due to the soil physical parameters, the site-wide concentrations of arsenic in the Former Dump Area soil are not expected to pose risk to soil invertebrates. The HQs for the remaining COPECs range from 19 to 205, indicating risk may be more likely. Assuming a 41 percent bioavailability, HQs for all compounds (excluding arsenic) remain above 1, indicating that risk from chromium, copper, mercury, and zinc to soil invertebrates is potentially present at the Former Dump Area. As highlighted previously, the Former Dump Area is inundated with water twice daily during high tide and during storm events. In addition, the Former Dump Area includes areas with thick stands of *Phragmites* that may prevent habitation by soil invertebrates. Though, core samples taken from a phragmites dominated tidal marsh in New Jersey, USA indicates macroinvertebrate presence and community richness with Oligochaeta, Nematoda and Polychaeta being most abundant (Angradi et al. 2001).

Based on the high HQ exceedances (HQs of 205, 19, 34, and 28 for chromium, copper, mercury, and zinc, respectively) and a lack of site-specific information on the invertebrate community, potential risk to this receptor group could not be ruled out.

8.4.7.3 Terrestrial Herbivorous Mammals

Potential risks to herbivorous mammals were evaluated using a food web model for meadow voles. Ingestion doses were calculated for each exposure area based on the 95UCL EPCs for surface soil (Iona Island) and surface and subsurface soil (Former Dump Area), which were used to predict the concentration in plant tissue that would be consumed by voles. The dose from soil

and dose from biota were summed to calculate a total dose, which was then compared to NOAEL and LOAEL-based TRVs to calculate an HQ. HQs greater than 1 indicate potential risk. None of the constituents in any DU had NOAEL or LOAEL-based HQs greater than 1; therefore, there is no potential risk to herbivorous mammals in either exposure area.

8.4.7.4 Terrestrial Insectivorous Birds

Potential risks to insectivorous birds were evaluated using a food web model for the American robin. Robins were assumed to be migratory, spending only a portion of their time (8 months) at the site. Ingestion doses were calculated for each exposure area based on the combined 95UCL EPCs for surface soil (Iona Island) and surface and subsurface soil (Former Dump Area), which were also used to predict a concentration in plant and invertebrate tissue that would be consumed by robins. The dose from soil and dose from biota were summed to calculate a total dose, which was then compared to NOAEL and LOAEL-based TRVs to calculate an HQ. HQs greater than 1 indicate potential risk. The insert below presents the HQs ($HQ_{NOAEL,}$ HQ_{LOAEL}, and Bioavailability Adjusted HQ_{LOAEL}) as well as risk characterization conclusions for all COPECs that exceeded the NOAEL-based TRVs.

Insert 8-3. Risk Characterization for Terrestrial Insectivorous Birds.

Receptor	Exposure Area	COPEC	HQ_{NOAEL}	HQ_{LOAEL}	Bioavailability Adjusted HQ_{LOAEL}	Risk Characterization Conclusions
Insectivorous birds (American robin)	Iona Island	Lead	6	3	1	No risk due to adjusted HQ≤1
		HMW PAH	3	<1	-	No risk, HQ_{LOAEL}<1
	Former Dump Area	Cadmium	3	<1	<1	No risk, HQ_{LOAEL}<1
		Copper	21	7	3	Potential for risk
		Lead	29	15	7	Potential for risk
		Zinc	2	<1	<1	No risk, HQ_{LOAEL}<1

- Not calculated, bioavailability adjustment method was not developed for these analytes (EPA 2020).

When the doses are compared to the NOAEL-based TRVs, lead and HMW PAHs HQs exceed 1 in the Iona Island exposure area and cadmium, copper, lead, and zinc HQs exceed 1 in the Former Dump Area. When the doses are compared to the LOAEL-based TRVs, all HQs fall to 1 or below 1 with the exception of lead in the Iona Island exposure area and copper and lead in the Former Dump Area. It is important to consider that the LOAEL TRV for HMW PAHs is highly uncertain. EPA (2007f) did not derive a TRV for HMW PAHs due to a lack of data; thus, an uncertainty factor was applied to the available NOAEL to estimate a LOAEL. Consequently, the HQ based on this value is uncertain.

Adjusting the soil EPC by 41 percent, the HQ based on the comparison of the LOAEL-based TRV for lead to the dose to insectivorous birds at Iona Island falls to 1. Consequently, site-wide concentrations of lead in the Iona Island exposure area surface soil are not expected to pose risk to terrestrial insectivorous birds.
Adjusting the soil EPC in the Former Dump Area by 41 percent, resultant HQs are 3 and 7 based on comparison to the LOAEL-based TRVs for copper and lead, respectively. Consequently,

measured soil physical parameters and the resultant lower bioavailability would not entirely mitigate potential risks from copper and lead to insectivorous birds at the Former Dump Area.

Several uncertainties exist with regards to the models and assumptions used to assess risks to terrestrial insectivorous birds. In the absence of site-specific tissue, the oligochaete tissue concentrations are modeled based on an uptake factor and equation for copper and lead, respectively. The uptake factor and equations developed by Sample et al. (1998a) and suggested for use in EcoSSL guidance (EPA 2007a) are generalized, as they represent multiple oligochaete species, seasons, and soil types and characteristics, which have all been shown to affect uptake (Sample et al. 1998a). Therefore, the uncertainty with the oligochaete tissue estimate for any specific location may be high (Sample et al. 1998a), and thus the exposure estimates to the wildlife receptors that eat oligochaetes are also uncertain.

Further uncertainty exists relating to the suitability of the Former Dump Area habitat for soil invertebrate foraging by insectivorous birds. As highlighted previously, thick stands of *Phragmites* cover a limited area of the Former Dump Area, which may provide a barrier to soil invertebrate foraging by insectivorous birds. Phragmites colonization is likely to have a negative overall impact on bird communities; however, some species are known to have preference for Phragmites dominated habitat.

The Former Dump Area is inundated with water twice daily during high tide and during storm events, which may limit the presence of soil invertebrate prey items within the area. A previous study of *Phragmites* dominated marsh in New Jersey found presence of macroinvertebrates including Oligochaeta, Nematoda, and Polychaeta, suggesting that suitable prey items are likely present (Angradi et al. 2001). Macroinvertebrate densities were high in *Phragmites* reeds on Iona Island, based on surveys conducted in 1999 and 2000 (Yozzo and Osgood 2013). Though some of the species identified in the aforementioned studies were aquatic or semiaquatic, bioaccumulation of copper and lead in benthic macroinvertebrates would be higher in these species compared to terrestrial soil invertebrates based on bioaccumulation factors. In addition, bird species known to use *Phragmites* dominated habitat, such as the marsh wren, consume both terrestrial and aquatic invertebrates (Beaubien et al. 2020). Without further site-specific information, it is impossible to know which condition is predominant at the Former Dump Area.

The America robin was selected as the surrogate receptor for the cerulean warbler and the golden-winged warbler, which are both considered species of special concern by the state of New York. Both protected species are smaller than the robin and use of the robin as a surrogate receptor may underestimate risk to these species based on differences in ingestion rate relative to body weight. The diet of both cerulean and golden-winged warblers primarily consists of insects (NYDEC 2023); thus, the American robin model was adjusted to consume almost entirely insects to more closely represent the two state species of concern. The cerulean warbler prefers deciduous forest habitats (Cornell Lab of Ornithology 2023a), and the golden-winged warbler prefers mosaic forest near wetlands (Cornell Lab of Ornithology 2023b). Both habitat types exist on-site; thus, both species may be present at the site. Thick stands of *Phragmites australis* are not their preferred habitat, meaning it is unlikely either species will spend all their time inhabiting the Former Dump Area. Consequently, risks to these threatened species may be overestimated

based on the lack of habitat suitability, though the use of the Former Dump Area for foraging by species of concern cannot be ruled out based on this assessment.

There is potential for population-level impacts to terrestrial insectivorous birds given LOAEL-based HQs exceed 1 for lead and copper (HQs of 7 and 3, respectively, see **Insert 8-3**) even when bioavailability is incorporated into the exposure model. The LOAEL-based HQs for lead and copper are based on comparisons to TRVs that are derived from chronic exposures with effects on reproductive endpoints. Given this impact is directly linked to population sustainability (fecundity and recruitment), it is prudent to highlight the potential for population-level impacts to insectivorous avian species for lead and copper at the Former Dump Area. However, population-level effects on this receptor group cannot be determined or ruled out without further site-specific ecological data. Information on populations present within the Former Dump Area (abundance and density as well as other parameters) would be needed to reduce this uncertainty and to provide insight into population impacts from these metals. Equally important, species of concern may be present in the area, for which effects at the individual effect level are significant. Consequently, potential risks to species of concern from copper and lead exposure in the Former Dump Area cannot be ruled out. Therefore, it is concluded there is potential risk to insectivorous birds and consequently two bird species of special concern due to copper and lead at the Former Dump Area.

8.4.7.5 Terrestrial Insectivorous Mammals

Potential risks to insectivorous mammals were evaluated using a food web model for short-tailed shrew. Ingestion doses were calculated for each exposure area based on the 95UCL EPCs for surface soil (Iona Island) and surface and subsurface soil (Former Dump Area), which were also used to predict a concentration in plant, small mammal, and invertebrate tissue that would be consumed by shrews. The dose from soil and dose from biota were summed to calculate a total dose, which was then compared to NOAEL and LOAEL-based TRVs to calculate an HQ. HQs greater than 1 indicate potential risk. The insert below presents the HQs (HQ_{NOAEL}, HQ_{LOAEL}, and Bioavailability Adjusted HQ_{LOAEL}) as well as risk characterization conclusions for all COPECs that exceeded the NOAEL-based TRVs.

Insert 8-4. Risk Characterization for Terrestrial Insectivorous Mammals.

Receptor	Exposure Area	COPEC	HQ_{NOAEL}	HQ_{LOAEL}	Bioavailability Based HQ_{LOAEL}	Risk Characterization Conclusions
Insectivorous mammals (shrew)	Iona Island	Lead	2	<1	<1	No risk, HQ_{LOAEL}<1
		HMW PAHs	10	<1	-	No risk, HQ_{LOAEL}<1
	Former Dump Area	Antimony	9	<1	-	No risk, HQ_{LOAEL}<1
		Cadmium	6	<1	<1	No risk, HQ_{LOAEL}<1
		Copper	12	7	3	Potential for risk
		Lead	7	4	2	Potential for risk
		Thallium	3	<1	-	No risk, HQ_{LOAEL}<1
		Zinc	2	<1	<1	No risk, HQ_{LOAEL}<1
		HMW PAHs	3	<1	-	No risk, HQ_{LOAEL}<1

- Not calculated, bioavailability adjustment method was not developed for these analytes (EPA 2020).

When the doses were compared to the NOAEL-based TRVs, lead and HMW PAHs HQs exceeded 1 in the Iona Island exposure area and antimony, cadmium, copper, lead, thallium, zinc, and HMW PAHs HQs exceeded 1 in the Former Dump Area. When the doses are compared to the LOAEL-based TRVs, all HQs fell below 1 except for copper and lead in the Former Dump Area. Accounting for bioavailability based on soil parameters as discussed previously (i.e., assuming 41 percent bioavailability), HQs still exceeded 1 for both copper and lead when compared to NOAEL and LOAEL-based TRVs, indicating that the lower bioavailability could not mitigate the potential for risk to terrestrial insectivorous mammals.

The shrew was a surrogate receptor for the Indiana bat (*Myotis sodalis*) and northern long-eared bat (*Myotis septentrionalis*), which are both federal and state-listed endangered species. There is uncertainty associated with the use of the short-tailed shrew as a surrogate for these species based on differences in size and life history (see Section 2.1.6.1 of the ERA; **Appendix H**). Additional uncertainty exists regarding the models used to estimate soil invertebrate tissue concentrations as discussed in the preceding section. The short-tailed shrew is assumed to spend all its time at the site based on the published home range (EPA 1993), which is a conservative assumption given that the area is inundated with water twice daily during high tide and during storm events. Previous studies suggest that short-tailed shrews favor forested habitats over tidally inundated marshes (Ekernas and Mertes 2006). As such, risks based on exposure within the Former Dump Area to this receptor group may be overestimated. In addition, the endangered bat species for which the shrew was a surrogate receptor are unlikely to forage entirely in the Former Dump Area; thus, risks may be further overestimated. Despite this, the potential for population-level effects on this receptor group cannot be determined or ruled out without further site-specific ecological data; though effects may be possible based on exceedance of TRVs associated with effects on reproduction. Given the shrew was a receptor for both federal and state-listed endangered species, risks at the individual level are important. Therefore, it is concluded there is potential risk to insectivorous mammals and consequently protected bat species from copper and lead at the Former Dump Area.

8.4.7.6 Carnivorous Mammals

The potential risks to carnivorous mammals were evaluated using a food web model for red fox. Ingestion doses were calculated for each exposure area based on the 95UCL EPCs for surface soil (Iona Island) and surface and subsurface soil (Former Dump Area), which were also used to predict a concentration in small mammal tissue that would be consumed by fox. The dose from soil and dose from biota were summed to calculate a total dose, which was then compared to NOAEL and LOAEL-based TRVs to calculate an HQ. HQs greater than 1 indicate potential risk. None of the HQs exceeded the threshold of 1 so risk to carnivorous mammals is not expected.

8.4.7.7 Carnivorous Birds

Potential risks to carnivorous birds were evaluated using a food web model for red-tailed hawk. Ingestion doses were calculated for each exposure area based on the 95UCL EPCs for surface soil (Iona Island) and surface and subsurface soil (Former Dump Area), which were also used to predict a concentration in small mammal tissue that would be consumed by hawks. The dose

from soil and dose from biota were summed to calculate a total dose, which was then compared to NOAEL and LOAEL-based TRVs to calculate an HQ. HQs greater than 1 indicate potential risk.

When the doses were compared to the NOAEL-based TRVs, HQs were less than 1 except for the HQ for lead which was 3. The HQ for lead dropped to 1 when the dose was compared to the LOAEL-based TRV. Consideration of soil physical parameters and the associated reduced bioavailability of constituents reduced risk further. Based on the lack of exceedance of the LOAEL-based TRVs, risk to carnivorous birds is not expected. The red-tailed hawk was a surrogate species for the northern harrier (*Circus cyaneus*), a state-listed threatened species. Risk to this protected bird species is not expected.

8.4.7.8 Herptiles (Terrestrial and Aquatic)

In Section 2.1.6.1 of the ERA (**Appendix H)**, herptiles (i.e., reptiles and amphibians) were evaluated based on a qualitative evaluation using other receptors as surrogate species. For reptiles, potential risks are expected to be most similar to that of birds (Salice et al. 2009), but risks to any receptor could indicate potential risks to herptiles. This assumption is made due to the lack of toxicological and exposure information for herptiles. The RSLERA results and risk characterization for terrestrial species are presented above in Section 8.4.6.1.1 of this RI report and the risk characterization for aquatic species are presented below in Section 8.4.6.1.2 of this RI report.

There is potential risk to herptiles in the Former Dump Area due to copper and lead in the soil because of the potential risk to terrestrial insectivorous birds as well as terrestrial plants and soil invertebrates (copper only). There are also potential risks to herptiles due to chromium, mercury, and zinc due to risks to plants and/or soil invertebrates.

Since there were no COPECs identified in surface water or potential risks to other aquatic life, there are no anticipated risks to herptiles due to concentrations of COPECs in surface water. There is potential risk to aquatic insectivorous birds, aquatic plants, benthic invertebrates, demersal fish, and, therefore, herptiles due to lead in the sediment at the Iona Island Hudson River Shoreline. There are also risks to herptiles due to antimony, cadmium, nickel, and zinc in the sediment at Iona Island Hudson River Shoreline due to risks to aquatic plants, benthic invertebrates, and demersal fish.

Given that box and painted turtles have been recorded in the study area, it is possible that bog turtles, a federally threatened and state endangered species, could be present on site. However, of the areas with potential risks to herptiles, adequate habitat is likely not present. The Former Dump Area is densely vegetated with primarily *Phragmites australis*, an invasive species known to eliminate the microhabitats important to the bog turtle (NYDEC 2023c). Iona Island Hudson River Shoreline also does not feature the preferred habitat of the bog turtles (open wet meadows and boggy areas). Therefore, bog turtles are not likely to be found in these areas of potential risk, and risk is not expected to bog turtles.

Overall, using other receptors as surrogates for herptiles, potential risk was identified for this group at the Former Dump Area from chromium, copper, lead, mercury, and zinc. At the Iona Island Hudson River Shoreline, potential risk from antimony, cadmium, lead, nickel, and zinc was identified for herptiles based on exceedances for other receptors including birds and soil invertebrates.

8.4.7.9 Aquatic Plant Community

As discussed above in 2.1.6.2 and 4.2.2 of **Appendix H**, there are no sediment screening values protective of aquatic plants. Therefore, aquatic plants rooted in sediments were evaluated by comparing EPCs for sediment to refined sediment screening benchmarks. The HQs for six metals at Iona Island Hudson River Shoreline (antimony, cadmium, copper, lead, nickel, and zinc) exceeded 1. Only zinc exceeded its RSV in the Riprap Drainage Swale with an HQ of 3. Zinc in this area may be attributed to the metal debris (e.g., rebar, old fencing, and other metal pieces) observed in the Riprap Drainage Swale. AVS/SEM results from the Riprap Drainage Swale indicate that metals in sediment are unlikely to be bioavailable; therefore, zinc is not expected to pose risk in the Riprap Drainage Swale exposure area. No concentrations of metals exceeded RSVs in the Tidal Wetland Swale. In addition, none of the concentrations of metals in any surface water samples exceeded surface water quality criteria in any area. Therefore, aquatic plants are not at risk in the Riprap Drainage Swale or the Tidal Wetland Swale.
As discussed in the Benthic Invertebrate Community results in Section 8.4.7.10, metals in sediments are bioavailable at the Iona Island Hudson River Shoreline based on AVS/SEM results and low TOC content. Despite the low concentrations in surface water, due to the exceedance of the RSVs and bioavailability of metals, risk to aquatic plants from antimony, cadmium, copper, lead, nickel, and zinc in sediment is possible at the 0.5 acre Iona Island Hudson River Shoreline exposure area.

8.4.7.10 Benthic Invertebrate Community

When the sediment EPCs for each aquatic DU (Iona Island Hudson River Shoreline, Riprap Drainage Swale, and Tidal Wetland Swale) were compared to the RSVs, the following COPECs had HQs greater than 1:

Insert 8-5. Risk Characterization for Benthic Invertebrates.

Receptor	Exposure Area	COPEC	HQ	Risk Characterization Conclusions
Benthic Invertebrates	Iona Island Hudson River Shoreline	Antimony	5	Potential for risk
		Cadmium	2	Potential for risk
		Copper	68	Potential for risk
		Lead	147	Potential for risk
		Nickel	3	Potential for risk
		Zinc	9	Potential for risk
	Riprap Drainage Swale	Zinc	3	No risk due to AVS/SEM results

None of the COPECs in the Tidal Wetland Swale had HQs greater than 1. Only one COPEC, zinc, has an HQ greater than 1 in the Riprap Drainage Swale. Zinc in this area may be attributed

to the metal debris (e.g., rebar, old fencing, and other metal pieces) observed in the drainage swale. AVS/SEM results from the Riprap Drainage Swale are less than 130 µmol/g_{oc}, which indicates that the metals in sediment are unlikely to be bioavailable; therefore, zinc is not expected to pose risk to benthic invertebrates in the Riprap Drainage Swale exposure area.

At Iona Island Hudson River Shoreline, AVS/SEM results combined with low TOC content and sandy sediments indicate that the area provides suitable conditions for metals in sediment to be bioavailable. During the Shoreline Reconnaissance, benthic organisms were observed beneath large boulders and riprap along the shoreline, but none were observed within the river shoreline sediments during sampling. The area is primarily gravel, riprap, and course-grained sand with the exception of pockets of deposited sediment (EA 2020); thus, limited habitat may be present for benthic invertebrates. A benthic community assessment on the Hudson River Shoreline sediments would need to be completed in order to confirm the lack of benthos and lack of suitable habitat. The lack of observed benthic organisms in the sediment could also be an indicator that concentrations of COPECs in the sediment are contributing to benthic organism toxicity.

This exposure area is spatially limited to one-half acre, immediately adjacent to the Former Dump Area. Just beyond this shallow shelf, river bathymetry indicates a steep slope leading to a deep river channel. Concentrations of metals in surface water are low, indicating dilution from the Hudson River current or that metals are not desorbing from sediment particles and are not dissolving into surface water at concentrations that would cause adverse effects

Due to the exceedance of the RSVs and bioavailability of metals, risk to benthic invertebrates from antimony, cadmium, copper, lead, nickel, and zinc in sediment is possible.

8.4.7.11 Zooplankton Community

Zooplankton were evaluated by comparing surface water concentrations to freshwater surface water quality criteria. There were no exceedances of any water quality criteria; therefore, risks to the zooplankton community are not expected.

8.4.7.12 Demersal Fish Community

Demersal fish (i.e., benthic-feeding fish) are exposed to surface water and sediment (Section 2.6.3). Demersal fish were evaluated by comparing EPCs for sediment to RSVs and by comparing surface water concentrations to water quality criteria. There were no exceedances of any water quality criteria. The HQs for six metals in sediment at Iona Island Hudson River Shoreline (antimony, cadmium, copper, lead, nickel, and zinc) exceeded 1. As highlighted above, the AVS/SEMs results coupled with sandy sediments and low organic carbon at Iona Island Hudson River Shoreline suggest that metals may be bioavailable.

Evaluating risk to demersal fish from the drainage swales may be a conservative evaluation as the areas may be dry for at least part of the year. However, aerial images show drainage swales connecting to water (Figure 3-3). With the available information, use of the drainage swales by

these receptors cannot be dismissed. Only zinc exceeded its RSV in the Riprap Drainage Swale with an HQ of 3. Zinc in this area may be attributed to the metal debris (e.g., rebar, old fencing, and other metal pieces) observed in the drainage swale. AVS/SEM results from the Riprap Drainage Swale indicate that metals in sediment are unlikely to be bioavailable; therefore, zinc is not expected to pose risk in the Riprap Drainage Swale exposure area. No concentrations of metals exceeded RSVs in the Tidal Wetland Swale. Therefore, demersal fish are not at risk in the Riprap Drainage Swale or the Tidal Wetland Swale.

Demersal fish will not use the Former Dump Area as habitat. Thus, the Former Dump Area is not evaluated as an exposure area for this receptor. As previously mentioned, the small shelf area at the 0.5 acre Iona Island Hudson River Shoreline exposure area adjacent to the Former Dump Area is lined with boulders and riprap. Beyond the rocky shoreline, sandy sediments that lack organic matter are prevalent. As a result, there may be a lack of sufficient habitat for infaunal benthic invertebrate communities and aquatic plants. Without this base of the food web for foraging and sufficient habitat for spawning, small benthic-feeding fish (i.e., demersal fish) are also unlikely to inhabit this area, minimizing the potential for exposure and risk in these receptor groups.

Concentrations of metals in surface water are low, indicating dilution from the Hudson River current or that metals are not desorbing from sediment particles and are not dissolving into surface water at concentrations that would cause adverse effects. As discussed above, metals in sediments are bioavailable based on AVS/SEM results and low TOC content. Due to the exceedance of the RSVs and bioavailability of metals, risk to demersal fish from antimony, cadmium, copper, lead, nickel, and zinc in sediment is possible.

The endangered Atlantic sturgeon and shortnose sturgeon are demersal fish. Atlantic sturgeon migrates up the Hudson River from the Atlantic beginning in April for reproduction and migrate back to the ocean in the late summer through fall (NOAA 2023a, New York Heritage Program 2023a). Shortnose sturgeon spawn in the Hudson River using large rocky substrate (New York Heritage Program 2023b), which is found at the littoral zone of the Iona Island Hudson River Shoreline. Juvenile shortnose sturgeon may remain at the saltfront during maturation. Within the Hudson River the saltfront is dynamic and is identified by specific conductance at 500 µS cm^{-1}. The United States Geological Survey defines the saltfront and provides daily and historical measurements of the river as supported by the Hudson River Saltfront Data and Project (https://ny.water.usgs.gov/projects/dialerplots/saltfront.html). Juvenile Atlantic sturgeon have been harvested near and south of Iona (Peterson et al. 2000; Sweka 2007) indicating they could be present at the Iona Island Hudson River Shoreline. Adult sturgeon are likely to be transient in nature and thus risks to that lifestage may be limited; however, juvenile sturgeon could be at risk due to lead in the sediment at Iona Island Hudson River Shoreline.

8.4.7.13 Pelagic Fish Community

Pelagic fish inhabit the water column. They were evaluated by comparing surface water concentrations to water quality criteria. There were no exceedances of any water quality criteria; therefore, risks to the pelagic fish community are not expected.

8.4.7.14 Aquatic Herbivorous Birds

Potential risks to herbivorous birds were evaluated using a food web model for mallard duck. Ingestion doses were calculated for each aquatic DU (Iona Island Hudson River Shoreline, Riprap Drainage Swale, and Tidal Wetland Swale) based on the EPC in sediment, which was also used to predict a concentration in plant tissue that would be consumed by ducks. The dose from sediment and the dose from biota were summed to calculate a total dose, which was then compared to NOAEL and LOAEL-based TRVs to calculate HQs. Mallard duck has a large habitat/foraging range (1,075 acres) and, therefore, the AUF was adjusted to account for the expected proportion of time the species would spend in 0.5-acre DUs. HQs greater than 1 indicate potential risk. None of the constituents in any DU had NOAEL or LOAEL-based HQs greater than 1; therefore, risks to aquatic herbivorous birds are not expected.

8.4.7.15 Aquatic Herbivorous Mammals

Potential risks to herbivorous mammals were evaluated using a food web model for muskrat. Ingestion doses were calculated for each aquatic DU (Iona Island Hudson River Shoreline, Riprap Drainage Swale, and Tidal Wetland Swale) based on the EPC in sediment, which was also used to predict a concentration in plant tissue that would be consumed by muskrat. The muskrat was also evaluated in the Former Dump Area (DUs 17,18, and 19) because this area is inundated with water twice daily during high tide and during storm events and contains an abundance of *Phragmites australis*, which could be consumed by muskrat (Kiviat 2013). Ingestion doses were calculated for the Former Dump Area based on the soil EPC, which was also used to predict concentrations in plant tissue.

The dose from sediment/soil and the dose from biota were summed to calculate a total dose, which was then compared to NOAEL and LOAEL-based TRVs to calculate an HQ. HQs greater than 1 indicate potential risk. None of the constituents in the Riprap Drainage Swale, Tidal Wetland Swale, or the Former Dump Area had NOAEL or LOAEL-based HQs greater than 1; therefore, there is no potential risk to herbivorous mammals. The HQs (HQ_{NOAEL} and HQ_{LOAEL}) as well as risk characterization conclusions for all COPECs in exceedance of the NOAEL-based TRV at Iona Island Hudson River Shoreline for aquatic herbivorous mammals are presented in the following insert.

Insert 8-6. Risk Characterization for Aquatic Herbivorous Mammals.

Receptor	Exposure Area	COPEC	HQ_{NOAEL}	HQ_{LOAEL}	Risk Characterization Conclusions
Aquatic herbivorous mammals (muskrat)	Iona Island Hudson River Shoreline	Antimony	5	<1	No risk, HQ_{LOAEL}<1
		Copper	2	1	No risk, HQ_{LOAEL}≤1
		Lead	4	2	No risk due to low HQ and habitat considerations

When the doses from Iona Island Hudson River Shoreline are compared to the NOAEL-based TRVs, antimony, copper, and lead, exceed 1. When the doses are compared to the LOAEL-based TRVs, the HQ for antimony falls below 1, and to a value of 1 for copper. Therefore, risk to aquatic herbivorous mammals is not expected due to antimony and copper in sediment.

The shoreline area consists of sandy sediment and lacks aquatic vegetation due to the high-energy environment, which is subject to scouring. It is unlikely that muskrat would spend 100 percent of its time in this area (as the food web models assume due to a relatively small range of 0.33 acre) when there are areas such as the Former Dump Area with vegetation nearby. Habitat suitability studies have shown that muskrat burrows and foraging are positively related to aquatic vegetation coverage, with muskrat occupancy also negatively related to percent sand in soil (Cotner and Schooley 2011; Nadeau et al. 1995). Taking this into account with the relatively low HQs based on comparison to the LOAEL-based TRV (HQ of 2), risk to aquatic herbivorous mammals from lead is not expected.

8.4.7.16 Aquatic Insectivorous Birds

Potential risks to insectivorous birds were evaluated using a food web model for lesser scaup. Ingestion doses were calculated for each aquatic DU (Iona Island Hudson River Shoreline, Riprap Drainage Swale, and Tidal Wetland Swale) based on the EPC in sediment, which was also used to predict a concentration in invertebrate tissue that would be consumed by scaup. The dose from sediment and the dose from biota were summed to calculate a total dose, which was then compared to NOAEL and LOAEL-based TRVs to calculate an HQ. Lesser scaup has a large habitat/foraging range (219 acres) and, therefore, the AUF was adjusted to account for the expected proportion of time the species would spend in 0.5-acre DUs (Section 8.4.5).

HQs greater than 1 indicate potential risk. When the doses were compared to the NOAEL-based TRVs, HQs were less than 1 except for the HQ for lead at Iona Island Hudson River Shoreline only which was 6. The HQ for lead dropped to 3 when the dose was compared to the LOAEL-based TRV. Based on the exceedance of the LOAEL-based TRV, there is potential for risk to insectivorous birds due to lead at the Iona Island Hudson River Shoreline. As highlighted above, AVS/SEM results, low TOC content, and sandy sediments indicate that the area provides conditions for metals in sediment to be bioavailable. Thus, it is concluded that potential risks to aquatic insectivorous birds may be present. The HQs (HQ_{NOAEL} and HQ_{LOAEL}) as well as risk characterization conclusions for lead at Iona Island Hudson River Shoreline for aquatic insectivorous birds are presented in the following insert.

Insert 8-7. Risk Characterization for Aquatic Insectivorous Birds.

Receptor	Exposure Area	COPEC	HQ_{NOAEL}	HQ_{LOAEL}	Risk Characterization Conclusions
Aquatic insectivorous birds (lesser scaup)	Iona Island Hudson River Shoreline	Lead	6	3	Potential for risk

The lesser scaup was selected as a surrogate receptor for the pied-billed grebe, a protected species that prefers wetland habitats with both open water and aquatic vegetation cover available. The Iona Island Hudson River Shoreline does not provide suitable habitat for the species. Therefore, the pied-billed grebe is not likely to use the exposure area for nesting and foraging and is unlikely to be at risk due to lead in sediment.

As highlighted previously (Section 8.4.7.4), effects at the population-level cannot be determined based on the magnitude of HQ exceedances, though effects at this level are considered possible based on the exceedances of TRVs derived from studies of reproductive effects. Additional data collection and modeling approaches would be necessary to fully elucidate the potential for population-level effects on aquatic insectivorous birds at the Iona Island Hudson River Shoreline.

8.4.7.17 Piscivorous Mammals

Potential risks to piscivorous mammals were evaluated using a food web model for river otter. Ingestion doses were calculated for the site based on the EPC in sediment for each aquatic DU (Iona Island Hudson River Shoreline, Riprap Drainage Swale, and Tidal Wetland Swale). Concentrations in fish tissue were calculated using surface water concentrations and BCFs. The dose from sediment and the dose from biota were summed to calculate a total dose, which was then compared to NOAEL and LOAEL-based TRVs to calculate an HQ. River otter have a large habitat/foraging range (859 acres) and, therefore, the AUF was adjusted to account for the expected proportion of time the species would spend in 0.5-acre DUs. HQs greater than 1 indicate potential risk. None of the HQs exceeded the threshold of 1; therefore, risk to piscivorous mammals is not expected.

8.4.7.18 Piscivorous Birds

Potential risks to piscivorous birds were evaluated using a food web model for great blue heron. Ingestion doses were calculated for the site based on the EPC in sediment for each aquatic DU (Iona Island Hudson River Shoreline, Riprap Drainage Swale, and Tidal Wetland Swale). Concentrations in fish tissue were calculated using surface water concentrations and BCFs. The dose from sediment and the dose from biota were summed to calculate a total dose, which was then compared to NOAEL and LOAEL-based TRVs to calculate an HQ. Great blue heron habitat/foraging range is expected to be approximately 11 acres and, therefore, the AUF was adjusted to account for the expected proportion of time the species would spend in 0.5-acre DUs. HQs greater than 1 indicate potential risk. None of the HQs exceeded the threshold of 1; therefore, risk to piscivorous birds is not expected.

The great blue heron was selected as a surrogate receptor for the following piscivorous protected species: least bittern, bald eagle, and osprey. The suitability of the great blue heron as a surrogate receptor for each of the protected species is discussed in Section 2.1.6.2 of the ERA (Appendix H). The home ranges of the protected species are greater than the 11-acre home range of the great blue heron. The least bittern home range is approximately 24 acres (Cornell Lab 2024), and the bald eagle and osprey are expected to have minimum home ranges that are approximately

300 acres (EPA 1993). Since no risks to piscivorous birds are expected, no risks to the protected species are expected.

8.5 RISK ASSESSMENT SUMMARIES

The subsections below present summaries of the human health and ecological risk assessments evaluations and conclusions.

8.5.1 Human Health Risk Assessment Summary

The HHRA identified COPCs in each soil and sediment DU based-on detected concentrations that exceeded the EPA Residential Soil RSLs and exceedances of background concentrations. In soil, COPCs included mainly metals and PAHs. The PCB Aroclor 1260 was also identified as a COPC in soil within DU-18, which is located within AOC #16 – Area D (Former Dump Area). In sediment, select metals were identified as COPCs in each of the three sediment DUs. No COPCs were identified in surface water. Therefore, surface water was not evaluated further in the HHRA and no risk concerns for human receptors exposed to site surface water.

Potential receptors evaluated in the HHRA included park personnel, researcher, construction workers, recreational users (adult, adolescent, and child), adolescent trespasser, and camper/Boy Scout. Each receptor was evaluated for exposure to each individual DUs. The evaluation of DU analytical results was performed on a DU-basis to inform potential decisions that relate to the DU. Carcinogenic risks for all receptors exposures to the individual DUs were either below or within the EPA's acceptable risk range of $1x10^{-6}$ to $1x10^{-4}$. The non-cancer HI thresholds for all receptors exposure to the individual DUs were below the acceptable threshold of 1.0, except the construction worker exposure to DU-13 and DU-18. However, a breakdown by target organ did not reveal any target organs above the acceptable threshold of 1.0 for the construction workers exposure to DU-13 and DU-18. Therefore, the HHRA did not reveal potential concerns for carcinogenic risks or non-cancer hazards for any receptor's exposure to each DU.

Additionally, the HHRA noted that all potential site receptors may not remain within one DU because none of the DUs present an attractive area for any of the receptors to spend a majority of time while onsite. It is likely that all receptors may visit various areas of Iona Island during their visit. Therefore, the HHRA evaluated all potential receptors for exposure to two exposure areas: Iona Island Exposure Area and the Former Dump Area Exposure Area. For both the Iona Island and Former Dump Area Exposure Areas, the HHRA indicated all carcinogenic risks were either below or within the EPA's acceptable risk range of $1x10^{-6}$ to $1x10^{-4}$. The non-cancer HI thresholds were below the acceptable threshold of 1.0 for all receptors evaluated, except the construction worker exposure to the Former Dump Area Exposure Area. A breakdown by target organ did not reveal any target organs above the acceptable threshold of 1.0 for the construction workers exposure to the Former Dump Area Exposure Area. Therefore, the HHRA did not reveal potential concerns for carcinogenic risks or non-cancer hazards for any receptor's exposure to each exposure area.

Lead was identified as a COPC in onsite soil based upon a comparison to the EPA residential soil RSL (400 mg/kg). Blood lead modeling for soil and sediment analytical results revealed greater than 5 percent of the population exceeded the reference blood-lead level of 5 µg/dL for the following receptors:

- Construction workers exposed to surface soil at DU-7 in the upland area, and surface and subsurface soil at DU-17 and DU-18 covering the eastern portion of AOC #16 – Area D (Former Dump Area), and sediment from IHRS-DU-01 (Iona Island Hudson River shoreline adjacent to AOC #16 – Area D [Former Dump Area])

- Park personnel exposed to surface and subsurface soil at DU-17 and DU-18 and sediment within IHRS-DU-01

- Recreational users exposed to sediment within IHRS-DU-01.

The HHRA determined that potential risk concerns associated with lead for the park personnel and construction workers are likely overestimated. It is noted that the Former Dump Area Exposure Area, which includes DU-17 and DU-18, is a marshy area that is covered with vegetation and subject to tidal influence that makes access difficult. The Former Dump Area is also identified as a future nature preserve/wetland area. No construction or other activities are expected in this area and actual contact with this area is minimal and unlikely to result in human health concerns. Additionally, construction worker exposure represents exposures that are usually controlled using standard health and safety protocols and personal protective equipment. Potential lead risk concerns identified for the construction worker within DU-7, DU-17, DU-18, and the Former Dump Exposure Area do not warrant further evaluation or risk management decisions.

Additionally, the park personnel potential exposure to one specific DU for an entire year is not an expected scenario. The park personnel are more likely to be exposed to environmental media over the entire island for activities such as grass mowing, site inspections, and general maintenance. For this reason, the exposure to the entire island is better represented by an average (or mean) concentration of the DUs across the site, which includes all DUs sampled (i.e., DU-1 through DU-7, DU-9 through DU-19, IHRS, RRDS, and TWS). It is noted that this mean concentration does not include the areas of the site not sampled and likely overestimates the true mean lead concentration. The mean soil lead concentration across all DUs is 667 mg/kg, revealing less than 5% of the population exceeds the reference blood-lead level of 5 µg/dL. The results of the ALM modeling for the mean lead concentration across all the DUs reveal no potential concerns for the park personnel exposure to lead based upon expected exposure. Therefore, the park personnel exposure to Iona Island does not warrant further evaluation or risk management decisions.

The recreational user exposure to lead in sediment from IHRS DU did reveal significant exceedance of the acceptable blood-lead threshold. Unlike the worker expected exposure, the recreational user may spend a significant amount of time in this area. While sediments in this

area are generally sandy with larger grain size that is difficult to adhere to the skin surface, there is a potential for contact, sample results from the IHRS DU reveal potential transport of contaminants from AOC #16 (Former Dump Area) along the surface via overland runoff and erosion and into shoreline sediments. As a result, there are sufficient potential concerns for a recreational user exposure to the IHRS DU to warrant additional evaluation and/or risk management decisions in a Feasibility Study. Sample results from the RRDS and TWS DUs on the tidal marsh side of Iona Island do not reveal impacts from AOC #16 or potential risk concerns for receptors, which reveals the tidal marsh area is disconnected from the Former Dump Area.

8.5.2 Ecological Risk Assessment Summary

The ERA evaluated both terrestrial and aquatic receptors. After the completion of the SLERA, only those receptors potentially at risk were evaluated using a site-specific RSLERA.

The terrestrial exposure areas were: 1) Iona Island Exposure Area; and 2) Former Dump Exposure Area. Representative terrestrial receptor categories included plants, soil invertebrates, herbivorous mammals (representative species meadow vole), insectivorous birds (representative species American robin), insectivorous mammals (representative species short-tailed shrew), carnivorous birds (representative species red tailed hawk), carnivorous mammals (representative species red fox), and herptiles.

The aquatic exposure areas were: 1) Iona Island Hudson Shoreline; 2) riprap drainage swale; and 3) tidal wetland swale. Representative aquatic receptor categories included plants, benthic invertebrates, zooplankton, demersal fish, pelagic fish, herbivorous birds (representative species mallard duck), herbivorous mammals (representative species muskrat), insectivorous birds (representative species lesser scaup), piscivorous mammals (representative species river otter) piscivorous birds (representative species great blue heron), and herptiles.

No receptors were found to be at risk in the terrestrial Iona Island exposure area, which does not include the Former Dump Area. These risk findings apply also to two federal/state-listed species of bats (i.e. Indiana bat, northern long-eared bat) and two state listed species of insectivorous birds (i.e. cerulean warbler and golden-winged warbler). No risks to aquatic receptors were found in the riprap drainage swale or the tidal wetland swale exposure areas.

In the Former Dump Area soil exposure area, plants, soil invertebrates, insectivorous mammals, insectivorous birds, and herptiles are potentially at risk from metals (chromium, copper, lead, mercury, and/or zinc), with risk being driven by avian exposure to lead. This risk potentially extends to two federal/state-listed species of bats (i.e. Indiana bat, northern long-eared bat) and two species of insectivorous birds which are New York State listed species of special concern (i.e. cerulean warbler and golden-winged warbler). In the Iona Island Hudson Shoreline sediment exposure area, plants, benthic invertebrates, demersal fish, herptiles and insectivorous birds are potentially at risk from metals (antimony, cadmium, copper, lead, nickel and zinc), with risk being driven by exposure to lead. This risk from sediment potentially extends to two species of endangered demersal fish (juvenile sturgeon) (i.e. Atlantic sturgeon, short-nosed sturgeon).

Insert 8-8. Summary of Potential Risk Characterization for All Ecological Receptors.

Habitat Type	Exposure Area	Media	COPEC	Receptors
Terrestrial	Iona Island	No receptors are at risk due to COPECs in soil.		
	Former Dump Area	Soil (surface and subsurface)	Chromium	• Terrestrial plants • Soil invertebrates • Herptiles
			Copper	• Terrestrial plants • Soil invertebrates • Terrestrial Insectivorous Birds (including 2 NY species of special concern) • Terrestrial Insectivorous Mammals (including 2 federal and state-listed endangered bat species) • Herptiles
			Lead	• Terrestrial plants • Terrestrial Insectivorous Birds (including 2 NY species of special concern) • Terrestrial Insectivorous Mammals (including 2 federal and state-listed endangered bat species) • Herptiles
			Mercury	• Terrestrial plants • Soil invertebrates • Herptiles
			Zinc	• Terrestrial plants • Soil invertebrates • Herptiles
Aquatic	Iona Island Hudson Shoreline	Sediment	Antimony, Cadmium, Copper, Lead, Nickel, and Zinc	• Aquatic plants • Benthic invertebrates • Demersal fish (including 2 species of endangered sturgeon) • Herptiles
			Lead	• Aquatic insectivorous birds
	Riprap Drainage Swale	No receptors are at risk due to COPECs in surface water or sediment.		
	Tidal Wetland Swale	No receptors are at risk due to COPECs in surface water or sediment.		

Risk from soil in the Former Dump Area is mitigated for common species by the small spatial extent of the area (< 2 acres), dense phragmites stands and twice daily inundation during tidal cycles; population level effects are unlikely from soils in this area. Similarly, population level risk is unlikely for common species due to the small extent of sediment in shoreline areas immediately adjacent to the Former Dump Area. The attenuation of risk these factors is not as clear for the two listed bats species, two listed bird species and two endangered fish species (listed because of preferred riverine habitat by the Former Dump Area for a juvenile life stage), as value is put on a single individual in these instances.

The purpose of the RSLERA was to incorporate easily obtained site specific information to refine the ecological risk evaluation. With the introduction of these sub-tiers of evaluation, the SLERA was refined to provide fewer generic conclusions of ecological risk; however, even with

these refinements, hazard calculations show potentially significantly greater risks in this isolated area due to the presence of federal/state-listed or endangered species in the Former Dump Area. These species include two federal/state-listed species of bats (i.e. Indiana bat, northern long-eared bat) and state listed/Special Concern avian species (cerulean warbler and golden-winged warbler), as well as two endangered species of fish (shortnose sturgeon and Atlantic sturgeon) potentially exposed to sediments at the waterline in front of the Former Dump Area along the shoreline of Iona Island on the Hudson River.

The risk conclusions of the SLERA/RSLERA after these sub-tiers of evaluation show that potential risks are confined to a small area of the site with a sharply defined lateral extent of contamination due to island topography and the Hudson River, as well as a sharply defined vertical extent of contamination due to bedrock at approximately three (3) ft bgs based on test pitting and shoreline bathymetric data. Size notwithstanding, based upon current nature and extent information, the Former Dump Area represents on-going source area due to the presence of ash from the former on-site incinerator, as encountered during test pitting.

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9. CONCLUSION AND RECOMMENDATIONS

The HTRW RI was conducted to characterize the nature and extent of hazardous substances in environmental media attributable to past DoD activities and to evaluate potential risk to human health and ecological receptors. Samples to characterize nature and extent were collected as ISM DUs across the island. This section presents conclusions of the HHRA and ERA and recommendations.

9.1 HUMAN HEALTH RISK ASSESSMENT CONCLUSIONS

DUs were evaluated as individual exposure areas and combined into two separate exposure areas for the HHRA: 1) Iona Island Exposure Area; and 2) the Former Dump Exposure Area. The HHRA current receptors included park personnel, researcher, adult recreator, adolescent recreator, child recreator, adolescent trespasser, and camper. Potential future site users included each of the current users as well as a construction worker. Based upon potential receptors and their current or reasonably anticipated future exposures at the site, only the child/adult/adolescent recreational users exposed to lead in sediment located along the Hudson River shoreline (IHRS-DU-01) presented potentially significant risk that would require additional risk management decisions for the Iona FUDS.

9.2 ECOLOGICAL RISK ASSESSMENT CONCLUSIONS

The ERA evaluated both terrestrial and aquatic receptors. After the completion of the SLERA, only those receptors potentially at risk were evaluated using a site-specific RSLERA.

The terrestrial exposure areas were: 1) Iona Island Exposure Area; and 2) Former Dump Exposure Area. Representative terrestrial receptor categories included plants, soil invertebrates, herbivorous mammals (representative species meadow vole), insectivorous birds (representative species American robin), insectivorous mammals (representative species short-tailed shrew), carnivorous birds (representative species red tailed hawk), carnivorous mammals (representative species red fox), and herptiles.

The aquatic exposure areas were: 1) Iona Island Hudson Shoreline; 2) riprap drainage swale; and 3) tidal wetland swale. Representative aquatic receptor categories included plants, benthic invertebrates, zooplankton, demersal fish, pelagic fish, herbivorous birds (representative species mallard duck), herbivorous mammals (representative species muskrat), insectivorous birds (representative species lesser scaup), piscivorous mammals (representative species river otter) piscivorous birds (representative species great blue heron), and herptiles.

No receptors were found to be at risk in the terrestrial Iona Island exposure area, which does not include the Former Dump Area. These risk findings apply also to two federal/state-listed species of bats (i.e. Indiana bat, northern long-eared bat) and two state listed species of insectivorous birds (i.e. cerulean warbler and golden-winged warbler). No risks to aquatic receptors were found in the riprap drainage swale or the tidal wetland swale exposure areas.

In the Former Dump Area soil exposure area, plants, soil invertebrates, insectivorous mammals, insectivorous birds, and herptiles are potentially at risk from metals (chromium, copper, lead, mercury, and/or zinc), with risk being driven by avian exposure to lead. This risk potentially extends to two federal/state-listed species of bats (i.e. Indiana bat, northern long-eared bat) and two species of insectivorous birds which are New York State listed species of special concern (i.e. cerulean warbler and golden-winged warbler). In the Iona Island Hudson Shoreline sediment exposure area, plants, benthic invertebrates, demersal fish, herptiles and insectivorous birds are potentially at risk from metals (antimony, cadmium, copper, lead, nickel and zinc), with risk being driven by exposure to lead. This risk from sediment potentially extends to two species of endangered demersal fish (juvenile sturgeon) (i.e. Atlantic sturgeon, short-nosed sturgeon).

Risk from soil in the Former Dump Area is mitigated for common species by the small spatial extent of the area (< 2 acres), dense phragmites stands and twice daily inundation during tidal cycles; population level effects are unlikely from soils in this area. Similarly, population level risk is unlikely for common species due to the small extent of sediment in shoreline areas immediately adjacent to the Former Dump Area. The attenuation of risk these factors is not as clear for the two listed bats species, two listed bird species and two endangered fish species (listed because of preferred riverine habitat by the Former Dump Area for a juvenile life stage), as value is put on a single individual in these instances.

9.3 HTRW RI RECOMMENDATIONS

Both the human health and ecological risk assessments indicate potentially significant risk for the Former Dump Area and the Iona Island Hudson River shoreline sediments in its immediate vicinity. These conclusions are the result of a baseline HHRA and an RSLERA.

The purpose of the RSLERA was to incorporate easily obtained site specific information to refine the ecological risk evaluation. With the introduction of these sub-tiers of evaluation, the SLERA was refined to provide fewer generic conclusions of ecological risk; however, even with these refinements, hazard calculations show potentially significantly greater risks in this isolated area due to the presence of federal/state-listed or endangered species in the Former Dump Area. These species include two federal/state-listed species of bats (i.e. Indiana bat, northern long-eared bat) and state listed/Special Concern avian species (cerulean warbler and golden-winged warbler), as well as two endangered species of fish (shortnose sturgeon and Atlantic sturgeon) potentially exposed to sediments at the waterline in front of the Former Dump Area along the shoreline of Iona Island on the Hudson River.

The risk conclusions of the SLERA/RSLERA after these sub-tiers of evaluation show that potential risks are confined to a small area of the site with a sharply defined lateral extent of contamination due to island topography and the Hudson River, as well as a sharply defined vertical extent of contamination due to bedrock at approximately three (3) ft bgs based on test pitting and shoreline bathymetric data. Size notwithstanding, based upon current nature and extent information, the Former Dump Area represents on-going source area due to the presence of ash from the former on-site incinerator, as encountered during test pitting.

In accordance with USACE's Environmental Quality Risk Assessment Handbooks, Volumes 1 (human health) (USACE 1999), and 2 (environmental evaluation) (USACE 2010), baseline risk assessments must be completed for the FUDS (USACE 2022). The HHRA and the SLERA/RSLERA meet the definition of baseline risk assessments (USEPA, 2001); therefore, the RI is complete.

It is recommended that this project proceed directly to an FS, rather than spend time and resources determining a less conservative site-specific cleanup number or by conducting a BERA. The conclusion of this RI is that the portion of this FUDS, known as the Former Dump Area, indicates potentially significant risk to listed species since value is placed at the individual level. Based upon its small size, and sharply defined boundaries for the contamination, this FUDS should proceed to a FS to evaluate the appropriate remedy to address these risks (USEPA 2001). The FS will consider State applicable or relevant and appropriate requirements associated with both the environment and human health. A letter will be sent to NYSDEC/ New York State Department of Health requesting the state's proposed list of applicable or relevant and appropriate requirements.

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Figures

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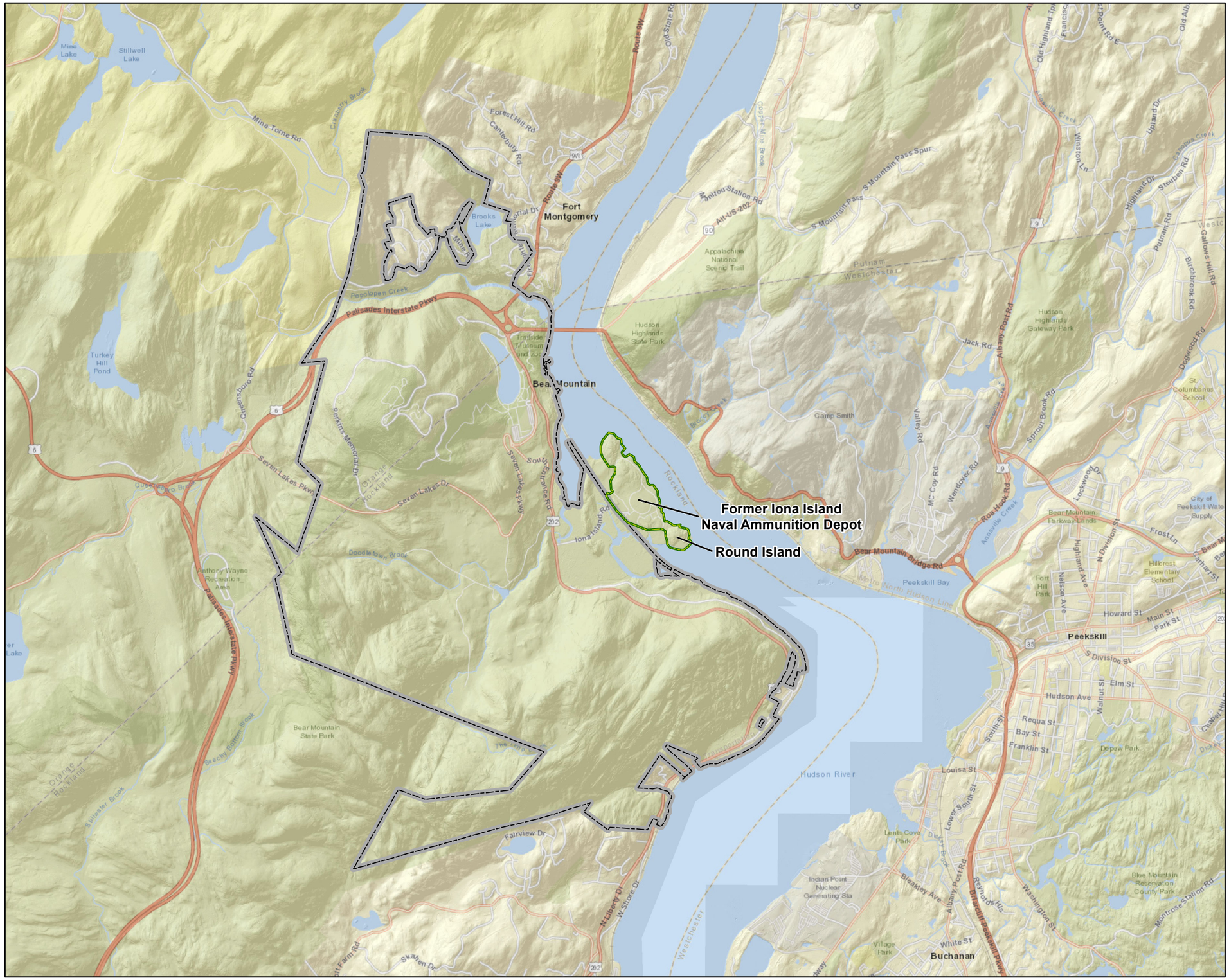
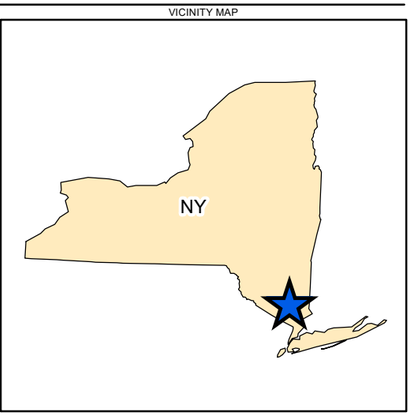


VICINITY MAP



Legend

- FUDS Boundary
- Bear Mountain State Park Boundary (NYS Office of Parks, Recreation & Historic Preservation, 2018)

0 0.5 1
Miles
1 in = 1 miles

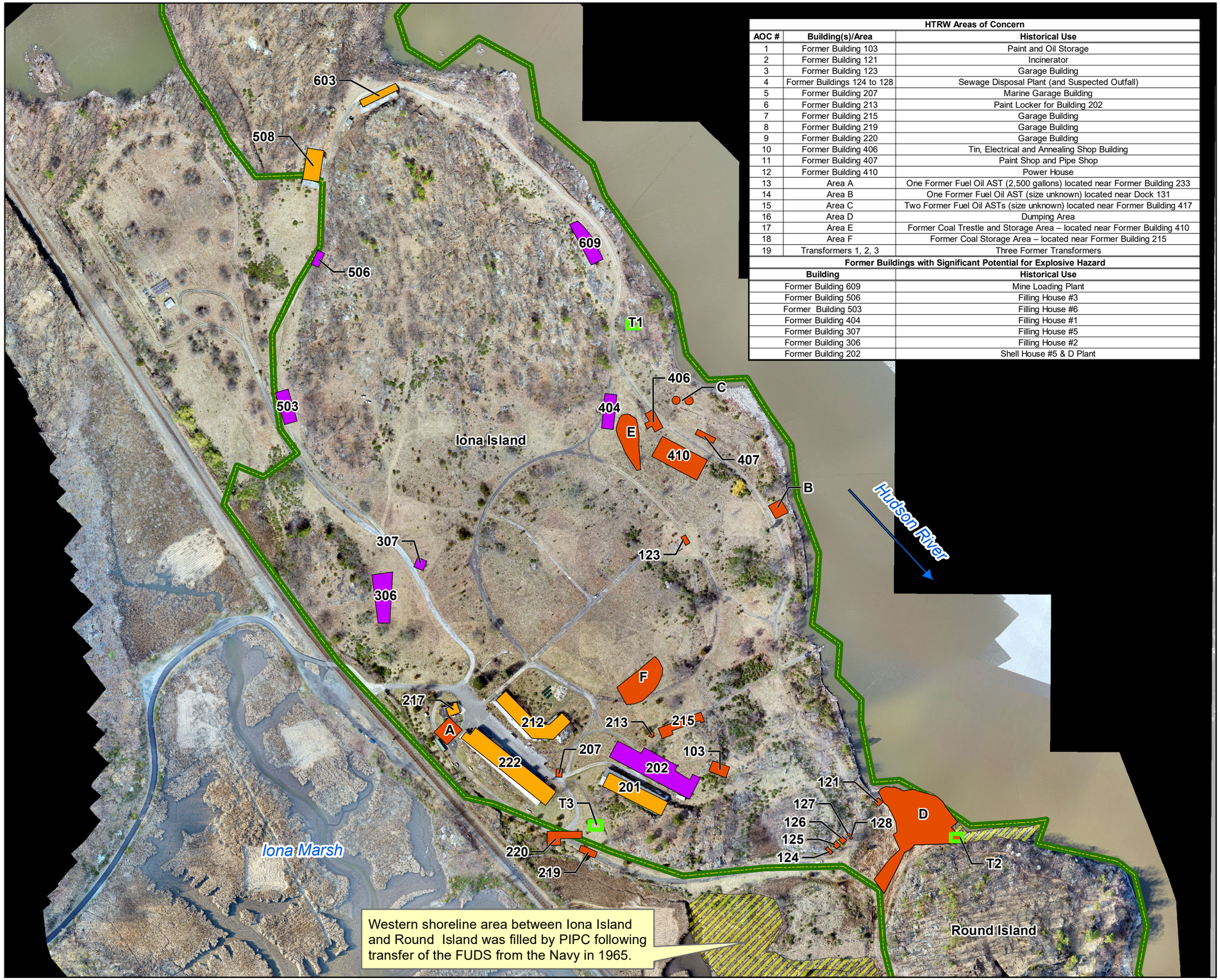
N

FIGURE 1-1
General Location of the Iona Island Naval Ammunition Depot Formerly Used Defense Site

HAZARDOUS TOXIC AND RADIOACTIVE WASTE REMEDIAL INVESTIGATION REPORT

Source
Basemap: ESRI World Street Map - ArcGIS Online Map Service (ESRI 2009).
DEM: 2012, Photo Science, Inc., Coastal New York LiDAR (Hydro Flattened Raster DEM), 1-Meter Resolution, New York State GIS

Map Date: 9/19/2022



HTRW Areas of Concern

AOC #	Building(s)/Area	Historical Use
1	Former Building 103	Paint and Oil Storage
2	Former Building 121	Incinerator
3	Former Building 123	Garage Building
4	Former Buildings 124 to 128	Sewage Disposal Plant (and Suspected Outfall)
5	Former Building 207	Marine Garage Building
6	Former Building 213	Paint Locker for Building 202
7	Former Building 215	Garage Building
8	Former Building 219	Garage Building
9	Former Building 220	Garage Building
10	Former Building 406	Tin, Electrical and Annealing Shop Building
11	Former Building 407	Paint Shop and Pipe Shop
12	Former Building 410	Power House
13	Area A	One Former Fuel Oil AST (2,500 gallons) located near Former Building 233
14	Area B	One Former Fuel Oil AST (size unknown) located near Dock 131
15	Area C	Two Former Fuel Oil ASTs (size unknown) located near Former Building 417
16	Area D	Dumping Area
17	Area E	Former Coal Trestle and Storage Area – located near Former Building 410
18	Area F	Former Coal Storage Area – located near Former Building 215
19	Transformers 1, 2, 3	Three Former Transformers

Former Buildings with Significant Potential for Explosive Hazard

Building	Historical Use
Former Building 609	Mine Loading Plant
Former Building 506	Filling House #3
Former Building 503	Filling House #6
Former Building 404	Filling House #1
Former Building 307	Filling House #5
Former Building 306	Filling House #2
Former Building 202	Shell House #5 & D Plant

VICINITY MAP

Legend

- FUDS Boundary
- HTRW Project Areas of Concern
- FormerTransformers
- Remaining Structure (Not FUDS Eligible)
- Former Buildings with Significant Potential for Explosive Hazard
- Disturbed Ground/Fill Area
- Surface Water Flow Direction

0 300 600
Feet
1 in = 300 ft

N

FIGURE 1-2
HTRW Project Areas of Concern

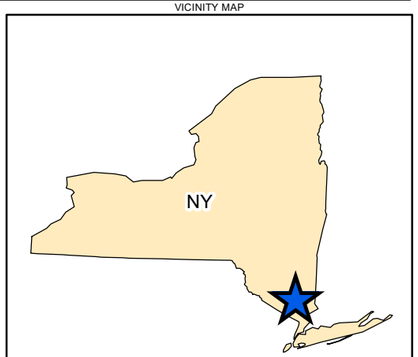
HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial: EA Engineering, Science, and Technology. April 7, 2020

Map Date: 1/11/2024

HTRW Areas of Concern		
AOC #	**Building(s)/Area**	**Historical Use**
1	Former Building 103	Paint and Oil Storage
2	Former Building 121	Incinerator
3	Former Building 123	Garage Building
4	Former Buildings 124 to 128	Sewage Disposal Plant (and Suspected Outfall)
5	Former Building 207	Marine Garage Building
6	Former Building 213	Paint Locker for Building 202
7	Former Building 215	Garage Building
8	Former Building 219	Garage Building
9	Former Building 220	Garage Building
10	Former Building 406	Tin, Electrical and Annealing Shop Building
11	Former Building 407	Paint Shop and Pipe Shop
12	Former Building 410	Power House
13	Area A	One Former Fuel Oil AST (2,500 gallons) located near Former Building 233
14	Area B	One Former Fuel Oil AST (size unknown) located near Dock 131
15	Area C	Two Former Fuel Oil ASTs (size unknown) located near Former Building 417
16	Area D	Dumping Area
17	Area E	Former Coal Trestle and Storage Area – located near Former Building 410
18	Area F	Former Coal Storage Area – located near Former Building 215
19	Transformers 1, 2, 3	Three Former Transformers
Former Buildings with Significant Potential for Explosive Hazard		
Building		**Historical Use**
Former Building 609		Mine Loading Plant
Former Building 506		Filling House #3
Former Building 503		Filling House #6
Former Building 404		Filling House #1
Former Building 307		Filling House #5
Former Building 306		Filling House #2
Former Building 202		Shell House #5 & D Plant

VICINITY MAP



Legend

- FUDS Boundary
- HTRW Project Areas of Concern
- FormerTransformers
- Former Buildings with Significant Potential for Explosive Hazard (Included in the HTRW RI pending direction of contracting offer)
- 1996 Subsurface Soil Sample Location (Greeley-Polhemus 1997)
- Surface Water Flow Direction

0 300 600
Feet
1 in = 300 ft

N

FIGURE 1-3
1996 Data Collection Activities

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial: EA Engineering, Science, and Technology. April 7, 2020
Aerial: 1943 aerial imagery from U.S. Army Geospatial Center 2018.

Map Date: 1/11/2024

Note: Aerial Base Map from 1943.

HTRW Areas of Concern		
AOC #	**Building(s)/Area**	**Historical Use**
1	Former Building 103	Paint and Oil Storage
2	Former Building 121	Incinerator
3	Former Building 123	Garage Building
4	Former Buildings 124 to 128	Sewage Disposal Plant (and Suspected Outfall)
5	Former Building 207	Marine Garage Building
6	Former Building 213	Paint Locker for Building 202
7	Former Building 215	Garage Building
8	Former Building 219	Garage Building
9	Former Building 220	Garage Building
10	Former Building 406	Tin, Electrical and Annealing Shop Building
11	Former Building 407	Paint Shop and Pipe Shop
12	Former Building 410	Power House
13	Area A	One Former Fuel Oil AST (2,500 gallons) located near Former Building 233
14	Area B	One Former Fuel Oil AST (size unknown) located near Dock 131
15	Area C	Two Former Fuel Oil ASTs (size unknown) located near Former Building 417
16	Area D	Dumping Area
17	Area E	Former Coal Trestle and Storage Area – located near Former Building 410
18	Area F	Former Coal Storage Area – located near Former Building 215
19	Transformers 1, 2, 3	Three Former Transformers
Former Buildings with Significant Potential for Explosive Hazard		
Building		**Historical Use**
Former Building 609		Mine Loading Plant
Former Building 506		Filling House #3
Former Building 503		Filling House #6
Former Building 404		Filling House #1
Former Building 307		Filling House #5
Former Building 306		Filling House #2
Former Building 202		Shell House #5 & D Plant

VICINITY MAP

Legend

- FUDS Boundary
- Former Dock Location (USAGC 2018)
- 1903 Explosion Radius of Influence (USAGC 2018)
- HTRW Project Areas of Concern
- FormerTransformers
- Former Buildings with Significant Potential for Explosive Hazard (Included in the HTRW RI pending direction of contracting offer)
- 2007 Surface Soil Sample (Alion 2008)
- 2007 Sediment Sample (Alion 2008)
- Surface Water Flow Direction

0 400 800
Feet
1 in = 400 ft

N

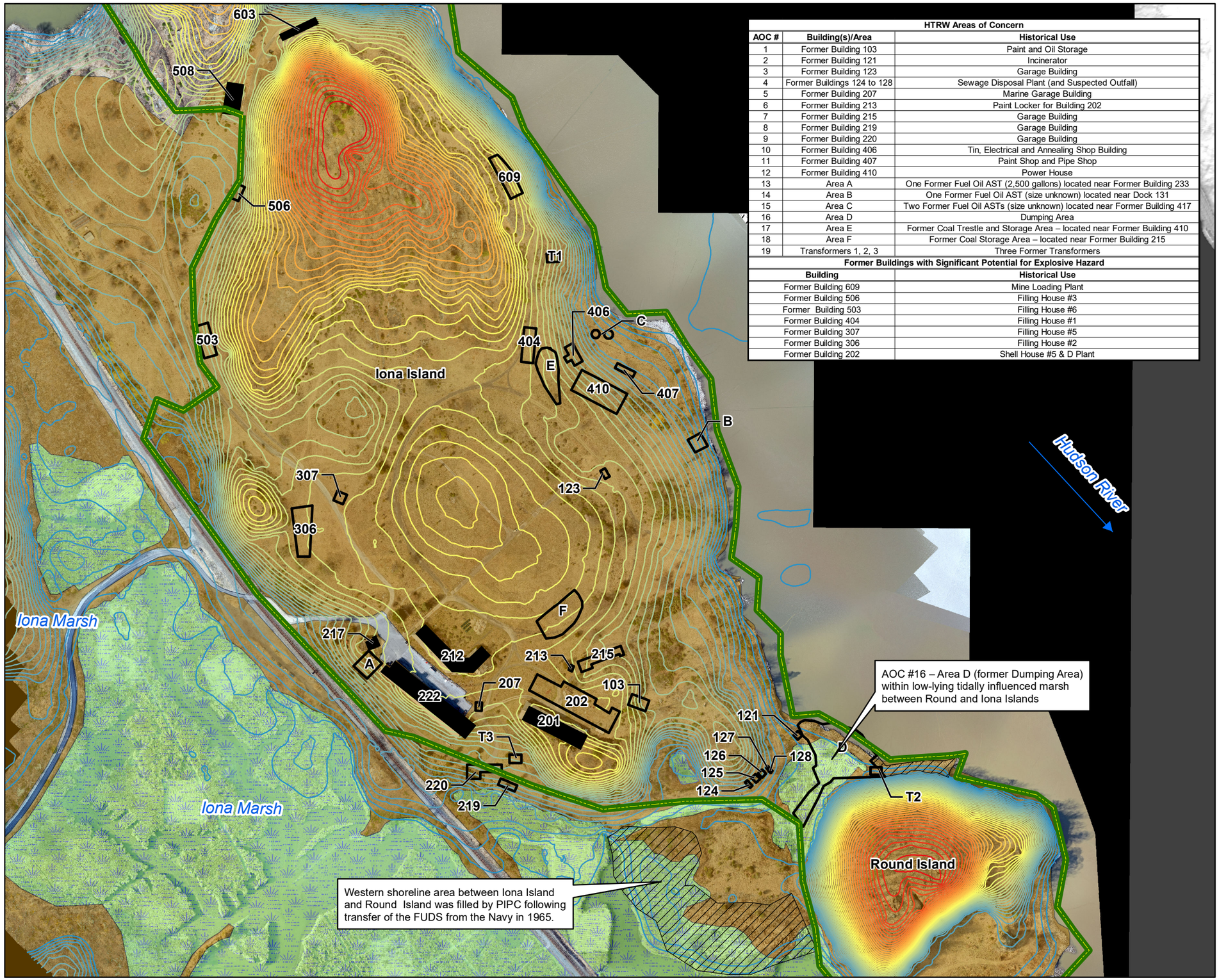
FIGURE 1-4
2007 Site Inspection

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial: EA Engineering, Science, and Technology. April 7, 2020
Aerial: 1943 aerial imagery from U.S. Army Geospatial Center 2018.

Map Date: 1/11/2024

Note: Aerial Base Map from 1943.



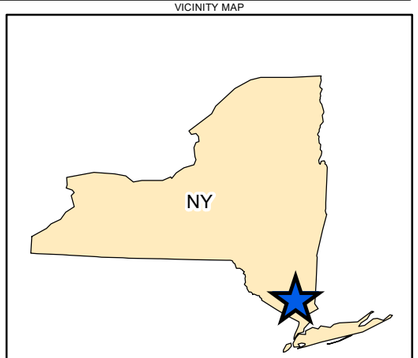
HTRW Areas of Concern

AOC #	Building(s)/Area	Historical Use
1	Former Building 103	Paint and Oil Storage
2	Former Building 121	Incinerator
3	Former Building 123	Garage Building
4	Former Buildings 124 to 128	Sewage Disposal Plant (and Suspected Outfall)
5	Former Building 207	Marine Garage Building
6	Former Building 213	Paint Locker for Building 202
7	Former Building 215	Garage Building
8	Former Building 219	Garage Building
9	Former Building 220	Garage Building
10	Former Building 406	Tin, Electrical and Annealing Shop Building
11	Former Building 407	Paint Shop and Pipe Shop
12	Former Building 410	Power House
13	Area A	One Former Fuel Oil AST (2,500 gallons) located near Former Building 233
14	Area B	One Former Fuel Oil AST (size unknown) located near Dock 131
15	Area C	Two Former Fuel Oil ASTs (size unknown) located near Former Building 417
16	Area D	Dumping Area
17	Area E	Former Coal Trestle and Storage Area – located near Former Building 410
18	Area F	Former Coal Storage Area – located near Former Building 215
19	Transformers 1, 2, 3	Three Former Transformers

Former Buildings with Significant Potential for Explosive Hazard

Building	Historical Use
Former Building 609	Mine Loading Plant
Former Building 506	Filling House #3
Former Building 503	Filling House #6
Former Building 404	Filling House #1
Former Building 307	Filling House #5
Former Building 306	Filling House #2
Former Building 202	Shell House #5 & D Plant

VICINITY MAP



Legend

- FUDS Boundary
- Existing Building / Structure
- Former Building / Structure
- Upland
- Marsh/Wetland
- Disturbed Ground/Fill Area
- Surface Water Flow Direction

2-Foot Topographic Contour Gradations

(Feet above mean sea level (amsl)

High : 84 ft amsl

Low : 0 ft amsl

0 300 600

Feet

1 in = 300 ft

N

FIGURE 1-5
Topography

HAZARDOUS TOXIC AND RADIOACTIVE WASTE REMEDIAL INVESTIGATION REPORT

Source
Aerial: EA Engineering, Science, and Technology. April 7, 2020

Map Date: 1/11/2024

HTRW Areas of Concern		
AOC #	**Building(s)/Area**	**Historical Use**
1	Former Building 103	Paint and Oil Storage
2	Former Building 121	Incinerator
3	Former Building 123	Garage Building
4	Former Buildings 124 to 128	Sewage Disposal Plant (and Suspected Outfall)
5	Former Building 207	Marine Garage Building
6	Former Building 213	Paint Locker for Building 202
7	Former Building 215	Garage Building
8	Former Building 219	Garage Building
9	Former Building 220	Garage Building
10	Former Building 406	Tin, Electrical and Annealing Shop Building
11	Former Building 407	Paint Shop and Pipe Shop
12	Former Building 410	Power House
13	Area A	One Former Fuel Oil AST (2,500 gallons) located near Former Building 233
14	Area B	One Former Fuel Oil AST (size unknown) located near Dock 131
15	Area C	Two Former Fuel Oil ASTs (size unknown) located near Former Building 417
16	Area D	Dumping Area
17	Area E	Former Coal Trestle and Storage Area – located near Former Building 410
18	Area F	Former Coal Storage Area – located near Former Building 215
19	Transformers 1, 2, 3	Three Former Transformers

Former Buildings with Significant Potential for Explosive Hazard	
Building	**Historical Use**
Former Building 609	Mine Loading Plant
Former Building 506	Filling House #3
Former Building 503	Filling House #6
Former Building 404	Filling House #1
Former Building 307	Filling House #5
Former Building 306	Filling House #2
Former Building 202	Shell House #5 & D Plant

VICINITY MAP

Legend

- FUDS Boundary
- Existing Building / Structure
- Former Building / Structure
- Disturbed Ground/Fill Area

Bathymetric Contours (meters)

- -54 - -35
- -34 - -21
- -20 - -13
- -12 - -8
- -7 - -1
- Surface Water Flow Direction

Doodletown Bight
Iona Island
Iona Marsh
Round Island
Hudson River
603
508
506
609
T1
406
C
503
404
E
410
407
B
307
123
306
F
217
A
212
213
215
207
103
222
202
201
T3
121
127
126
125
124
128
D
220
219
T2

AOC #16 – Area D (former Dumping Area) within low-lying tidally influenced marsh between Round and Iona Islands

Western shoreline area between Iona Island and Round Island was filled by PIPC following transfer of the FUDS from the Navy in 1965.

8000
4000
2000
1000
500
250
50
10
0
-2
-10
-50
-250
-1000
-2000
-4000
-8000
Elevation/depth in meters

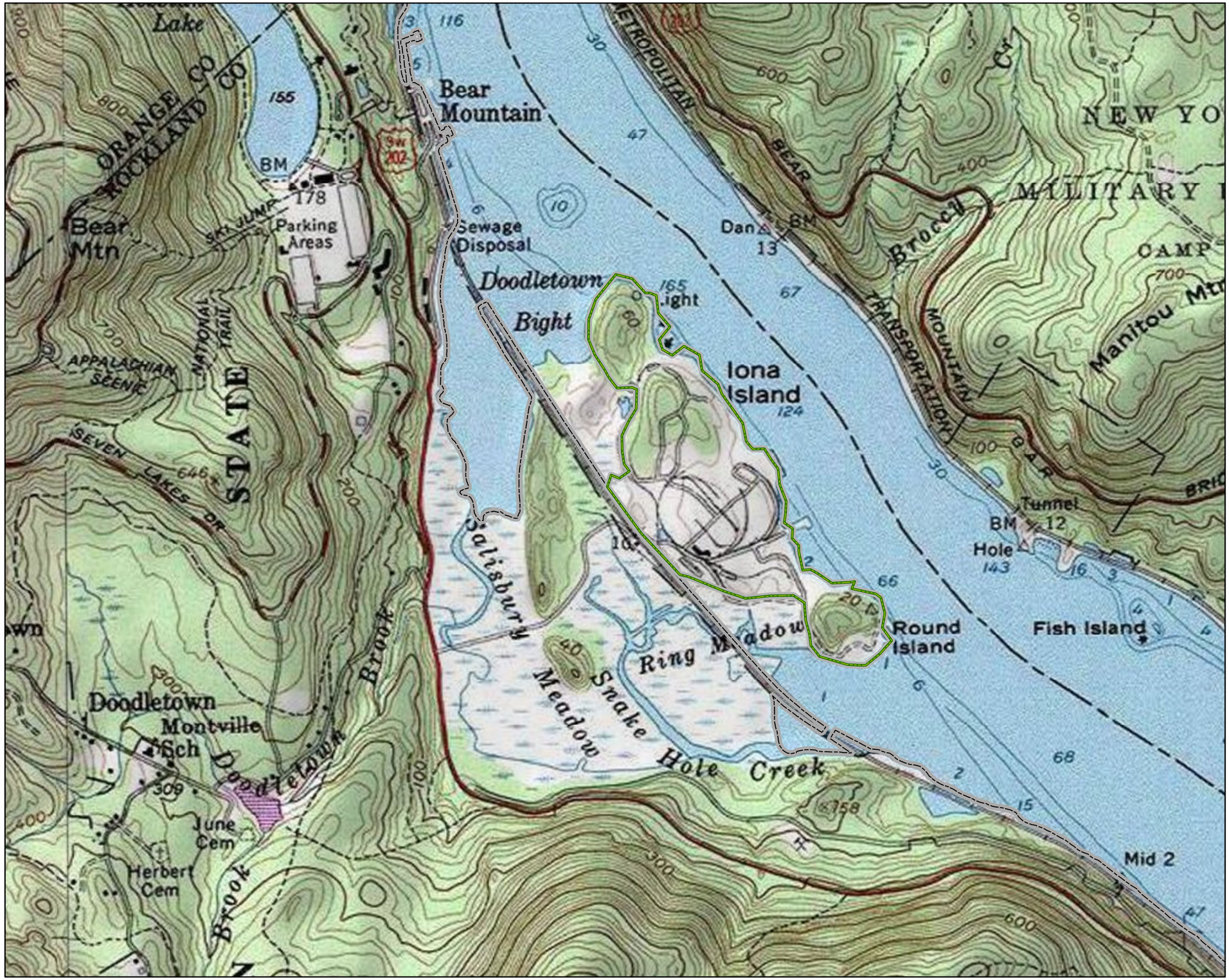
0 500 1,000
Feet
1 in = 500 ft

N

FIGURE 1-6
Hudson River Bathymetry

HAZARDOUS TOXIC AND RADIOACTIVE WASTE REMEDIAL INVESTIGATION REPORT

Source
Aerial: EA Engineering, Science, and Technology. April 7, 2020
DEM and bathymetry: NOAA National Centers for Environmental Information. March 15, 2022.
Map Date: 1/11/2024



VICINITY MAP

Legend

- FUDS Boundary
- Bear Mountain State Park Boundary

0 1,000 2,000
Feet
1 in = 1,000 feet

N

FIGURE 1-7
Hydrology

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Topographic Map: USGS 1981 Peekskill Quadrangle
Digital Raster Graphic Quadrangle
(1:24,000 scale - UTM Zone 18, NAD 27)

Map Date: 1/3/2023

HTRW Areas of Concern		
AOC #	**Building(s)/Area**	**Historical Use**
1	Former Building 103	Paint and Oil Storage
2	Former Building 121	Incinerator
3	Former Building 123	Garage Building
4	Former Buildings 124 to 128	Sewage Disposal Plant (and Suspected Outfall)
5	Former Building 207	Marine Garage Building
6	Former Building 213	Paint Locker for Building 202
7	Former Building 215	Garage Building
8	Former Building 219	Garage Building
9	Former Building 220	Garage Building
10	Former Building 406	Tin, Electrical and Annealing Shop Building
11	Former Building 407	Paint Shop and Pipe Shop
12	Former Building 410	Power House
13	Area A	One Former Fuel Oil AST (2,500 gallons) located near Former Building 233
14	Area B	One Former Fuel Oil AST (size unknown) located near Dock 131
15	Area C	Two Former Fuel Oil ASTs (size unknown) located near Former Building 417
16	Area D	Dumping Area
17	Area E	Former Coal Trestle and Storage Area – located near Former Building 410
18	Area F	Former Coal Storage Area – located near Former Building 215
19	Transformers 1, 2, 3	Three Former Transformers
Former Buildings with Significant Potential for Explosive Hazard		
Building		**Historical Use**
Former Building 609		Mine Loading Plant
Former Building 506		Filling House #3 (Bombproof)
Former Building 503		Filling House #6
Former Building 404		Filling House #1
Former Building 307		Filling House #5
Former Building 306		Filling House #2
Former Building 202		Shell House #5 & D Plant

VICINITY MAP

Legend

- FUDS Boundary
- Former Building / Structure
- Existing Building / Structure
- Disturbed Ground/Fill Area

Wetland Type

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Surface Water Flow Direction

0 300 600
Feet
1 in = 300 ft

N

FIGURE 1-8
Wetland Resources

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial: EA Engineering, Science, and Technology. April, 7 2020
Wetlands: U.S. Fish and Wildlife Services National Wetlands Inventory Mapper 2018.

Map Date: 1/11/2024

HTRW Areas of Concern		
AOC #	**Building(s)/Area**	**Historical Use**
1	Former Building 103	Paint and Oil Storage
2	Former Building 121	Incinerator
3	Former Building 123	Garage Building
4	Former Buildings 124 to 128	Sewage Disposal Plant (and Suspected Outfall)
5	Former Building 207	Marine Garage Building
6	Former Building 213	Paint Locker for Building 202
7	Former Building 215	Garage Building
8	Former Building 219	Garage Building
9	Former Building 220	Garage Building
10	Former Building 406	Tin, Electrical and Annealing Shop Building
11	Former Building 407	Paint Shop and Pipe Shop
12	Former Building 410	Power House
13	Area A	One Former Fuel Oil AST (2,500 gallons) located near Former Building 233
14	Area B	One Former Fuel Oil AST (size unknown) located near Dock 131
15	Area C	Two Former Fuel Oil ASTs (size unknown) located near Former Building 417
16	Area D	Dumping Area
17	Area E	Former Coal Trestle and Storage Area – located near Former Building 410
18	Area F	Former Coal Storage Area – located near Former Building 215
19	Transformers 1, 2, 3	Three Former Transformers
Existing Structures / Not FUDS Eligible		
Building		**Historical Use**
Building 201		Empty Projectile Magazine
Building 212		Former Marine Barracks
Building 217		Fire Station and Labor Office Building
Building 222		Miscellaneous Storage Building
Building 508		Bag Charge Magazine
Building 603		Pyrotechnic Magazine

VICINITY MAP

Legend

- FUDS Boundary
- HTRW Project Areas of Concern
- FormerTransformers
- Former Buildings with Significant Potential for Explosive Hazard (Included in the HTRW RI pending direction of contracting offer)
- Remaining Structure (Not FUDS Eligible)
- Previous Elevated Concentration of COPC (Greeley-Polhemus 1997 and Alion 2008)
- 1-Acre DU
- 60 x 60 ft DU
- Explosives Building DU

0 300 600
Feet
1 in = 300 ft

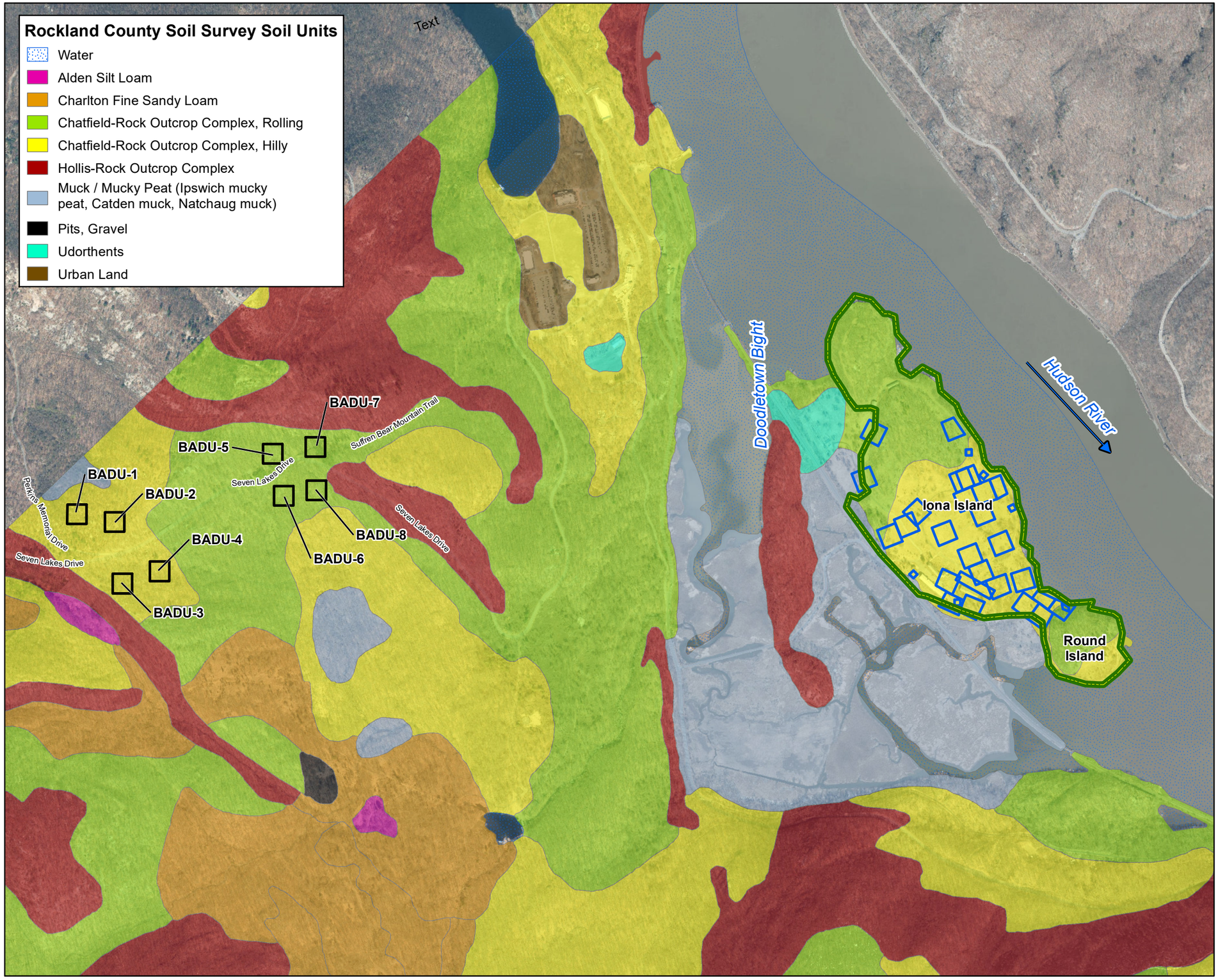
N

FIGURE 3-1
Phase I Onsite Soil Incremental Sampling Decision Units

HAZARDOUS TOXIC AND RADIOACTIVE WASTE REMEDIAL INVESTIGATION REPORT

Source
Aerial: EA Engineering, Science, and Technology. April, 7 2020

Map Date: 9/19/2022



VICINITY MAP

Legend

- FUDS Boundary
- Bear Mountain State Park 200x200 ft Surface and Subsurface Soil DU
- Onsite DU
- Surface Water Flow Direction

0 1,000 2,000
Feet
1 in = 1,000 ft

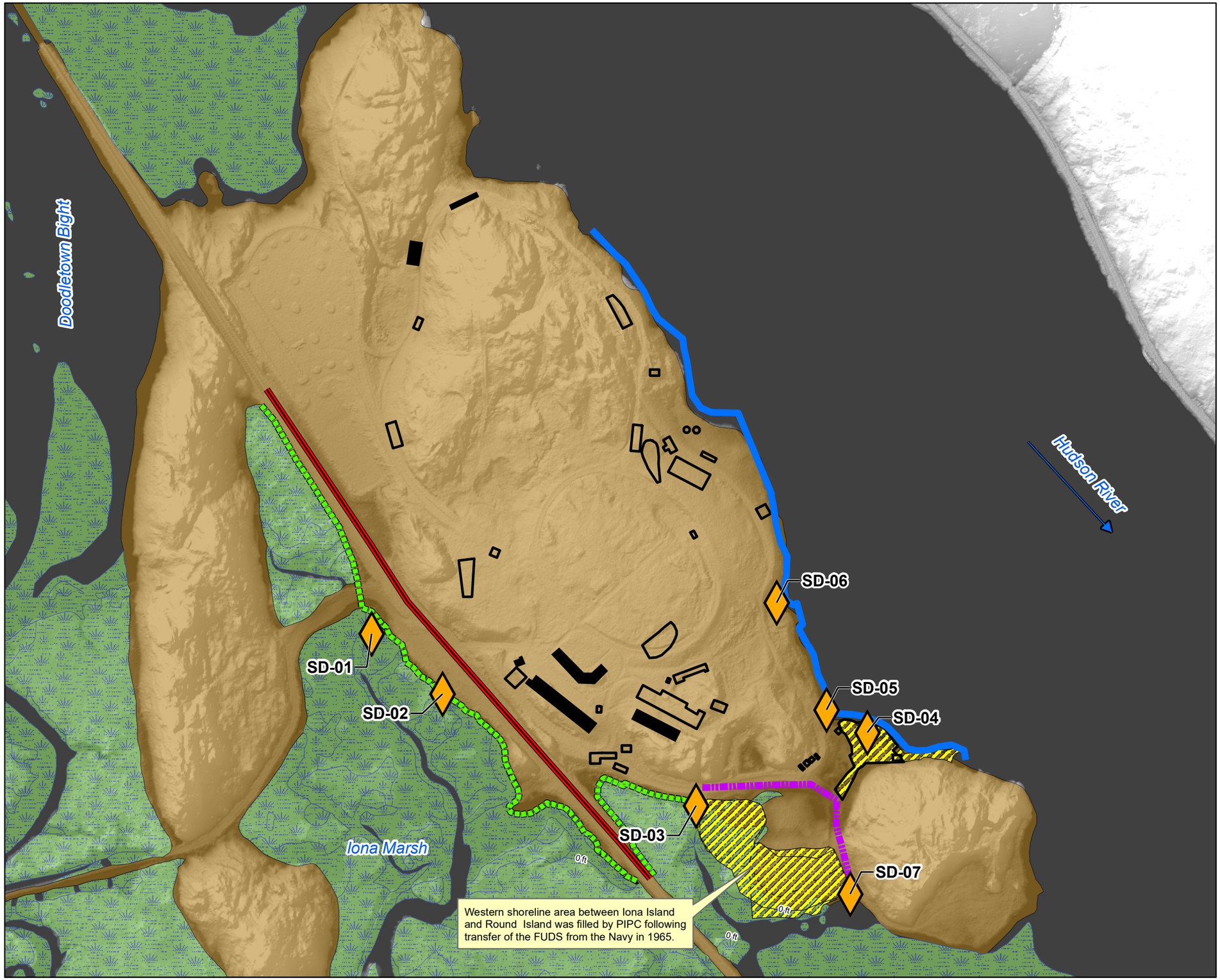
N

FIGURE 3-2
Phase I Background Soil Incremental Sampling Decision Units

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Sources
Aerial: October, 12, 2018. Maxar Technologies.
ESRI ArcGIS Online Map Service.
Soil Units: USDA NRCS 2013

Map Date: 1/11/2024



VICINITY MAP

Legend

- Former Building / Structure
- Existing Building / Structure
- Disturbed Ground/Fill Area
- Upland
- Marsh/Wetland

Phase I Shoreline Reconnaissance Areas

- Recon Area 1 — Hudson River Shoreline
- Recon Area 2 — Iona Marsh Shoreline
- Recon Area 3 — Western Shoreline Between Iona and Round Island
- Recon Area 4 — CSX Railroad Tracks (East and West Sides)
- Sediment Sample Location
- Surface Water Flow Direction

0 400 800
Feet
1 in = 400 ft

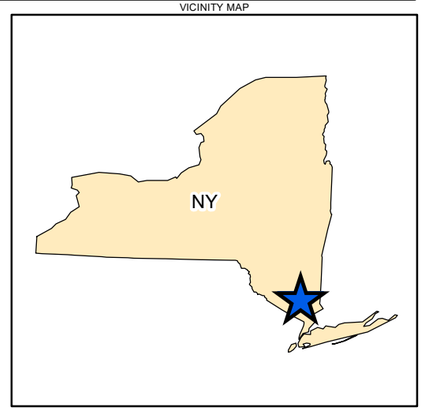
N

FIGURE 3-3
Phase I Shoreline Reconnaissance Survey Areas and Sediment Sampling Locations

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
DEM: 2012, Photo Science, Inc., Coastal New York LiDAR (Hydro Flattened Raster DEM), 1-Meter Resolution, New York State GIS
Map Date: 1/11/2024
Upland and Marsh/Wetland: Cornell Cornell Institute for Resource Information Sciences (IRIS) 2011

VICINITY MAP



Legend

- FUDS Boundary
- Phase II Soil Physical Parameter DU
- Upland
- Marsh/Wetland
- Surface Water Flow Direction

0 200 400
Feet
1 in = 200 ft

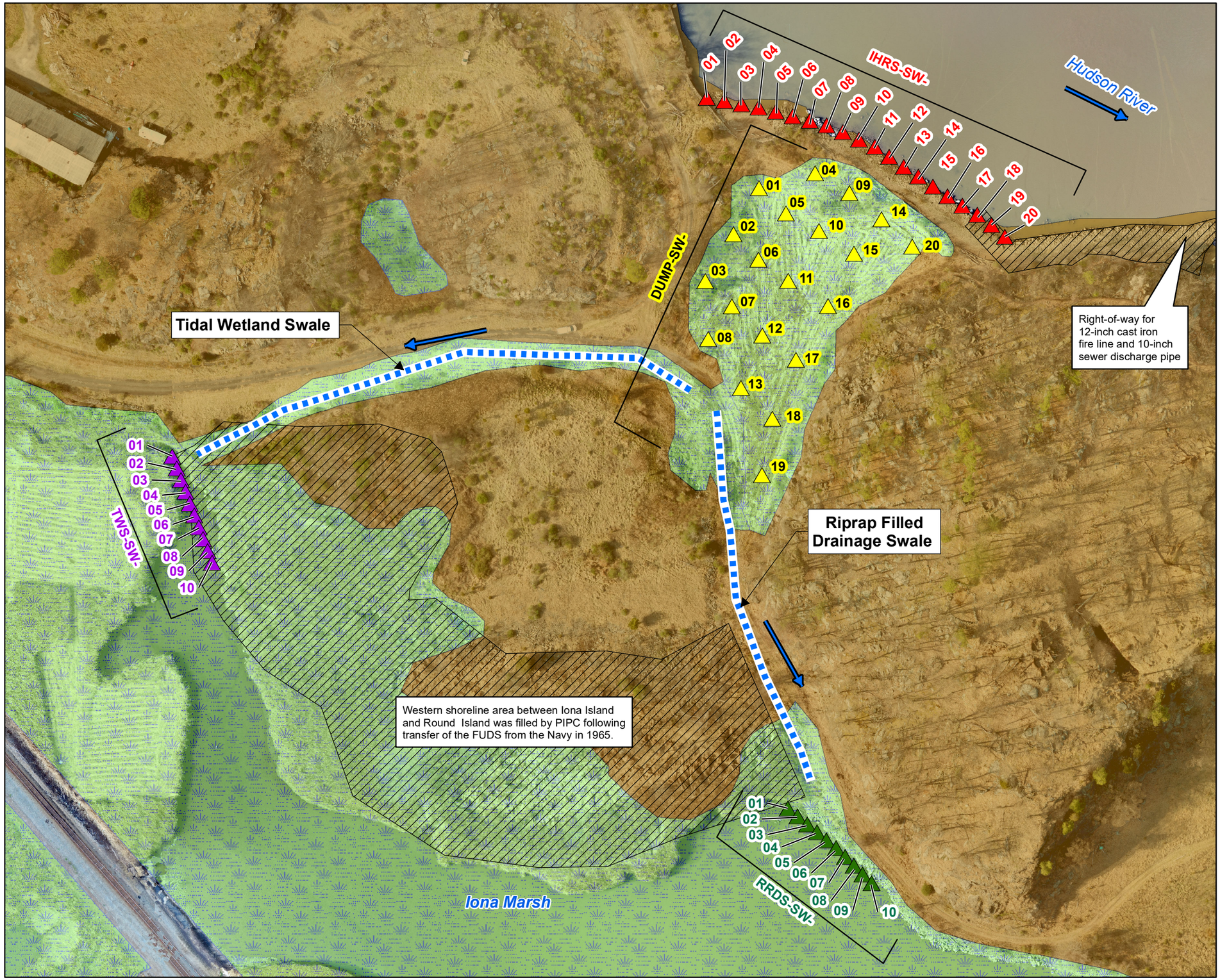
N

FIGURE 3-4
Phase II Surface Soil Physical Parameter Sampling Locations

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial: EA Engineering, Science, and Technology. April, 7 2020
AOC Boundary: USAGC 2018
Upland and Marsh/Wetland: 2020 EA Shoreline Reconnaissance

Map Date: 1/11/2024



VICINITY MAP

Legend

- AOC #16 – Area D (former Dumping Area)
- Upland
- Marsh/Wetland
- ISM Sediment Decision Unit
- Surface Water Migration Pathway

Surface Water Sampling Location

- Iona Island Hudson River Shoreline
- AOC #16 – Area D (former Dumping Area)
- Iona Marsh Tidal Wetland Swale Outlet
- Iona Marsh Riprap Filled Drainage Swale Outlet
- Surface Water Flow Direction

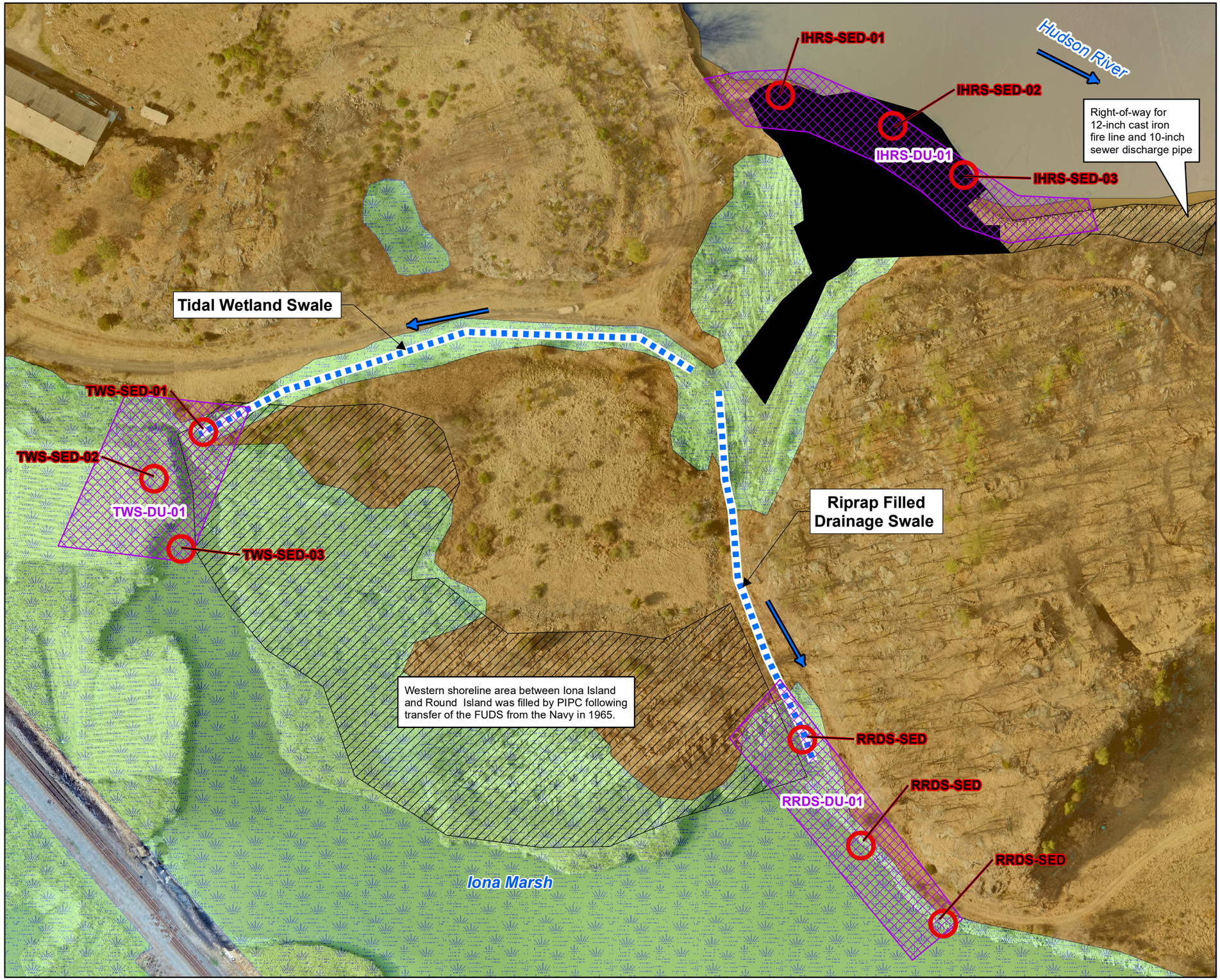
0 100 200
Feet
1 in = 100 ft

N

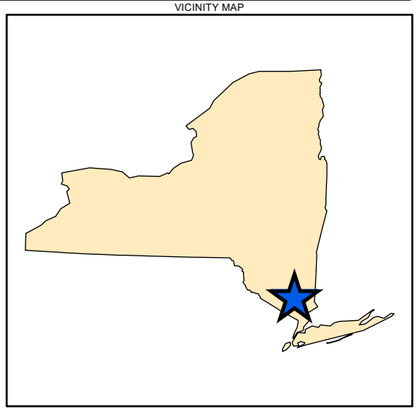
FIGURE 3-5
Phase II Iona Island Surface Water Sampling Locations

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial and Topographic Contours: EA Engineering, Science, and Technology. April, 7 2020
Disturbed Ground/Fill Area and AOC Boundaries: USAGC 2018
Upland and Marsh/Wetland: 2020 EA Shoreline Reconnaissance
Map Date: 9/19/2022



VICINITY MAP



Legend

- AOC #16 – Area D (former Dumping Area)
- Upland
- Marsh/Wetland
- ISM Sediment Decision Unit
- Surface Water Migration Pathway
- Sediment AVS/SEM Sampling Location
- Surface Water Flow Direction

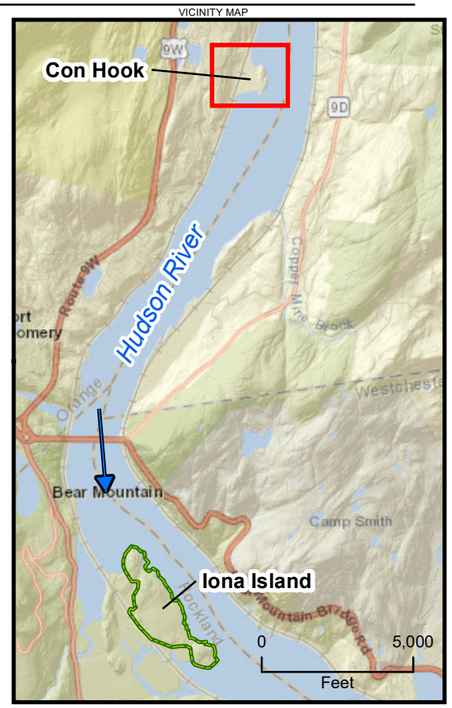
0 100 200
Feet
1 in = 100 ft

N

FIGURE 3-6
Phase II Iona Island Sediment Sampling Locations

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial and Topographic Contours: EA Engineering, Science, and Technology. April, 7 2020
Disturbed Ground/Fill Area and AOC Boundaries: USAGC 2018
Upland and Marsh/Wetland: 2020 EA Shoreline Reconnaissance
Map Date: 9/19/2022



Legend

- Background Sediment Sampling Unit
- Discrete Surface Water Sampling Location
- Surface Water Flow Direction

0 200 400
Feet
1 in = 200 ft

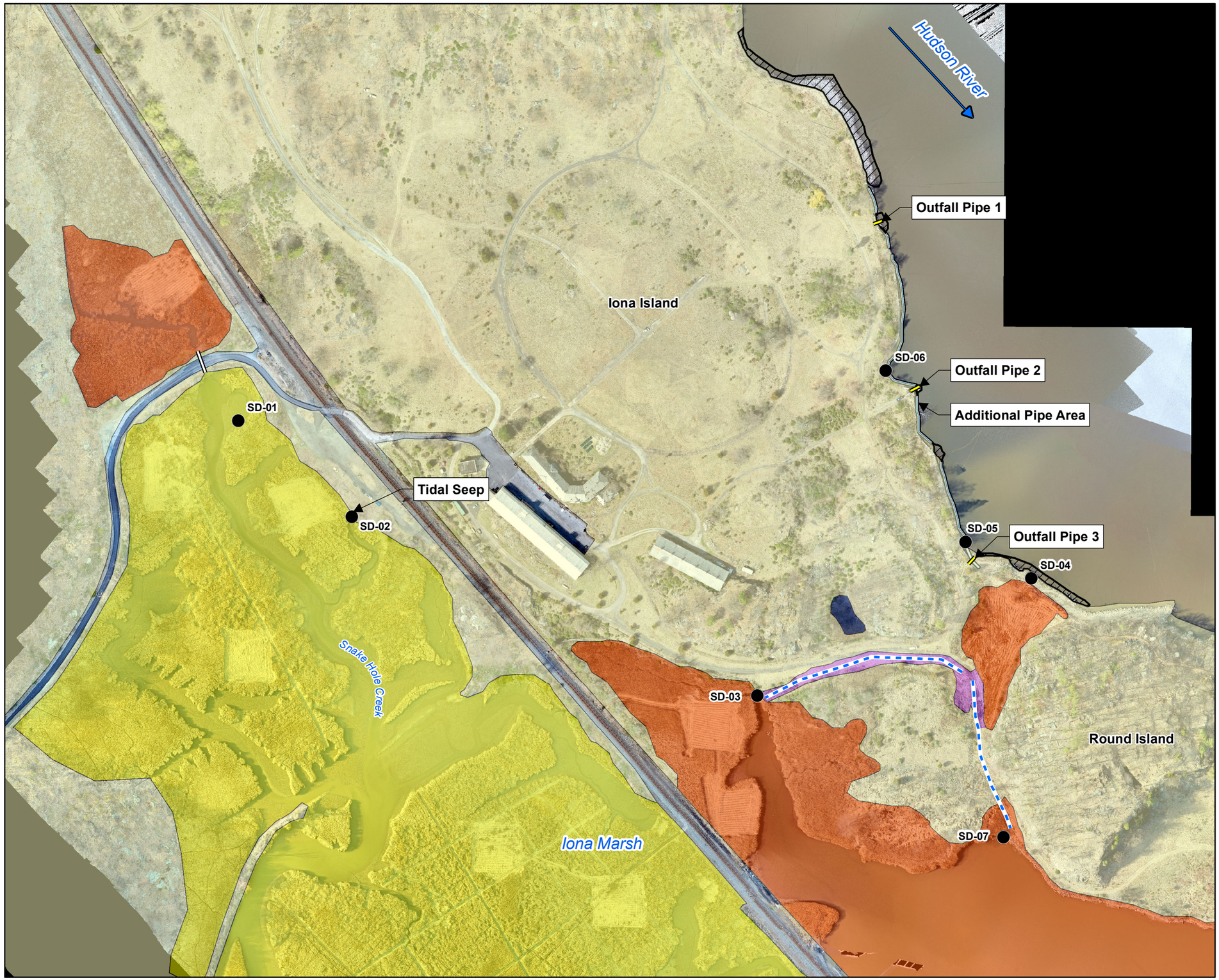
N

FIGURE 3-7
Con Hook Background Surface Water and Sediment Sampling Locations

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial: ESRI ArcGIS Online Map Service (ESRI 2009b).
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Map Date: 9/19/2022



VICINITY MAP

Legend

- Sediment Sample Location
- Potential Preferential Pathway
- Culvert
- Outfall Pipe
- River Wall
- Upland
- Phragmites Wetland
- Phragmites Tidal Wetland
- Cattail Tidal Wetland
- Tidal Wetland Swale
- Macroinvertebrate Habitat
- Surface Water Flow Direction

0 250 500
Feet
1 in = 250 ft

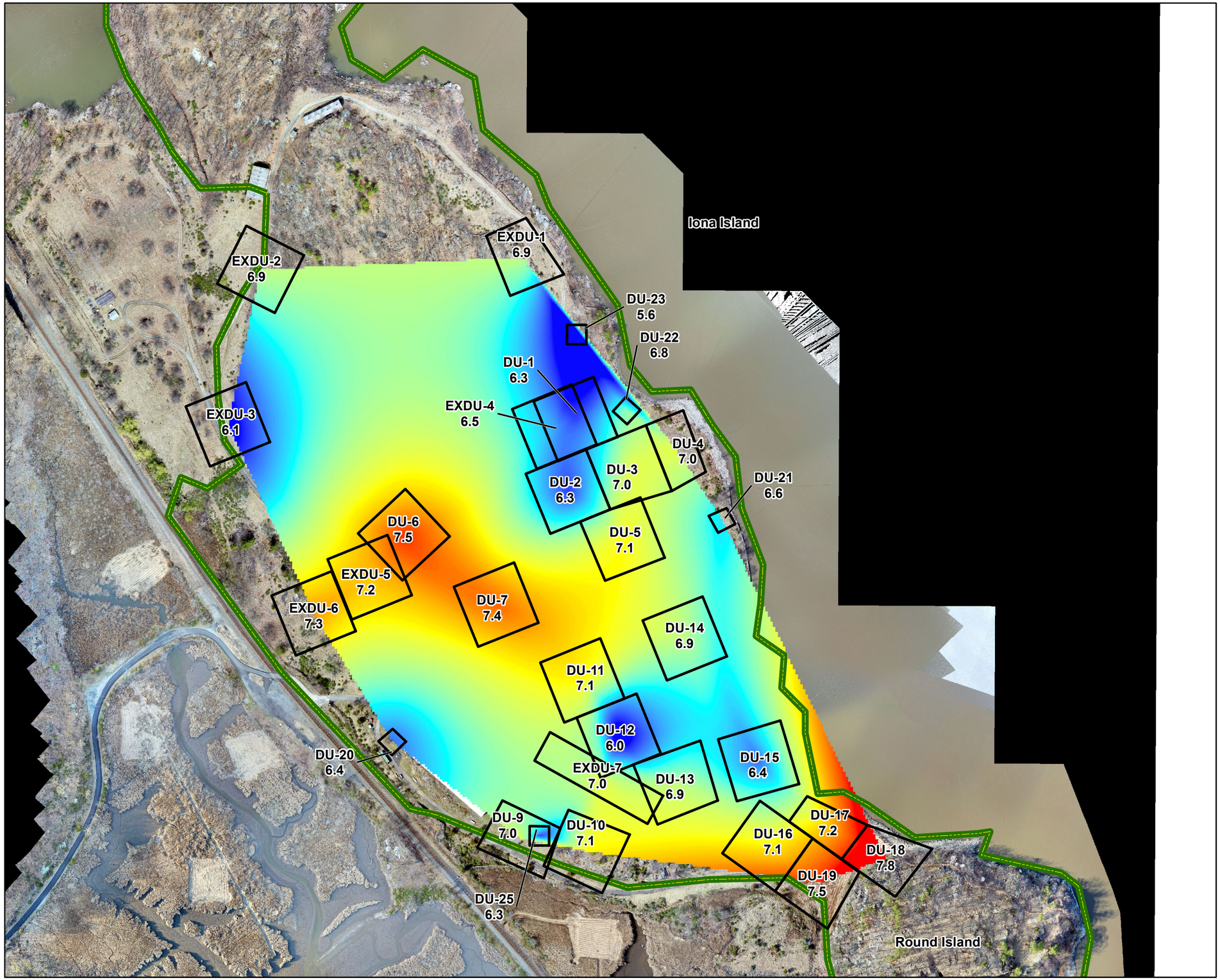
N

FIGURE 5-1
Phase I Shoreline Reconnaissance Observations

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial: EA Engineering, Science, and Technology. April, 7 2020

Map Date: 1/11/2024



VICINITY MAP

Legend

- FUDS Boundary
- Decision Unit

Surface Soil Average pH

High : 7.8

Low : 5.6

0 300 600

Feet

1 in = 300 ft

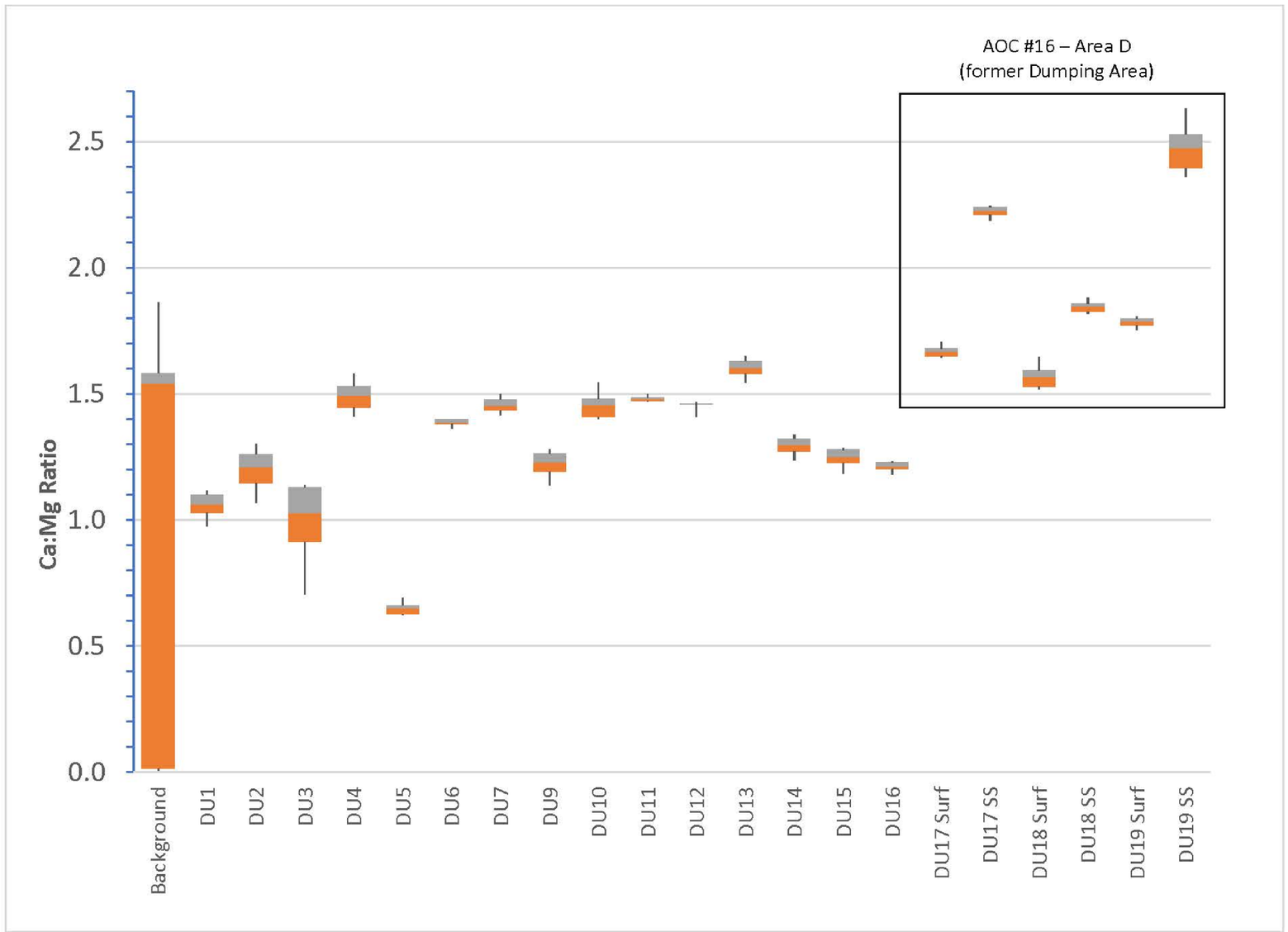
N

FIGURE 5-2
Phase I Average pH in Surface Soil

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial: EA Engineering, Science, and Technology. April, 7 2020

Map Date: 9/22/2022



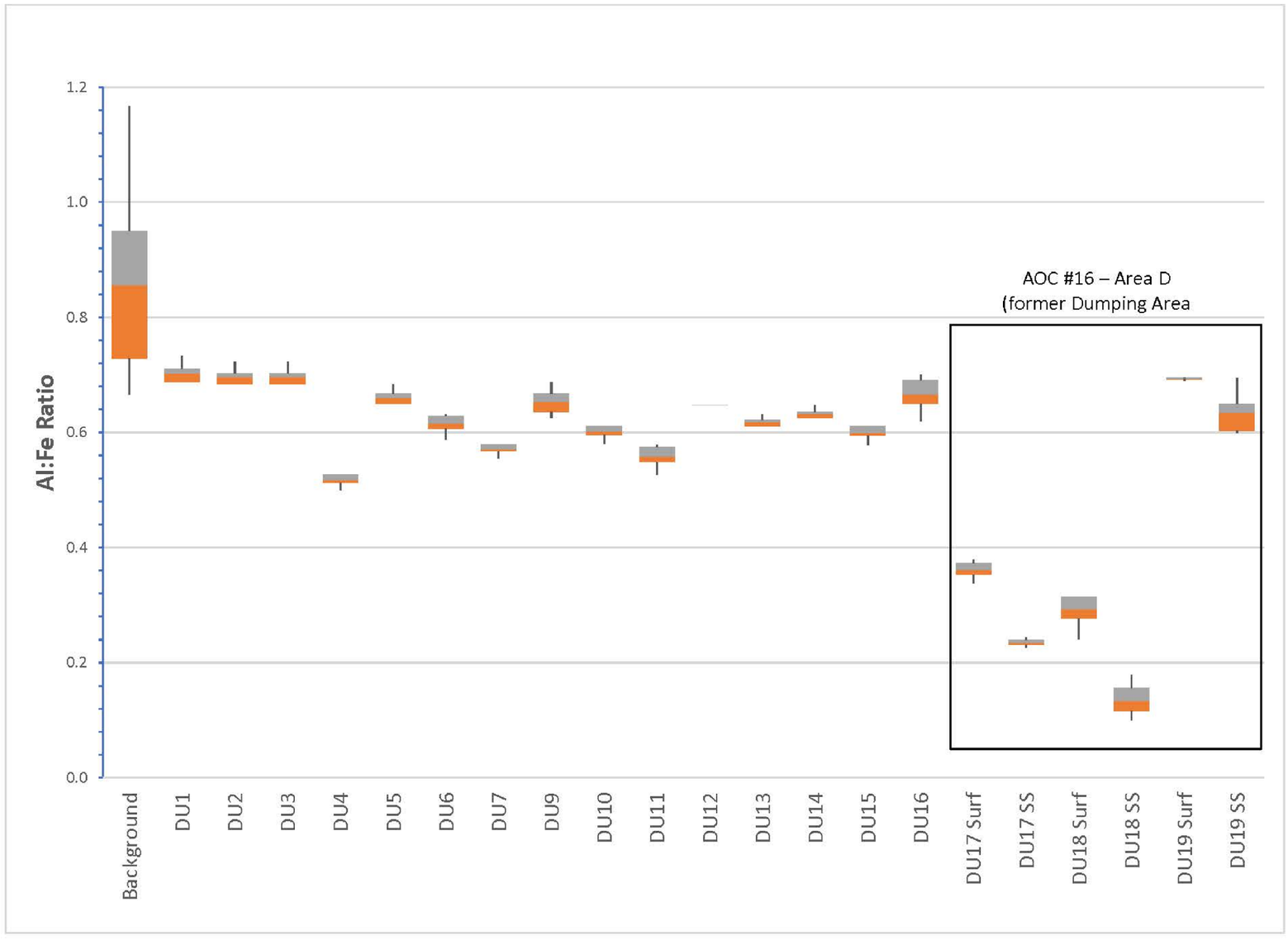
Calcium:Magnesium					
	Range of Calcium concentrations	Range of Magnesium Concentrations	Range of Ratios	Average Ratio	Median Ratio
Sitewide Upland	2,900 to 28,000	3,800 to 19,000	0.625 to 1.648	1.332	1.309
Background	650 to 2,100	600 to 3,100	0.210 to 1.633	0.714	0.630
Former Dumping Area	10,000 to 74,000	5,700 to 45,000	1.5 to 2.6	1.832	2.222

VICINITY MAP

FIGURE 5-3
Onsite and Background Soil Calcium to Magnesium Ratios

HAZARDOUS TOXIC AND RADIOACTIVE WASTE REMEDIAL INVESTIGATION REPORT

Map Date: 9/9/2020



Aluminum:Iron					
	Range of Aluminum concentrations	Range of Iron Concentrations	Range of Ratios	Average Ratio	Median Ratio
Sitewide Upland	9,300 to 15,000	15,000 to 22,000	0.500 to 0.733	0.629	0.611
Background	7,300 to 15,000	8,600 to 21,000	0.667 to 1.167	0.857	0.926
Former Dumping Area	4,300 to 25,000	14,000 to 43,000	0.1 to 0.7	0.391	0.218

VICINITY MAP

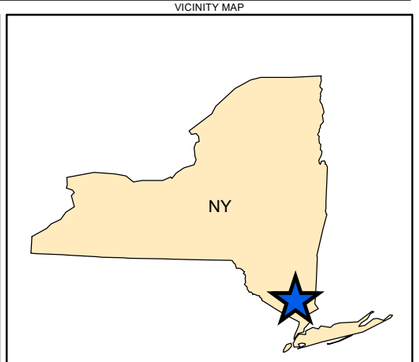
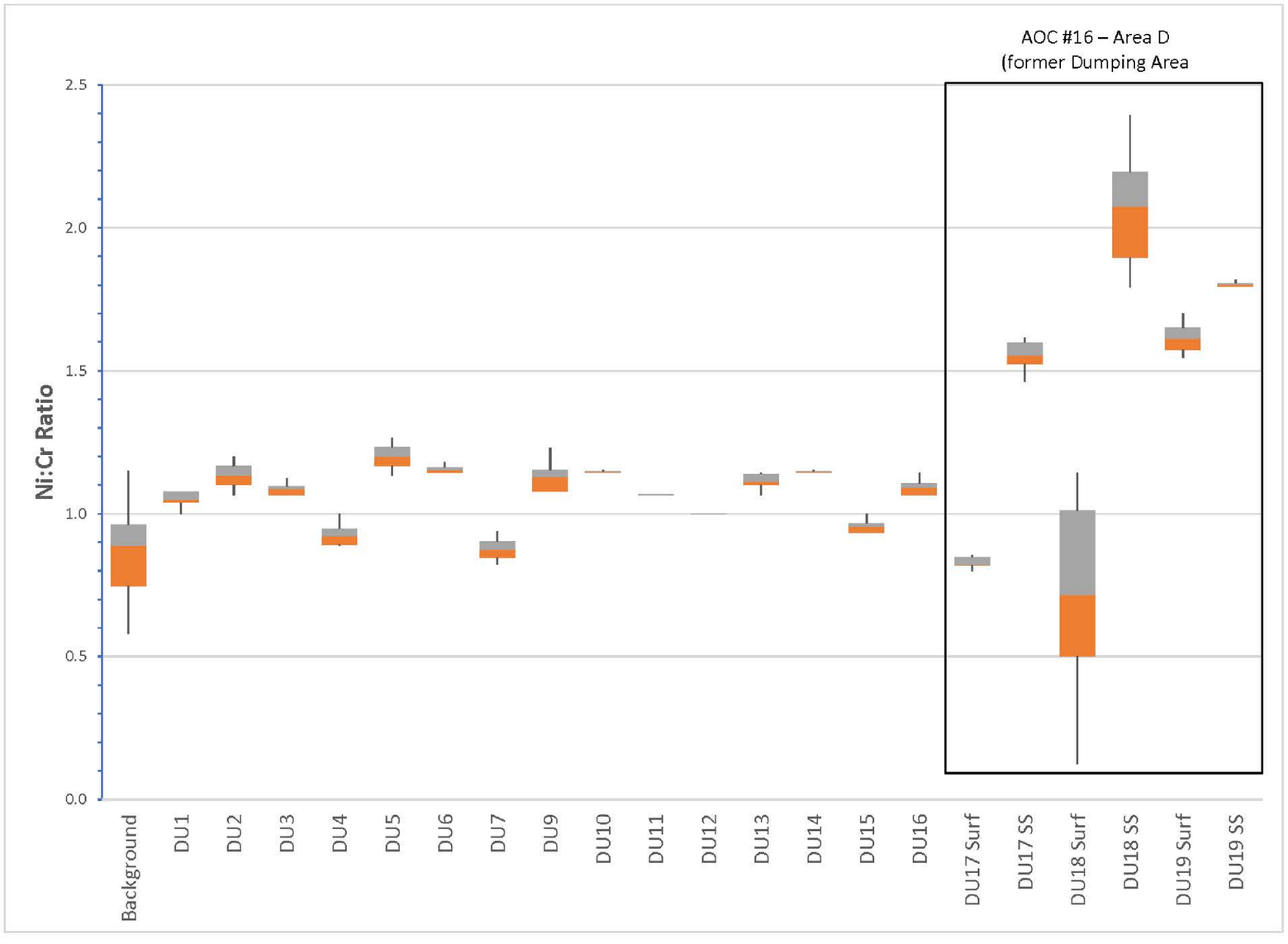


FIGURE 5-4
Onsite and Background Soil Aluminum to Iron Ratios

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Map Date: 9/9/2020



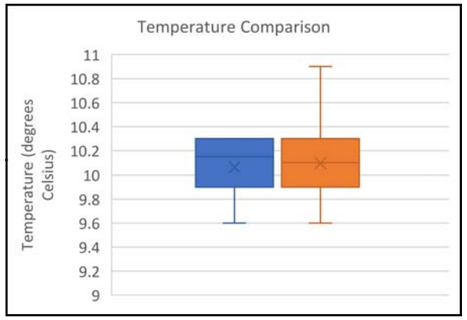
Nickel:Chromium					
	Range of Nickel concentrations	Range of Total Chromium Concentrations	Range of Ratios	Average Ratio	Median Ratio
Sitewide	13 to 19	11 to 19	0.824 to 1.267	1.067	1.067
Background	2.7 to 23	3.6 to 31	0.580 to 1.150	0.888	0.901
Former Dumping Area	5.9 to 79	6.9 to 240	0.1 to 2.4	0.883	1.385

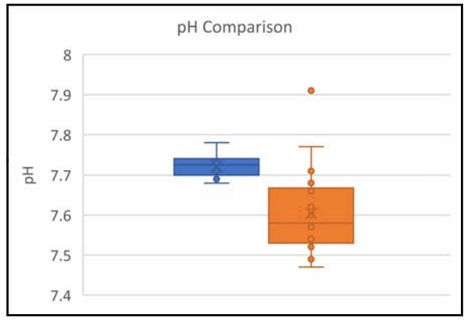
VICINITY MAP

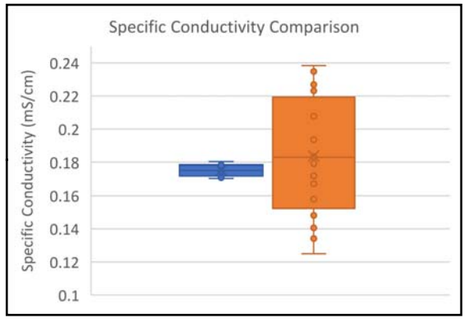
FIGURE 5-5
Onsite and Background Soil Nickel to Total Chromium Ratios

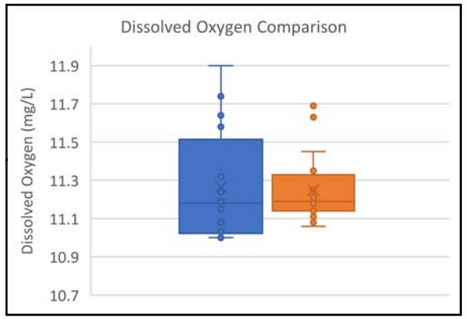
HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

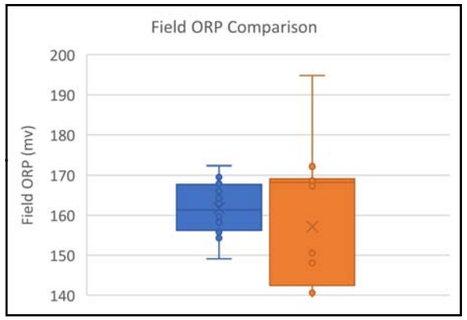
Map Date: 9/9/2020

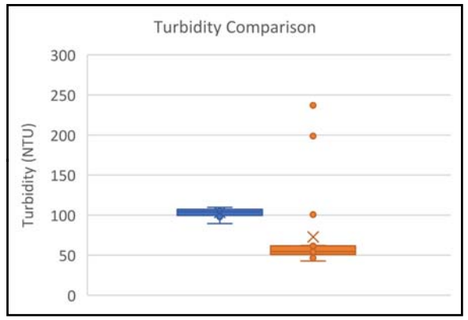


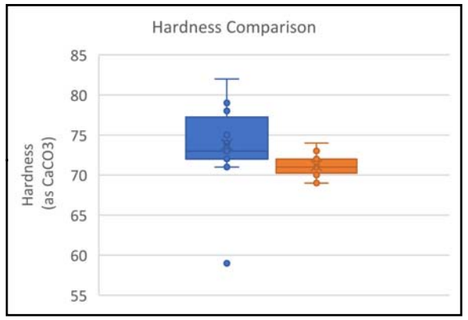


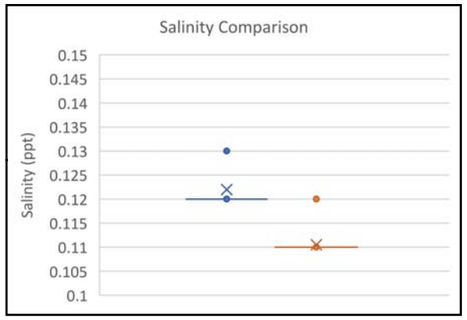












Depositional Environment	Mean of Results: Temperature (degrees Celsius)	pH	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Field ORP (mV)	Standard Hydrogen Electrode ORP (mV)	Turbidity (NTU)	Salinity (ppt)	Hardness (as CaCO3)
Iona Island Hudson River Shoreline	10.065	7.72	0.17551	11.26	161.78	361.78	103.21	0.12	73.8
Con Hook Hudson River Shoreline	10.095	7.60	0.183705	11.25	157.17	357.17	72.71	0.11	71.2

Depositional Environment	Median of Results: Temperature (degrees Celsius)	pH	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Field ORP (mV)	Standard Hydrogen Electrode ORP (mV)	Turbidity (NTU)	Salinity (ppt)	Hardness (as CaCO3)
Iona Island Hudson River Shoreline	10.15	7.73	0.1753	11.18	161.30	361.30	104.20	0.12	73
Con Hook Hudson River Shoreline	10.1	7.58	0.183	11.19	168.20	368.20	54.50	0.11	71

Depositional Environment	Range of Results: Temperature (degrees Celsius)	pH	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Field ORP (mV)	Standard Hydrogen Electrode ORP (mV)	Turbidity (NTU)	Salinity (ppt)	Hardness (as CaCO3)
Iona Island Hudson River Shoreline	9.31 to 12.7	6.65 to 7.69	0.1849 to 0.3789	7.18 to 11.27	58.9 to 236.5	258.9 to 436.5	10.11 to 88.4	0.11 to 0.25	53 to 75
Con Hook Hudson River Shoreline	9.6 to 10.9	7.47 to 7.91	0.125 to 0.2384	11.06 to 11.69	96.4 to 194.8	296.4 to 394.8	42.7 to 237.1	0.11 to 0.12	69 to 74

VICINITY MAP

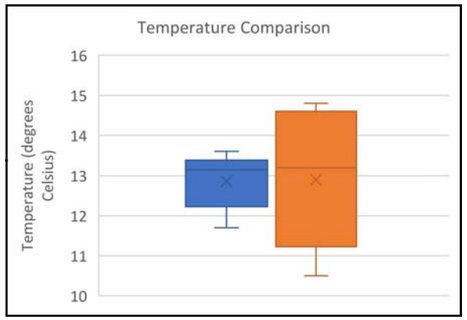
Iona Island Hudson River Shoreline

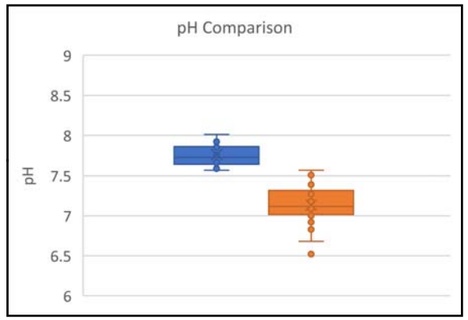
Con Hook Hudson River Shoreline

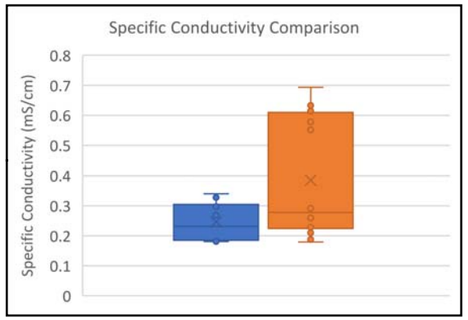
FIGURE 5-6
Onsite and Background Hudson River Shoreline Surface Water Quality Parameters Comparison

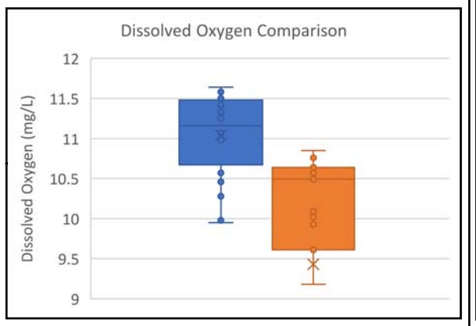
HAZARDOUS TOXIC AND RADIOACTIVE WASTE REMEDIAL INVESTIGATION REPORT

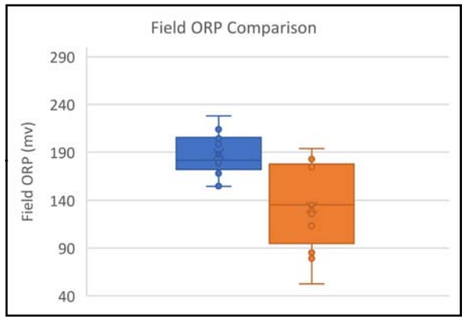
Map Date: 3/13/2023

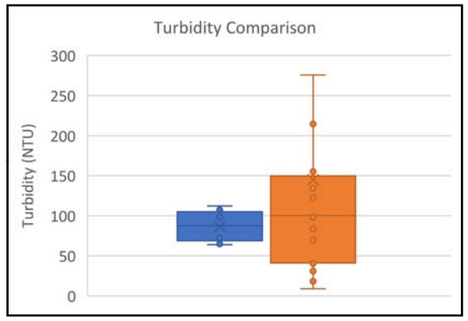


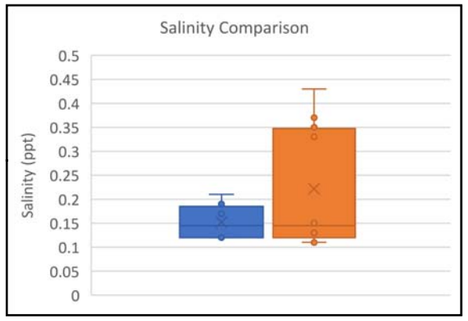


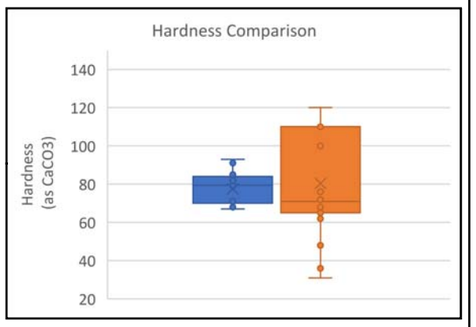












Depositional Environment	Mean of Results: Temperature (degrees Celsius)	pH	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Field ORP (mV)	Standard Hydrogen Electrode ORP (mV)	Turbidity (NTU)	Salinity (ppt)	Hardness (as CaCO3)
Iona Island Marsh Shoreline	12.86	7.76	0.24665	11.04	188.02	388.02	86.74	0.15	77.65
Con Hook Marsh Shoreline	12.9	7.13	0.385355	9.43	132.51	332.51	145.04	0.22	80.4
Depositional Environment	**Median of Results: Temperature (degrees Celsius)**	**pH**	**Specific Conductivity (mS/cm)**	**Dissolved Oxygen (mg/L)**	**Field ORP (mV)**	**Standard Hydrogen Electrode ORP (mV)**	**Turbidity (NTU)**	**Salinity (ppt)**	**Hardness (as CaCO3)**
Iona Island Marsh Shoreline	13.15	7.73	0.2314	11.16	181.45	381.45	87.54	0.15	79.5
Con Hook Marsh Shoreline	13.2	7.12	0.2776	10.50	135.50	335.50	100.21	0.15	71
Depositional Environment	**Range of Results: Temperature (degrees Celsius)**	**pH**	**Specific Conductivity (mS/cm)**	**Dissolved Oxygen (mg/L)**	**Field ORP (mV)**	**Standard Hydrogen Electrode ORP (mV)**	**Turbidity (NTU)**	**Salinity (ppt)**	**Hardness (as CaCO3)**
Iona Island Marsh Shoreline	11.7 to 13.6	7.57 to 8.01	0.181 to 0.3397	9.95 to 11.64	154.8 to 228	354.8 to 428	63.94 to 112.31	0.12 to 0.21	67 to 93
Con Hook Marsh Shoreline	10.5 to 14.8	6.52 to 7.57	0.1794 to 0.693	2.67 to 10.85	52.7 to 193.9	252.7 to 393.9	8.8 to 639	0.11 to 0.43	31 to 120

VICINITY MAP

Iona Island Marsh Shoreline

Con Hook Marsh Shoreline

FIGURE 5-7
Onsite and Background Marsh Shoreline Surface Water Quality Parameters Comparison

HAZARDOUS TOXIC AND RADIOACTIVE WASTE REMEDIAL INVESTIGATION REPORT

Map Date: 3/13/2023

Decision Unit	Contaminats Eligible for DERP FUDS Response
CERCLA Hazardous Metals Only	
DU-1	4 metals analytes (arsenic, cadmium, sodium, zinc)
DU-3	5 metals analytes (arsenic, copper, lead, sodium, zinc)
DU-5	4 metals analytes (arsenic, lead, sodium, zinc)
DU-6	6 metals analytes (arsenic, cadmium, copper, lead, sodium, zinc)
DU-7	7 metals analytes (arsenic, cadmium, copper, lead, sodium, thallium, zinc)
DU-9	3 metals analytes (copper, sodium, zinc)
DU-10	2 metals analytes (copper, msodium)
DU-14	5 metals analytes (arsenic, cadmium, lead, sodium, zinc)
DU-15	5 metals analytes (cadmium, copper, lead, sodium, zinc)
CERCLA Hazardous Metal and PAHs	
DU-2	5 metals analytes (arsenic, copper, lead, sodium, zinc) 18 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene,
DU-4	7 metals analytes (antimony, arsenic, cadmium, copper, lead, sodium, zinc) 16 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene,
DU-11	7 metals analytes (arsenic, cadmium, copper, lead, sodium, thallium, zinc) 13 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene,
DU-12	6 metals analytes (arsenic, cadmium, copper, lead, sodium, zinc) 17 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene,
DU-13	7 metals analytes (antimony, arsenic, cadmium, copper, lead, sodium, zinc) 18 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene,
DU-16	4 metals analytes (cadmium, copper, sodium, zinc) 4 PAH analytes (2-methylnaphthalene, acenaphthene, anthracene, indeno[1,2,3-c,d]pyrene)
CERCLA Hazardous Metal, PAHs, and PCBs	
DU-17	8 metals analytes (antimony, cadmium, copper, lead, mercury, silver, sodium, zinc) 5 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthylene, anthracene, naphthalene) 2 PCB analytes (PCB-1248 [Aroclor 1248], PCB-1260 [Aroclor 1260])
DU-18	10 metals analytes (antimony, arsenic, cadmium, chromium [total], copper, lead, mercury, silver, 9 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthylene, anthracene, benzo[a]pyrene, benzo[b]fluoranthene, chrysene, dibenz[a,h]anthracene, naphthalene) 2 PCB analytes (PCB-1248 [Aroclor 1248], PCB-1260 [Aroclor 1260])
DU-19	6 metals analytes (arsenic, cadmium, cobalt, copper, sodium, zinc) 13 PAH analytes (2-methylnaphthalene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, 1 PCB analyte (PCB-1260 [Aroclor 1260])
PAHs Only	
DU-22	18 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene,
PCBs Only	
DU-23	1 PCB analyte (PCB-1260 [Aroclor 1260])
DU-25	1 PCB analyte (PCB-1260 [Aroclor 1260])
Explosives Residues Only	
EXDU-1	3 explosives analytes (1,3-Dinitrobenzene [DNB], 2,4,6-Trinitrotoluene [TNT], 2,4-Dinitrotoluene

VICINITY MAP

Legend

- FUDS Boundary
- CERCLA Hazardous Metals Only
- CERCLA Hazardous Metals, PAHs
- CERCLA Hazardous Metals, PAHs, PCBs
- PAHs Only
- PCBs Only
- Explosives Only
- No Contaminants

0 300 600
Feet
1 in = 300 ft

N

FIGURE 6-1
Surface Soil Contaminants Summary

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial: EA Engineering, Science, and Technology. April, 7 2020

Map Date: 5/19/2023

Decision Unit	Contaminats Eligible for DERP FUDS Response
CERCLA Hazardous Metal and PAHs	
DU-17	10 metals analytes (antimony, arsenic, cadmium, copper, lead, mercury, selenium, sodium, thallium, zinc)
	4 PAH analytes (2-methylnaphthalene, acenaphthene, anthracene, naphthalene)
CERCLA Hazardous Metal, PAHs, and PCBs	
DU-18	12 metals analytes (antimony, arsenic, cadmium, chromium [total], copper, lead, mercury, nickel, silver, sodium, thallium, zinc)
	8 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, anthracene, chrysene, fluorene, naphthalene, phenanthrene)
	1 PCB analyte (PCB-1262 [Aroclor 1262])
CERCLA Hazardous Metal and PCBs	
DU-19	4 metals analytes (copper, sodium, vanadium, zinc)
	1 PCB analyte (PCB-1260 [Aroclor 1260])

603
508
EXDU-1
EXDU-2
DU-23
DU-22
EXDU-3
DU-1
EXDU-4
DU-4
DU-3
DU-2
Iona Island
DU-6
DU-5
DU-22
EXDU-5
EXDU-6
DU-7
DU-14
DU-11
DU-12
EXDU-7
DU-15
DU-13
DU-20
DU-25
DU-9
DU-10
DU-16
DU-17
DU-18
DU-19
Round Island

VICINITY MAP

Legend

- FUDS Boundary
- Not Sampled: shallow depth to refusal (less than 12 inches below ground surface)
- No Contaminants Detected
- CERCLA Hazardous Metals, PAHs, PCBs
- CERCLA Hazardous Metals, PCBs
- CERCLA Hazardous Metals, PAHs

0 300 600
Feet
1 in = 300 ft

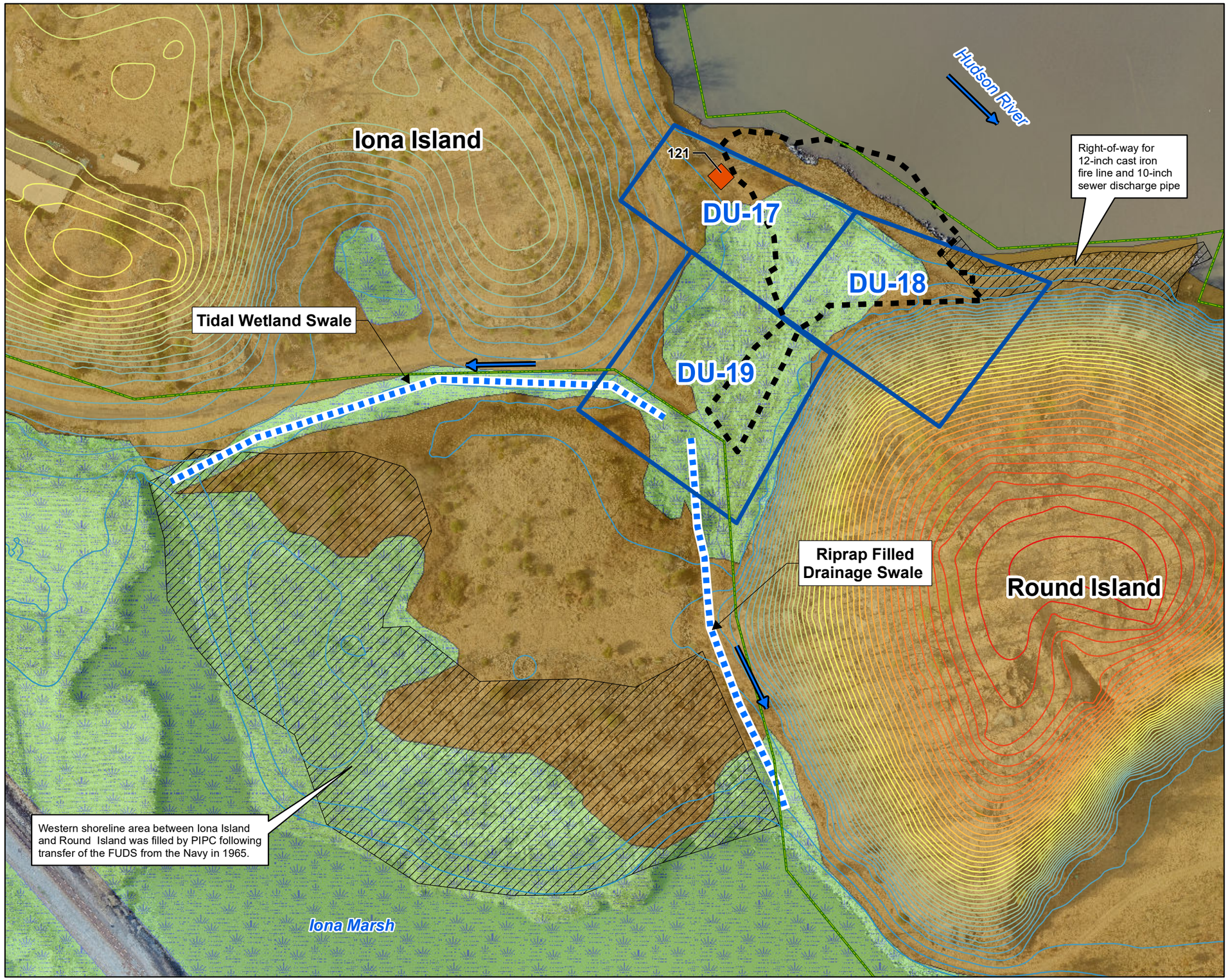
N

FIGURE 6-2
Subsurface Soil Contaminants Summary

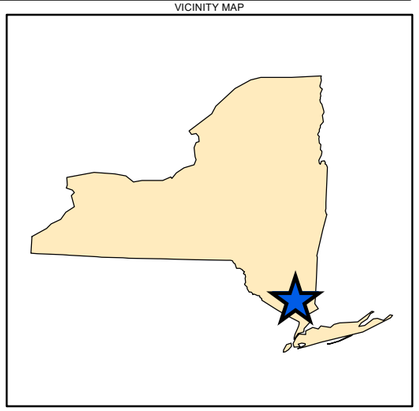
HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial: EA Engineering, Science, and Technology. April, 7 2020

Map Date: 5/19/2023



VICINITY MAP



Legend

- FUDS Boundary
- Upland
- Marsh/Wetland
- AOC #16 – Area D (former Dumping Area)
- Bldg 121 Incinerator
- Phase I Soil Decision Unit
- Disturbed Ground/Fill Area
- Surface Water Migration Pathway
- Surface Water Flow Direction

2-Foot Topographic Contour Gradations

(Feet above mean sea level (amsl)

High : 84 ft amsl

Low : 0 ft amsl

0 100 200

Feet

1 in = 100 feet

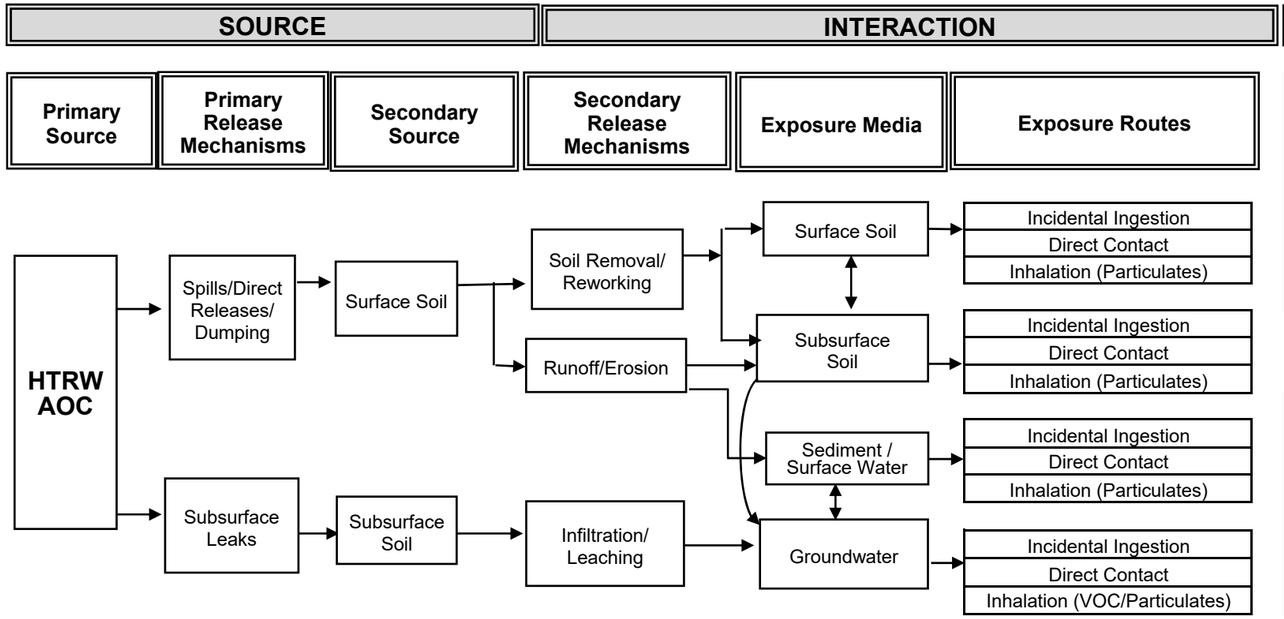
N

FIGURE 6-3
AOC #6 - Area D (Former Dumping Area) DU-17, DU-18, and DU-19

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial and Topographic Contours: EA Engineering, Science, and Technology. April, 7 2020
Disturbed Ground/Fill Area and AOC Boundary: USAGC 2018
Upland and Marsh/Wetland: 2020 EA Shoreline Reconnaissance
Map Date: 5/23/2023

Figure 8-1 Human Health Risk Assessment Conceptual Site Model



HUMAN RECEPTORS

Current and Future Park Personnel	Future Construction Workers	Current and Future Trespassers	Current and Future Researchers	Current and Future Recreational Users	Current and Future Campers/Boy Scouts
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
○	◑	○	○	○	◑
○	◑	○	○	○	◑
○	◑	○	○	○	◑
◑	◑	◑	○	●	○
◑	◑	◑	○	●	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○

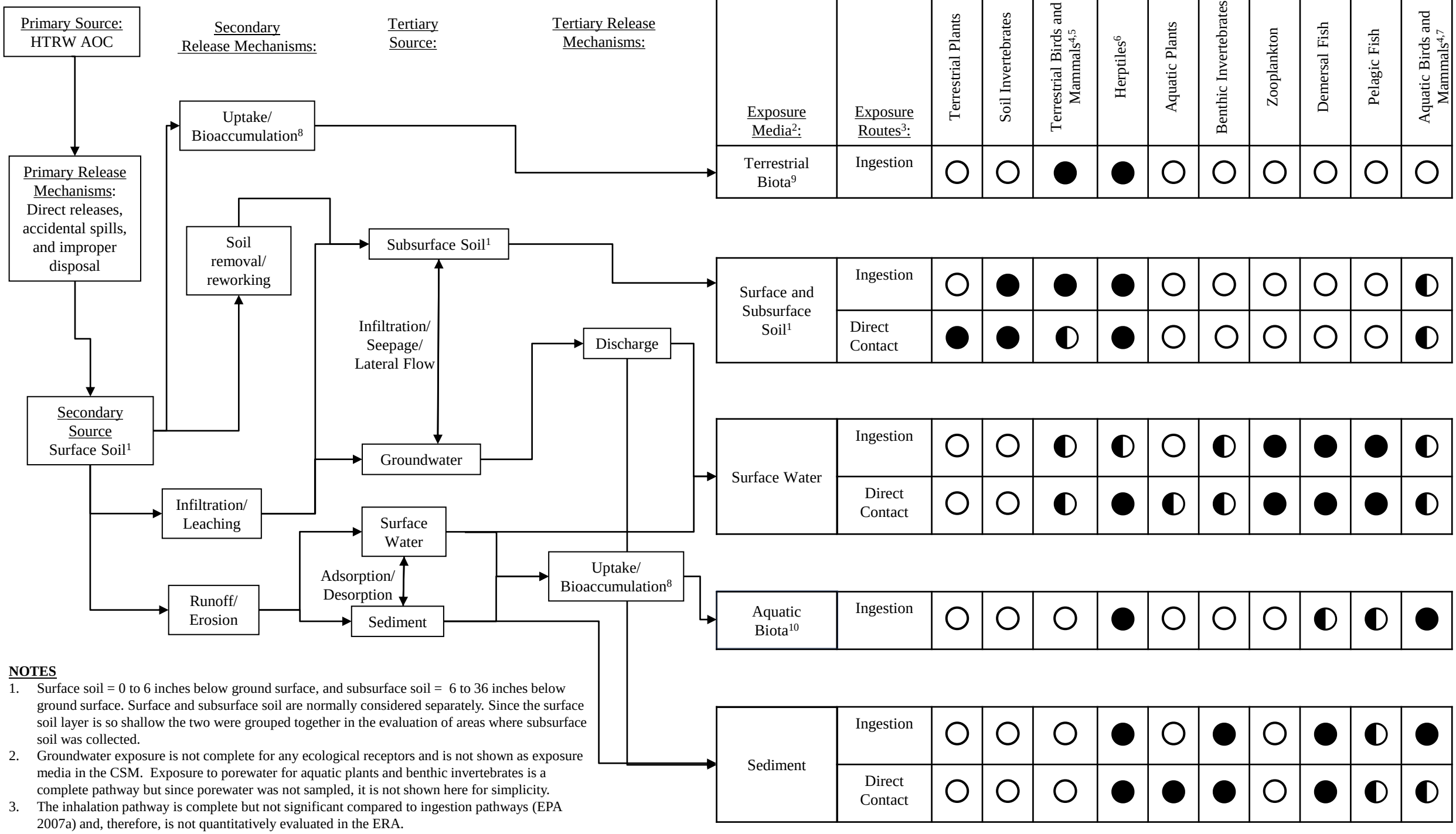
LEGEND

● Complete Pathway; confirmed receptor and media interaction (i.e., a source, migration route, and receptor have been identified).

◑ Potentially Complete Pathway; receptor and media interaction; however, the exposure may be limited, either due to the type of receptor or the nature of the source, and has not been confirmed.

○ Incomplete Pathway; no receptor and media interaction. No evaluation is conducted.

NOTES
Surface soil = defined as the interval from 0 to 6 inches bgs.
Subsurface soil = defined as the interval from 6 to 36 inches bgs.
VOC = Volatile Organic Compound



NOTES

1. Surface soil = 0 to 6 inches below ground surface, and subsurface soil = 6 to 36 inches below ground surface. Surface and subsurface soil are normally considered separately. Since the surface soil layer is so shallow the two were grouped together in the evaluation of areas where subsurface soil was collected.
2. Groundwater exposure is not complete for any ecological receptors and is not shown as exposure media in the CSM. Exposure to porewater for aquatic plants and benthic invertebrates is a complete pathway but since porewater was not sampled, it is not shown here for simplicity.
3. The inhalation pathway is complete but not significant compared to ingestion pathways (EPA 2007a) and, therefore, is not quantitatively evaluated in the ERA.
4. Direct contact pathways for mammals and birds is limited by fur and feathers and is considered in incidental soil ingestion during grooming.
5. Mammals such as voles, shrews, and foxes may be exposed to subsurface soil during burrowing activities.
6. Herptiles are evaluated qualitatively using other receptors as surrogate species due to the lack of ecotoxicity values for these receptors. Risks to any receptor could indicate potential risks to herptiles.
7. Aquatic birds and mammals may be exposed to soil when burrowing or foraging on the bank, but exposure to these receptors expected to be less than that captured by exposure to terrestrial birds and mammals. Primary abiotic media of concern to aquatic wildlife is sediment.
8. Only bioaccumulation directly into biota that will be consumed by a receptor is shown here for simplicity, though there can be several trophic levels.
9. Terrestrial biota identified as terrestrial plants, soil invertebrates, and small wildlife.
10. Aquatic biota identified as aquatic plants, benthic invertebrates, and demersal fish.

● Complete Pathway; confirmed receptor and media interaction (i.e., a source, migration route, and receptor have been identified). Exposure is evaluated quantitatively.

◑ Complete Pathway, but not Significant; There is confirmed receptor and media interaction. However, pathway is not significant and exposure is not evaluated quantitatively.

◯ There is no receptor and media interaction. No evaluation is conducted.

Figure 8-2 Ecological Conceptual Site Model

Iona Island Naval Ammunition Depot Formerly Used Defense Site
Stony Point, Rockland County, New York

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Tables

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Table 1-1 HTRW Project Areas of Concern

Area of Concenr (AOC) Number	Building/Structure	Historical Activities	Potential AOC-Specific Contaminants Based on Historical Activities	Historical Sampling Results[1.2]	Potential Release to Environment	COPC Specific Analyte List	Decision Unit
1	Former Building 103	Storage of paint and oil; likely solvent use.	Solvents from paints (VOCs and SVOCs); Petroleum Oil Lubricants (POL); and metals.	October 1996 – elevated metals (arsenic, lead) and PAHs in shallow subsurface soil sample IX103-B1 December 2007 – no samples collected	Volatilization of VOCs to air; spills to surface soil; overland flow to surface water/ sediment; leaching to subsurface soil and groundwater. **Note:** VOCs (including from POLs) are unlikely to be present in soil due to characteristics of solvent related VOCs (high solubility and mobility) and due to the time since deactivation (70 years). SVOCs from paints would	TAL metals, PAHs	DU-13
2	Former Building 121	Former incinerator; historical records do not indicate whether municipal solid waste or hazardous waste was burned in the incinerator.	Residual organics and metals; PAHs from incomplete combustion.	October 1996 – elevated metals (arsenic, barium, cadmium, lead) and PAHs in shallow subsurface soil sample IX121-B1 December 2007 – elevated metals (lead) detected in sediment sample II-EA-SD-02-02 collected near this AOC	Volatilization of ash particles into air and soil deposition; potential land disposal; overland flow to surface water/ sediment; leaching to subsurface soil and groundwater.	TAL metals, PAHs	DU-17
3	Former Building 123	Former garage; historical records do not indicate if this building was used for equipment or materials storage.	Solvents (VOCs and SVOCs), POL, and metals.	No historical samples collected	Volatilization of VOCs to air; spills to surface soil; overland flow to surface water/ sediment; leaching to subsurface soil and groundwater. Note: VOCs (including from POLs) are unlikely to be present in soil due to characteristics of solvent related VOCs (high solubility and mobility) and due to the time since deactivation (70 years).	TAL metals, PAHs	DU-5
4	Former Buildings 124, 125, 126, 127, and 128	Sewage Disposal Plant.	Chlorides, organic compounds (VOCs and SVOCs), metals, microorganisms.	October 1996 – elevated metals (arsenic, lead) in shallow subsurface soil sample IX124/8-B1. Low concentrations of PAHs (below screening criteria). December 2007 – elevated metals (antimony, copper, lead, mercury, zinc) in surface soil sample II-EA-SS-02-16	Chemical spills; leaks from sewer lines/ tanks to surface water or groundwater; land disposal of sludge. Note: VOCs (including from POLs) are unlikely to be present in soil due to characteristics of VOCs (high solubility and mobility) and due to the time since deactivation (70 years). Due to the time since deactivation (70 years), microorganisms from DoD use are likely not present.	TAL metals, PAHs	DU-16
5	Former Building 207	Former garage used by the Marines; historical records do not indicate if this building was used for equipment or materials	Solvents (VOCs and SVOCs), POL, and metals.	No historical samples collected	Volatilization of VOCs to air; spills to surface soil; overland flow to surface water/ sediment; leaching to subsurface soil and groundwater. **Note:** VOCs (including from POLs) are unlikely to be present in soil due to characteristics of solvent related	TAL metals, PAHs	DU-8
6	Former Building 213	Storage of paint; likely solvent use.	Solvents from paints (VOCs and SVOCs) and metals	No historical samples collected	Volatilization of VOCs to air; spills to surface soil; overland flow to surface water/ sediment; leaching to subsurface soil and groundwater. **Note:** VOCs are unlikely to be present in soil due to characteristics of solvent related VOCs (high solubility and mobility) and due to the time since deactivation (70 years). SVOCs from paints would have polymerized.	TAL metals, PAHs	DU-12

Table 1-1 HTRW Project Areas of Concern

Area of Concenr (AOC) Number	Building/Structure	Historical Activities	Potential AOC-Specific Contaminants Based on Historical Activities	Historical Sampling Results[1.2]	Potential Release to Environment	COPC Specific Analyte List	Decision Unit
7	Former Building 215	Former garage; historical records do not indicate if this building was used for equipment or materials storage.	Solvents (VOCs and SVOCs), POL, and metals.	No historical samples collected	Volatilization of VOCs to air; spills to surface soil; overland flow to surface water/ sediment; leaching to subsurface soil and groundwater. **Note:** VOCs (including from POLs) are unlikely to be present in soil due to characteristics of solvent related VOCs (high solubility and mobility) and due to the time since deactivation (70 years).	TAL metals, PAHs	DU-12
8	Former Building 219	Former garage; historical records do not indicate if this building was used for equipment or materials storage.	Solvents (VOCs and SVOCs), POL, and metals.	No historical samples collected	Volatilization of VOCs to air; spills to surface soil; overland flow to surface water/ sediment; leaching to subsurface soil and groundwater. **Note:** VOCs (including from POLs) are unlikely to be present in soil due to characteristics of solvent related VOCs (high solubility and mobility) and due to the time since deactivation (70 years).	TAL metals, PAHs	DU-9
9	Former Building 220	Former garage; historical records do not indicate if this building was used for equipment or materials storage.	Solvents (VOCs and SVOCs), POL, and metals.	No historical samples collected	Volatilization of VOCs to air; spills to surface soil; overland flow to surface water/ sediment; leaching to subsurface soil and groundwater. **Note:** VOCs (including from POLs) are unlikely to be present in soil due to characteristics of solvent related VOCs (high solubility and mobility) and due to the time since deactivation (70 years).	TAL metals, PAHs	DU-9
10	Former Building 406	Tin, electrical and annealing shop	Solvents (VOCs and SVOCs), POL, and metals.	No historical samples collected	Volatilization of VOCs to air; spills to surface soil; overland flow to surface water/ sediment; leaching to subsurface soil and groundwater. **Note:** VOCs (including from POLs) are unlikely to be present in soil due to characteristics of solvent related VOCs (high solubility and mobility) and due to the time since deactivation (70 years).	TAL metals, PAHs	DU-1
11	Former Building 407	Paint shop and pipe shop; likely solvent use	Solvents (VOCs and SVOCs), POL, and metals	October 1996 – elevated metals (arsenic, lead) and PAHs in shallow subsurface soil sample IX407-B1 December 2007 – elevated metals in surface soil sample (II-EA-SS-02-05) collected near this AOC	Volatilization of VOCs to air; spills to surface soil; overland flow to surface water/ sediment; leaching to subsurface soil and groundwater. **Note:** VOCs (including from POLs) are unlikely to be present in soil due to characteristics of solvent related VOCs (high solubility and mobility) and due to the time since deactivation (70 years).	TAL metals, PAHs	DU-3
12	Former Building 410	Power house; coal ash (including fly ash, bottom ash, and/or sludge).	PAHs and metals (such as arsenic, cadmium, and mercury)	October 1996 – highest detected PAHs at site, in shallow subsurface soil sample IX410-B1; metals were not tested December 2007 – no samples collected	Volatilization of ash particles into air and soil deposition; potential land disposal; leaching to subsurface soil and groundwater; overland flow to surface water / sediment.	TAL metals, PAHs	DU-3
13	Former fuel oil AST	One former 2,500-gallon fuel oil AST located near Former Building 233.	VOCs/BTEX, PAHs	October 1996 - no site-related VOCs in shallow subsurface soil.	Leaching to subsurface soil and groundwater; overland flow to surface water / sediment. Note: VOCs are unlikely to be present in soil due to characteristics of VOCs (high solubility and mobility) and due to the time since deactivation (70 years); however, as BTEX is a primary component of fuel oil, BTEX is retained for further evaluation.	BTEX, PAHs	DU-20

Table 1-1 HTRW Project Areas of Concern

Area of Concenr (AOC) Number	Building/Structure	Historical Activities	Potential AOC-Specific Contaminants Based on Historical Activities	Historical Sampling Results[1,2]	Potential Release to Environment	COPC Specific Analyte List	Decision Unit
14	Former fuel oil AST	One former fuel oil AST (size unknown) located near Dock 131.	VOCs/BTEX, PAHs	No historical samples collected	Leaching to subsurface soil and groundwater; overland flow to surface water / sediment. Note: VOCs are unlikely to be present in soil due to characteristics of VOCs (high solubility and mobility) and due to the time since deactivation (70 years); however, as BTEX is a primary component of fuel oil, BTEX is retained for further evaluation.	BTEX, PAHs	DU-21
15	Former fuel oil AST	Two former fuel oil ASTs (size unknown) located near Former Building 410.	VOCs/BTEX, PAHs	October 1996 - no site-related VOCs in shallow subsurface soil.	Leaching to subsurface soil and groundwater; overland flow to surface water / sediment. Note: VOCs are unlikely to be present in soil due to characteristics of VOCs (high solubility and mobility) and due to the time since deactivation (70 years); however, as BTEX is a primary component of fuel oil, BTEX is retained for further evaluation.	BTEX, PAHs	DU-22
16	Dump Area	Historical records suggest that construction debris was used as fill between Iona and Round Island; the content of the dump is unknown but may have contained waste or munitions debris.	Unknown contents – could include solvents, paints, POL (VOCs and SVOCs); PCBs, explosives, and metals	October 1996 – elevated metals (arsenic, barium, cadmium, chromium, lead, silver); PAHs; explosives compounds (2,4 dinitrotoluene, 2,6-dinitrotoluene) in shallow subsurface soil samples IXDMP-B1, -B2; one PCB compound (Aroclor 1260) detected in sample IXDMP-B1 December 2007 – no samples collected	Leaching to subsurface soil and groundwater; overland flow to surface water / sediment. Note: VOCs (including from POLs) are unlikely to be present in soil due to characteristics of solvent related VOCs (high solubility and mobility) and due to the time since deactivation (70 years).	TAL Metals, PAHs, PCBs, Explosives	DU-17, DU-18, DU-19
17	Former Coal Trestle and Storage Area – located near Former Building 410	Coal storage for the power house.	Metals (such as arsenic, cadmium, and mercury), SVOCs	No historical samples collected	Soil deposition; leaching to subsurface soil and groundwater; soil deposition; potential land disposal.	TAL metals, PAHs	DU--1, DU-2
18	Former Coal Storage Area – located near Former Building 215	Coal stored on a concrete foundation for use at the Depot.	Metals (such as arsenic, cadmium, and mercury), SVOCs	No historical samples collected	Soil deposition; leaching to subsurface soil and groundwater; soil deposition; potential land disposal.	TAL metals, PAHs	DU-11
19	Former transformers	Electrical transformers for Depot.	PCBs	No historical samples collected	Leaching to subsurface soil and groundwater; overland flow to surface water / sediment.	PCBs	DU-23, DU-24, DU-25

NOTES:

1. Low (estimated) detections of 1,1-dichloroethene, acetone, and methylene chloride were detected in all of the samples analyzed for VOCs in October 1996. The samples were qualified as “B” because the compounds were detected in one or more of the QA/QC blank samples and/or “J” because the detected concentration was less than the quantitation limit.

2. The December 2007 MMRP SI samples were not selected based on proximity to the HTRW AOCs (sampled previously by Greeley), they were selected for broad coverage of the 1903 Explosion Area.

NOTES:
AOC = Area of concern
AST = Above ground storage tank
BTEX = Benzene, toluene, ethylbenzene, and xylenes
COPC = Contaminant of potential concern
PAH = Polycyclic aromatic hydrocarbon
PCB = Polychlorinated biphenyl
POL = Petroleum oil and lubricants
SVOC = Semi-volatile organic compound
TAL = Target Analyte List
VOC = Volatile organic compound

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Table 1-2 Former Buildings on Iona Island Naval Ammunition Depot Associated with Ammunition and Explosives

Building No.[a], [b], [c], [f], (1)	Building Name[a], [b], [c], [f]	Decision Unit	Year Built[a], [c]	Built Purpose or Use[c], [e]	Foundation[a], [b], [e]	Notes [b], [c], [d]	Extent of Explosives Residues Presence (EM 385-1-97)			Other Basis/Notes
							Table I.5-1 Item No. Note 2	Solid, Liquid, Gas	Significant or Limited	
202	Shell House #5 & Explosive "D" Plant	EXDU-7	1912	(Shop)[e]	Stone/Concrete	• Walls-brick; Floor – wood; Roof – Tin laid on wood, with wood rafters[b] • Ammunition is almost always present[b] • Explosive "D" Loading Plant[g] • Two buildings labeled Vacuum System Housing (no building number) are located on the right and left sides of Building 202, map dated 1947[e]	22, 54, 63, 67-74, 97	Solid (dusts)	Significant	• D Plant • Bulk ammonium picrate? • No production at Iona Depot • Possible loading of explosives into large projectiles? • Document on Storage references the erection of Special buildings for "sifting" explosive "D" circa 1945[g]. This process could possibly require an explosives dust vacuum collection system. • Listed on 1958 Real Estate Annex Building 226 was a one-story concrete lean-to attached to Building 202[k]
306	Filling House #2 Cartridge Filling House and Reforming Plant[e]	EXDU-6	1939	Maintenance (Shop)[e] Maintenance (Cartridge Filling Shop)[k]	Concrete	• Attached to Bldg. 313, Cartridge Case Storage[c] • This building was attached to Building 313 and had a Vertical Electric Conveyor System to assist in moving material[k]	54, 97	Solid	Significant	• At intervals, a small amount of ammunition may be kept in them for a short period but not generally[b] • Possible loading of explosives? • Map dated 1947 shows this building was used to fill cartridge cases[e]
307	Filling House #5 Projectile Filling House[e]	EXDU-5	1940	Maintenance (Shop)[e] Maintenance (Projectile Filling House)[k]	Concrete		54, 63, 67-74, 97	Solid	Significant	• At intervals, a small amount of ammunition may be kept in them for a short period but not generally[b] • Possible loading of explosives? • Map dated 1947 shows this building was used to fill projectiles[e]
404	Filling House #1 Bag Charge Filling House[e]	EXDU-4	1939	Maintenance (Ammunition and Explosives) (Shop)[e]	Concrete	• Attached to Bldg. 404, Powder Storage Building[c] • This building is attached to Building 421[k]	54, 97	Solid	Significant	• At intervals, a small amount of ammunition may be kept in them for a short period but not generally[b] • Possible loading of explosives?
503	Filling House #6 Charge Assembly House[e]	EXDU-3	1942	Maintenance (Ammunition and Explosives) (Shop)[e]	Concrete	• Powder awaiting sale[b] • Ammunition is almost always present[b]	54, 63, 67-74, 82 97	Solid	Significant	• Possible assembly of cartridges, shrapnel rounds • Possible loading of explosives? • Enclosure B, para 2[i] Use of fusible links on opening between rooms normally indicates that maintenance on ammunition is being performed.

Table 1-2 Former Buildings on Iona Island Naval Ammunition Depot Associated with Ammunition and Explosives

Building No.[a], [b], [c], [f], (1)	Building Name[a], (b), (c), (f)	Decision Unit	Year Built[a], (c)	Built Purpose or Use[c], (e)	Foundation[a], (b), (e)	Notes (b), (c), (d)	Extent of Explosives Residues Presence (EM 385-1-97)			Other Basis/Notes
							Table I.5-1 Item No. Note 2	Solid, Liquid, Gas	Significant or Limited	
										This could be anything from repackaging to rebuilding.
506	Filling House #3 (Bombproof) Bombproof[e]	EXDU-2	1906	Maintenance (Storage)[f] Maintenance (Ammunition and Explosives)[k]	Brick		54, 59, 63, 67-74, 97	Solid	Significant	• At intervals, a small amount of ammunition may be kept in them for a short period but not generally[b] • Possible loading of explosives? • Maintenance on ammunition involved a number of operations such as those listed in the 1928 Annual report[j] • Shown on map dated 1947 as only a Bombproof[e]
609	Mine Loading Plant Inert Storehouse[f] Miscellaneous Storehouse[e]	EXDU-1	1918	Ammunition Storage (Storage)[e]	Concrete	• Ammunition is almost always present[b] • 8”, 10”, 14” and 16” dummy charges, steel plugs, 3” and 5” covers, drill projectiles, fleshless pellets[f] • Mine filling operation with melted TNT[h]	5, 48, 54, 56, 97	Solid, Liquids and Gas	Significant	• Shown as Mine Loading Plant on map dated 1928-12-31[e] • Plant was discontinued by late 1942 and kettles used to melt TNT were removed[h] • Shown on a map dated 1947 as a Miscellaneous Storehouse[e] • See 1918 Annual Report/Navy Department on detail info on Mine Loading Plant[l]

(a)1998, ASR, Appendix E; Public Works of the Navy Building List, July 1939

(b)1998, ASR, Appendix E; Public Works Memo, 9 November 1927

(c)1998, ASR, Appendix F; Legal Description of Iona Island, 1940 (date uncertain)
(d)1998 ASR, Appendix E; 1995 Findings of Fact, Site Survey Summary Sheet, dated 30 October 1992
(e)2018 HPA, 1965 Appraisal of Iona and Round Island
(f) 1944-10-07 Ltr. Monthly Rpt. of Stowage of Ammunition (reports use of building and type of ammunition stored in 1944.
(g) 1945-00-00 Comments on building Explosive “D: Plants
(h) 1942-12-17 Survey Request, Disposal of Kettles removed from Mine Loading Plant
(i) 1946-02-11 Report of Inspection of NAD Iona Island, NY, see Enclosure A, para 3 for burning grounds, Enclosure B, para 2 for fusible links in building 503, para. 2 and 3 for chemical stored in magazines 17 and 18.
(j) 1928-08-23 Annual Report, examples of ammunition maintenance activities
(k) 1958-05-01 Real Estate and Building Annex
(l) 1918 Annual Report/Navy Department, Mine Loading Plant

Note 2 Explanations of type of ammunition or explosives operation/facility phase of explosive released from Table I.5-1/EM 385-1-97 is provided below:

5 – Cast loading
22 –Explosives or explosives dust vacuum collection
54 – Pack/unpack bay in a maintenance or production building
56- 63 – Pressing, low speed, automated or manual (normally used in the press loading of larger items, such as projectiles and warheads
67 – Projectile base plate assembly or removal
68 – Projectile crimping
69 – Projectile fin assembly or removal
70 – Projectile main charge pressing
71 – Projectile ogive assembly or removal
72 – Projectile pull-apart (from cartridge case)
73 – Projectile rotating band or obturator assembly or removal
74 – Projectile seating
94 – Storage (e.g., earth covered magazines, aboveground magazines, covered storage pads, service magazines)
97 – Temporary storage bay in a maintenance or production building

Table 1-2 Former Buildings on Iona Island Naval Ammunition Depot Associated with Ammunition and Explosives

Building No.[(a), (b), (c), (f,) (1)]	Building Name[(a), (b), (c), (f)]	Decision Unit	Year Built[(a), (c)]	Built Purpose or Use[(c), (e)]	Foundation[(a), (b), (e)]	Notes [(b), (c), (d)]	Extent of Explosives Residues Presence (EM 385-1-97)			Other Basis/Notes
							Table I.5-1 Item No. [Note 2]	Solid, Liquid, Gas	Significant or Limited	

Note 1 - Building requires more information about specific operations that would indicate a source of potential significant explosives residue and would need to be revised to include operations such as cast loading (Item #5 of Table I.5-1/EM 385-1-97).

General Notes: Section 5 (*Building and Installed Equipment Containing Explosive Residues That Present Explosion Hazards*) in Engineering Manual 385-1-97 *Explosives Safety and Health Requirements Manual* and Department of Army Pamphlet 385-64 *Ammunition and Explosives Safety Standards* is specific to real property which includes buildings and installed equipment. The guidance provides safety requirements for former operating buildings and any installed equipment when there is a potential of residual explosives that present an explosive hazard.

Significant explosives residues – Caused by operations that can result in extensive migration of significant amounts of explosives in the building and its installed equipment. Can be released in solid, liquid, or vapor form. Can migrate into cracks, voids, behind wall and roof panels, drains, roof rafters, porous surfaces, etc. Solids - operations capable of generating explosive dusts result in significant migration and residual presence. Liquids - In process liquid explosives can leave residues in pipes and vessels. Spills and wash-down of equipment can carry explosives into cracks in the floor and into drains and sumps. Gases - When solid explosives are heated, can volatilize into the air, and migrate about the building. After condensation, the explosive is again a solid.

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Table 1-3 Data Collection Activities Soil Analytical Results, April 1997

					Location	Former Building 103 - Paint & Oil Storage	Former Building 121 – Incinerator	Former Sewage Disposal Plant	Former Building 407 – Paint Shop and Pipe Shop	Former Building 410 – Power House	Former Fuel Oil AST Near Dock 131	Former Fuel Oil ASTs Near Former Building 417		Former Dump Area	
					Sample ID	IX103-B1	IX121-B1	IX124/8-B1	IX407-B1	IX410-B1	IX131-B1	IX417-B1	IX417-B2	IXDMP-B1	IXDMP-B2
					Depth (feet)	0.0-2.0	0.0-2.0	0.0-2.0	0.0-2.0	0.0-2.0	0.0-2.0	0.0-2.0	0.0-2.0	0.0-2.0	0.0-2.0
					Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
					Sample Date										
Analyte	CAS Number	EPA Residential Soil RSL Value[1]	EPA Industrial Soil RSL Value[1]	EPA Ecological Soil Screening Level[2]	Units	10/2/1996	10/2/1996	10/2/1996	10/3/1996	10/3/1996	10/3/1996	10/2/1996	10/2/1996	10/2/1996	10/2/1996
RCRA Metals															
Arsenic	7440-38-2	0.68	3.0	19 (p)	mg/kg	**82.9**	2.5 B	5.1	**28.8**	Not tested	Not tested	Not tested	Not tested	(<0.13 U)	**24.5**
Barium	7440-39-3	1,500	22,000	333 (i)	mg/kg	42.3	**1,240**	36.8 B	69.2	Not tested	Not tested	Not tested	Not tested	289	**509**
Cadmium	7440-43-9	7.1	98	0.36 (m)	mg/kg	**0.97**	**220**	**0.44 B**	**0.56 B**	Not tested	Not tested	Not tested	Not tested	**5.8**	**9.9**
Total Chromium	16065-83-1	12,000	180,000	26 (a)	mg/kg	8.6	19.3	20.0	16.9	Not tested	Not tested	Not tested	Not tested	**26.2**	**244**
Lead	7439-92-1	400	800	11(a)	mg/kg	**118**	**8,990**	**84.7**	**542**	Not tested	Not tested	Not tested	Not tested	**1,270**	**9,160**
Mercury	7439-97-6	1.1	4.6	No standard	mg/kg	0.13	0.61	0.22	0.35	Not tested	Not tested	Not tested	Not tested	0.58	0.25
Selenium	7782-49-2	39	580	0.52 (p)	mg/kg	0.48 B	**0.95 B**	**1.2 B**	**0.68 B**	Not tested	Not tested	Not tested	Not tested	(<0.30 U)	**1.2 B**
Silver	7440-22-4	39	580	4.20 (a)	mg/kg	(<0.54 U)	(<3.6 U)	(<0.71 U)	(<0.64 U)	Not tested	Not tested	Not tested	Not tested	1.5 B	**16.3**
SVOCs															
2,4-dinitrotoluene	121-14-2	1.7	7.4	No standard	mg/kg	(<0.37 U)	(<0.43 U)	(<0.44 U)	(<0.36 U)	(<0.36 U)	(<0.37 U)	(<0.36 U)	(<0.37 U)	(<0.41 U)	68
2,6-dinitrotoluene	606-20-2	0.36	1.5	No standard	mg/kg	(<0.37 U)	(<0.43 U)	(<0.44 U)	(<0.36 U)	(<0.36 U)	(<0.37 U)	(<0.36 U)	(<0.37 U)	(<0.41 U)	2.8
2-methylnaphthalene	91-57-6	24	300	29.0 (i)	mg/kg	(<0.37 U)	0.037 J	(<0.44 U)	(<0.36 U)	(<0.36 U)	(<0.37 U)	(<0.36 U)	0.041	(<0.41 U)	(<0.047 U)
acenaphthalene	208-96-8	No standard	No standard	29.0 (i)	mg/kg	(<0.37 U)	(<0.43 U)	(<0.44 U)	0.024 J	0.040 J	(<0.37 U)	(<0.36 U)	0.044 J	(<0.41 U)	(<0.047 U)
acenaphthene	82-32-9	360	4,500	29.0 (i)	mg/kg	(<0.37 U)	(<0.43 U)	(<0.44 U)	(<0.36 U)	0.087 J	(<0.37 U)	(<0.36 U)	0.032 J	(<0.41 U)	(<0.047 U)
anthracene	120-12-7	1,800	23,000	29.0 (i)	mg/kg	(<0.37 U)	(<0.43 U)	(<0.44 U)	0.038 J	0.16 J	(<0.37 U)	(<0.89 U)	0.087 J	(<0.41 U)	(<0.047 U)
benzo(a)anthracene	56-55-3	1.1	21	1.1 (m)	mg/kg	0.065 J	0.20 J	(<0.44 U)	0.39	**1.1**	(<0.37 U)	0.25 J	0.61	(<0.41 U)	0.072 J
benzo(a)pyrene	50-32-8	0.11	2.1	1.1 (m)	mg/kg	0.072 J	0.21 J	(<0.44 U)	0.45	0.96	(<0.37 U)	0.28 J	0.65	0.066 J	0.062 J
benzo(b)fluoranthene	205-99-2	1.1	21	1.1 (m)	mg/kg	0.11 J	0.28 J	0.062 J	0.66	**1.1**	(<0.37 U)	0.40 J	0.87	(<0.41 U)	0.11 J
benzo(g,h,i)perylene	191-24-2	NS	NS	1.1 (m)	mg/kg	0.048 J	0.18 J	(<0.44 U)	0.31 J	0.7	(<0.37 U)	0.24 J	0.48	(<0.41 U)	0.052 J
benzo(k)fluoranthene	207-08-9	11	210	1.1 (m)	mg/kg	0.040 J	0.11 J	(<0.44 U)	0.25 J	0.42	(<0.37 U)	0.17 J	0.35 J	(<0.41 U)	0.054 J
bis(2-ethylhexyl)phthalate	117-81-7	39	160	No standard	mg/kg	(<0.37 U)	(<0.43 U)	(<0.44 U)	0.036 JB	0.019 JB	(<0.37 U)	(<0.36 U)	0.037 JB	(<0.41 U)	0.032 JB
Butyl Benzyl Phthalate	85-68-7	290	1,200	No standard	mg/kg	(<0.37 U)	(<0.43 U)	(<0.44 U)	0.038 J	0.024 J	(<0.37 U)	(<0.36 U)	0.026 J	(<0.41 U)	(<0.047 U)
carbazole	86-74-8	No standard	No standard	29.0 (i)	mg/kg	(<0.37 U)	(<0.43 U)	(<0.44 U)	(<0.36 U)	0.055 J	(<0.37 U)	(<0.36 U)	0.050 J	(<0.41 U)	(<0.047 U)
chrysene	218-01-9	110	2,100	1.1 (m)	mg/kg	0.087 J	0.24 J	(<0.44 U)	0.45	**1.1**	(<0.37 U)	0.28 J	0.75	(<0.41 U)	0.11 J
di-n-butylphthalate	84-74-2	630	8,200	No standard	mg/kg	0.14 J	0.15 J	0.037 J	0.4	0.29 J	0.12 J	(<0.36 U)	0.16 J	0.18 J	26
dibenz(a,h)anthracene	53-70-3	0.11	2.1	1.1 (m)	mg/kg	(<0.37 U)	0.055 J	(<0.44 U)	0.084 J	**0.15 J**	(<0.37 U)	0.076 J	0.099 J	(<0.41 U)	(<0.047 U)
dibenzofuran	132-64-9	7.3	100	No standard	mg/kg	(<0.37 U)	(<0.43 U)	(<0.44 U)	(<0.36 U)	0.040 J	(<0.37 U)	(<0.36 U)	(<0.37 U)	(<0.41 U)	(<0.047 U)
diethyl phthalate	84-66-2	5,100	66,000	No standard	mg/kg	(<0.37 U)	(<0.43 U)	(<0.44 U)	0.097 J	0.039 J	(<0.37 U)	0.34 J	(<0.37 U)	(<0.41 U)	(<0.047 U)
fluoranthene	206-44-0	240	3,000	1.1 (m)	mg/kg	0.10 J	0.33 J	0.076 J	0.41	**1.8**	(<0.37 U)	0.32 J	0.9	0.16 J	0.17 J
fluorene	86-73-7	240	3,000	29.0 (i)	mg/kg	(<0.37 U)	(<0.43 U)	(<0.44 U)	(<0.36 U)	0.088 J	(<0.37 U)	(<0.36 U)	0.024 J	(<0.41 U)	(<0.047 U)
indeno(1,2,3-c,d)pyrene	193-39-5	1.1	21	1.1 (m)	mg/kg	0.053 J	0.20 J	(<0.44 U)	0.38	0.73	(<0.37 U)	0.26 J	0.53	(<0.41 U)	0.058 J
n-nitrosodiphenylamine (2)	86-30-6	No standard	No standard	No standard	mg/kg	(<0.37 U)	(<0.43 U)	(<0.44 U)	(<0.36 U)	(<0.36 U)	(<0.37 U)	(<0.36 U)	(<0.37 U)	(<0.41 U)	1.1
naphthalene	91-20-3	3.8	17	29.0 (i)	mg/kg	(<0.37 U)	(<0.43 U)	(<0.44 U)	(<0.36 U)	0.027 J	(<0.37 U)	(<0.36 U)	(<0.37 U)	(<0.41 U)	(<0.047 U)
phenanthrene	85-01-8	No standard	No standard	29.0 (i)	mg/kg	(<0.37 U)	0.15 J	(<0.44 U)	0.12 J	0.75	(<0.37 U)	0.088 J	0.38	(<0.41 U)	0.10 J
phenol	108-95-2	1,900	25,000	No standard	mg/kg	(<0.37 U)	(<0.43 U)	(<0.44 U)	0.026 J	0.020 J	(<0.37 U)	(<0.36 U)	0.03 J	0.067 J	(<0.047 U)
pyrene	129-00-0	180	2,300	1.1 (m)	mg/kg	0.11 J	0.32 J	0.067 J	0.43	**2.0**	(<0.37 U)	0.30 J	1.0	0.13 J	0.12 J

Table 1-3 Data Collection Activities Soil Analytical Results, April 1997

						Location	Former Building 103 - Paint & Oil Storage	Former Building 121 – Incinerator	Former Sewage Disposal Plant	Former Building 407 – Paint Shop and Pipe Shop	Former Building 410 – Power House	Former Fuel Oil AST Near Dock 131	Former Fuel Oil ASTs Near Former Building 417		Former Dump Area	
						Sample ID	IX103-B1	IX121-B1	IX124/8-B1	IX407-B1	IX410-B1	IX131-B1	IX417-B1	IX417-B2	IXDMP-B1	IXDMP-B2
						Depth (feet)	0.0-2.0	0.0-2.0	0.0-2.0	0.0-2.0	0.0-2.0	0.0-2.0	0.0-2.0	0.0-2.0	0.0-2.0	0.0-2.0
						Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
						Sample Date										
Analyte	**CAS Number**	**EPA Residential Soil RSL Value[1]**	**EPA Industrial Soil RSL Value[1]**	**EPA Ecological Soil Screening Level[2]**	**Units**		10/2/1996	10/2/1996	10/2/1996	10/3/1996	10/3/1996	10/3/1996	10/2/1996	10/2/1996	10/2/1996	10/2/1996
VOCs																
1,1-Dichloroethene	75-35-4	23	100	No standard	mg/kg		0.002 JB	Not tested	0.002 JB	0.002 JB	0.002 JB	Not tested	Not tested	Not tested	0.002 JB	0.002 JB
Acetone	67-64-1	6,100	67,000	No standard	mg/kg		0.013 B	Not tested	0.005 JB	0.018 B	0.004 JB	Not tested	Not tested	Not tested	0.016 B	0.005 JB
Methylene Chloride	75-09-2	35	320	No standard	mg/kg		0.001 JB	Not tested	(<0.013 U)	0.002 SB	0.002 JB	Not tested	Not tested	Not tested	(<0.013 U)	0.002 JB
PCBs																
Aroclor 1260	11096-82-5	0.24	0.99	No standard	mg/kg		(<0.038 U)	Not tested	(<0.05 U)	0.14	Not tested	Not tested	Not tested	Not tested	**1.2**	**0.28**

1. United States Environmental Protection Agency (EPA) Regional Screening Levels (RSLs) Table, EPA, May 2019. Value shown is equal to HI=0.1. Carcinogenic values equal to 1x10-6.
2. EPA Ecological Soil Screening Levels (ECO-SSLs), February 2005 - April 2008. (a) = Avian; (i) = Soil Invertebrates; (m) = Mammalian; (p) = Plants

NOTES:
CAS = Chemical Abstracts Service
mg/kg = Milligram(s) per kilogram
B = Compound detected in one or more quality assurance / quality control blank sample(s)
J =Estimated concentration
U =The analyte was not detected. Reporting limits for the non-detects were not defined.
Bold values exceed NYSDEC background concentrations and EPA Ecological Soil Screening Levels.
Red concentrations meet or exceed EPA Residential Soil RSLs.
Concentrations highlighted in yellow are at or exceed EPA Industrial Soil RSLs.
Shaded values indicate detection limits are higher than screening values.

Table 1-4 Site Investigation Soil Analytical Results, 2007

Analyte	CAS Number	EPA Residential Soil RSL Value[2]	EPA Industrial Soil RSL Value[2]	Ecological Soil Screening Level [3]	Units	Location[1]	Sample ID:	Parent Name:	Depth (in.)	Matrix	Sample Date:
						Bldg 601 Magazine No. 1	II-EA-SS-02-01	NA	0-2	Soil	12/4/2007
						Bldg 601 Magazine No. 1	FD#1	II-EA-SS-02-01	0-2	Soil	12/4/2007
						Bldg 502 Magazine No. 4	II-EA-SS-02-02	NA	0-2	Soil	12/4/2007
						Bldg 308 Quarters No. 3	II-EA-SS-02-03	NA	0-2	Soil	12/4/2007
						Bldg 601 Magazine No. 1	II-EA-SS-02-04	NA	0-2	Soil	12/4/2007
						Bldg 407 Paint Shop and Pipe Shop	II-EA-SS-02-05	NA	0-2	Soil	12/4/2007
						Bldg 112 Quarters No. 2	II-EA-SS-02-06	NA	0-2	Soil	12/4/2007
						Bldg 419 Mine Storage	II-EA-SS-02-07	NA	0-2	Soil	12/4/2007
						Bldg 310 Hose House	II-EA-SS-02-08	NA	0-2	Soil	12/4/2007
						Bldg 316 Semi Sub-Surface Magazine	II-EA-SS-02-09	NA	0-2	Soil	12/4/2007
						Bldg 217 Fire Station and Labor Office	II-EA-SS-02-10	NA	0-2	Soil	12/4/2007
						Bldg 222 Miscellaneous Storage Building	II-EA-SS-02-11	NA	0-2	Soil	12/4/2007
						Bldg 215 Garage	II-EA-SS-02-12	NA	0-2	Soil	12/4/2007
						Bldg 108 Storehouse No. 2	II-EA-SS-02-13	NA	0-2	Soil	12/4/2007
						Bldg 203 Stone Crusher	II-EA-SS-02-14	NA	0-2	Soil	12/4/2007
						Bldg 104 Pump House No. 2	II-EA-SS-02-15	NA	0-2	Soil	12/4/2007
Metals											
Antimony	7440-36-0	3.1	47	0.27 (m)	mg/kg	**2.4 J**	**2 J**	**0.71 J**	(<0.29 UJ)	**0.52 J**	**0.86 J**	**0.67 J**	(<0.3 UJ)	1.2 J	**0.33 J**	(<0.32 UJ)	**0.68 J**	(<0.3 UJ)	**0.58 J**	**1.6 J**	**1.6 J**
Copper	7440-50-8	310	4,700	28 (m)	mg/kg	36.1	34.2	20.3	**52.9**	31.9	**76.1**	**44**	24.3	**64.1**	**106**	17.5	27.9	21.1	30.6	**112**	31.9
Lead	7439-92-1	400	800	11 (a)	mg/kg	**98.1 J**	**96.7 J**	**209 J**	**178 J**	**121 J**	**319 J**	**202 J**	**33.1 J**	772 J	**11.8 J**	**47.2 J**	**66.5 J**	**50.1 J**	**161 J**	**195 J**	**220 J**
Mercury	7439-97-6	1.1	4.6	No standard	mg/kg	0.54 J	0.56 J	0.21 J	0.087 J	0.2 J	0.37 J	0.3 J	0.089 J	0.053 J	0.028 J	0.09 J	0.12 J	0.094 J	0.35 J	0.44 J	0.57 J
Nickel	7440-02-0	150	2,200	130 (m)	mg/kg	20	19.5	8.8	18.8	20.9 J	21.6 J	19.1 J	19.6 J	16.8 J	16.4	14	13.3	15	18 J	21.9	16.3 J
Zinc	7440-66-6	2,300	35,000	46 (a)	mg/kg	**82.4**	**74.2**	**54.5**	**80.3**	**96.4 J**	**134 J**	**129 J**	**69 J**	**234 J**	**66.3**	**69.8**	**75.5**	**76.3**	**104 J**	**134**	**93.4 J**
Explosives											
2,4-dinitrotoluene	121-14-2	1.7	7.4	No standard	mg/kg	(<0.081 U)	(<0.08 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.079 U)	(<0.04 U)
2,6-dinitrotoluene	606-20-2	0.36	1.5	No standard	mg/kg	(<0.081 U)	(<0.08 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.079 U)	(<0.04 U)
2-amino-4,6-dinitrotoluene	35572-78-2	15	230	No standard	mg/kg	(<0.081 U)	(<0.08 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.079 U)	(<0.04 U)
2-nitrotoluene	88-72-2	3.2	15	No standard	mg/kg	(<0.16 U)	(<0.16 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.16 U)	(<0.08 U)
3-nitrotoluene	99-08-1	0.63	8.2	No standard	mg/kg	(<0.16 U)	(<0.16 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.16 U)	(<0.08 U)
4-amino-2,6-dinitrotoluene	19406-51-0	15	230	No standard	mg/kg	(<0.081 U)	(<0.08 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	0.044	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.079 U)	(<0.04 U)
4-nitrotoluene	99-99-0	25	140	No standard	mg/kg	(<0.16 U)	(<0.16 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.16 U)	(<0.08 U)
Nitroglycerin	55-63-0	0.63	8.2	No standard	mg/kg	(<8.1 U)	(<8 U)	(<4 U)	(<4 U)	(<4 U)	(<4 U)	(<4 U)	(<4 U)	(<4 U)	(<4 U)	(<4 U)	(<4 U)	(<4 U)	(<4 U)	(<7.9 U)	(<4 U)
Tetryl (Trinitrophenylmethylnitramine)	479-45-8	16	230	No standard	mg/kg	(<0.16 U)	(<0.16 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.16 U)	(<0.08 U)
TNT	118-96-7	3.6	51	No standard	mg/kg	(<0.081 U)	(<0.08 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	0.013 J	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.079 U)	(<0.04 U)

1. Location refers to the nearest former building.
2. United States Environmental Protection Agency (EPA) Regional Screening Levels (RSLs) Table, EPA, May 2019. Value shown is equal to HI=0.1. Carcinogenic values equal to 1x10-6.
3. EPA Ecological Soil Screening Levels (ECO-SSLs), February 2005 - April 2008. Lowest values presented: (a) = Avian; (i) = Soil Invertebrates; (m) = Mammalian; (p) = Plants

NOTES:
BG=background sample
CAS = Chemical Abstracts Service
J=Analyte is present. Reported value may not be accurate or precise.
U=Not detected (i.e. less than method detection limits for metals and less than reporting limits for explosives). The associated number indicates the approximate sample concentration necessary to be detected.
UJ=Not detected, quantitation limit may be inaccurate or imprecise.
Bold values exceed EPA Ecological Soil Screening Levels.
Red concentrations exceed EPA Residential Soil RSLs.
Shaded values indicate detection limits are higher than any screening values.

Table 1-4 Site Investigation Soil Analytical Results, 2007

Analyte	CAS	EPA Residential Soil RSL Value2	EPA Industrial Soil RSL Value2	Ecological Soil Screening Level [3]	Units	Location[1]	Bldg 104 Pump House No. 2	Bldgs 124-127 Sewage Disposal Plant	Bldg 210 Shell House	Bldg 210 Shell House	Bldg 115 Shell House	Background	Background	Background	Background	Background
						Sample ID:	FD#2	II-EA-SS-02-16	II-EA-SS-02-17	FD#4	II-EA-SS-02-18	II-BG-SS-02-01	II-BG-SS-02-02	II-BG-SS-02-03	II-BG-SS-02-04	II-BG-SS-02-05
						Parent Name:	II-EA-SS-02-15	NA	NA	II-EA-SS-02-17	NA	NA	NA	NA	NA	NA
						Depth (in.)	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
						Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
						Sample Date:	12/4/2007	12/4/2007	12/4/2007	12/4/2007	12/4/2007	12/4/2007	12/4/2007	12/4/2007	12/4/2007	12/4/2007
Metals																
Antimony	7440-36-0	3.1	47	0.27 (m)	mg/kg		**2.1 J**	**0.6 J**	**0.46 J**	(<0.31 UJ)	(<0.29 UJ)	**1.5 J**	**1.8 J**	**1.8 J**	**1.1 J**	**1.9 J**
Copper	7440-50-8	310	4,700	28 (m)	mg/kg		35.1	**73.8**	26.3	26.5	41.4	**45.7**	**54.9**	**55.1**	12.3	**45.7**
Lead	7439-92-1	400	800	11 (a)	mg/kg		**239 J**	**101 J**	**132 J**	**131 J**	**33.5 J**	**178 J**	**201 J**	**88.2 J**	**24.4 J**	**164 J**
Mercury	7439-97-6	1.1	4.6	No standard	mg/kg		0.66 J	0.46 J	0.087 J	0.073 J	0.068 J	0.82 J	0.58 J	0.56 J	0.14 J	0.52 J
Nickel	7440-02-0	150	2,200	130 (m)	mg/kg		18.2	12.3 J	13 J	13.5	9.8 J	26.8	23.4	13.5	12.1	22.5
Zinc	7440-66-6	2,300	35,000	46 (a)	mg/kg		**105**	**136 J**	**102 J**	**96.6**	**67.2 J**	**268**	**212**	**53.4**	**57**	**124**
Explosives																
2,4-dinitrotoluene	121-14-2	1.7	7.4	No standard	mg/kg		(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	Not tested	Not tested	Not tested	Not tested	Not tested
2,6-dinitrotoluene	606-20-2	0.36	1.5	No standard	mg/kg		(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	Not tested	Not tested	Not tested	Not tested	Not tested
2-amino-4,6-dinitrotoluene	35572-78-2	15	230	No standard	mg/kg		(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	Not tested	Not tested	Not tested	Not tested	Not tested
2-nitrotoluene	88-72-2	3.2	15	No standard	mg/kg		(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	Not tested	Not tested	Not tested	Not tested	Not tested
3-nitrotoluene	99-08-1	0.63	8.2	No standard	mg/kg		(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	Not tested	Not tested	Not tested	Not tested	Not tested
4-amino-2,6-dinitrotoluene	19406-51-0	15	230	No standard	mg/kg		(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	Not tested	Not tested	Not tested	Not tested	Not tested
4-nitrotoluene	99-99-0	25	140	No standard	mg/kg		(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	Not tested	Not tested	Not tested	Not tested	Not tested
Nitroglycerin	55-63-0	0.63	8.2	No standard	mg/kg		(<4 U)	(<4 U)	(<4 U)	(<4 U)	(<4 U)	Not tested	Not tested	Not tested	Not tested	Not tested
Tetryl (Trinitrophenylmethylnitramine)	479-45-8	16	230	No standard	mg/kg		(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	(<0.08 U)	Not tested	Not tested	Not tested	Not tested	Not tested
TNT	118-96-7	3.6	51	No standard	mg/kg		(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	(<0.04 U)	Not tested	Not tested	Not tested	Not tested	Not tested

Table 1-5 Site Investigation Sediment Analytical Results, 2007

Analyte	CAS Number	EPA Residential Soil RSL Value[1]	EPA Industrial Soil RSL Value[1]	EPA Ecological Sediment Screening Value[2]	Units	II-EA-SD-02-01	II-EA-SD-02-02	FD#3 Duplicate of II-EA-SD-02-02	II-BG-SD-02-01	II-BG-SD-02-02	II-BG-SD-02-03
Sample ID:						II-EA-SD-02-01	II-EA-SD-02-02	FD#3 Duplicate of II-EA-SD-02-02	II-BG-SD-02-01	II-BG-SD-02-02	II-BG-SD-02-03
Depth (in.)						0-6	0-6	0-6	0-6	0-6	0-6
Matrix						Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
Sample Date:						12/4/2007	12/4/2007	12/4/2007	12/4/2007	12/4/2007	12/4/2007
Metals											
Antimony	7440-36-0	3.1	47	2	mg/kg	0.55 J	**22.3 J**	**43.3 J**	1.1 UJ	1.4 UJ	1.9 J
Copper	7440-50-8	310	4,700	18.7	mg/kg	**48.8**	**1,110**	**2,740**	**45.8**	**46.1**	**104**
Lead	7439-92-1	400	800	30.2	mg/kg	**79 J**	**2,340 J**	**5,030 J**	**64.5 J**	**117 J**	**100 J**
Mercury	7439-97-6	1.1	4.6	0.13	mg/kg	0.082 J	0.026 J	0.05 J	**0.47 J**	**0.68 J**	**0.45 J**
Nickel	7440-02-0	150	220	15.9	mg/kg	20.6 J	**53.1 J**	**85.4**	**31.6**	**29.8**	**35.7**
Zinc	7440-66-6	2,300	35,000	124	mg/kg	**184 J**	**2,470 J**	**2,980**	**178**	**217**	**224**
Explosives											
2,4-dinitrotoluene	121-14-2	1.7	7.4	0.029	mg/kg	0.04 U	0.04 U	0.04 U	Not tested	Not tested	Not tested
2,6-dinitrotoluene	606-20-2	0.36	1.5	0.296	mg/kg	0.04 U	0.04 U	0.04 U	Not tested	Not tested	Not tested
2-amino-4,6-dinitrotoluene	35572-78-2	15	230	0.052	mg/kg	0.04 U	0.04 U	0.04 U	Not tested	Not tested	Not tested
2-nitrotoluene	88-72-2	3.2	15	3.448	mg/kg	0.08 U	0.08 U	0.08 U	Not tested	Not tested	Not tested
3-nitrotoluene	99-08-1	0.63	8.2	4.787	mg/kg	0.08 U	0.08 U	0.08 U	Not tested	Not tested	Not tested
4-amino-2,6-dinitrotoluene	19406-51-0	15	230	0.07	mg/kg	0.04 U	0.04 U	0.04 U	Not tested	Not tested	Not tested
4-nitrotoluene	99-99-0	25	140	4.534	mg/kg	0.08 U	0.08 U	0.08 U	Not tested	Not tested	Not tested
Nitroglycerin	55-63-0	0.63	82	0.133	mg/kg	4 U	4 U	4 U	Not tested	Not tested	Not tested
Tetryl (Trinitrophenylmethylnitramine)	479-45-8	16	230	NS	mg/kg	0.08 U	0.08 U	0.08 U	Not tested	Not tested	Not tested
Trinitrotoluene	118-96-7	3.6	51	0.112	mg/kg	0.04 U	0.04 U	0.04 U	Not tested	Not tested	Not tested

1. Location refers to the nearest former building.
2. United States Environmental Protection Agency (EPA) Regional Screening Levels (RSLs) Table for Soil, USEPA, May 2019. Value shown is equal to HI=0.1. Carcinogenic values equal to 1x10-6.
3. EPA Region 4 Sediment Screening Values for Hazardous Waste Sites, Marine/Estuarine Sediment Screening Value (March 2018)

NOTES:
CAS = Chemical Abstracts Service
J = Analyte is present between the method detection limit and the reporting limit.
U=Not detected (i.e. less than method detection limits for metals and less than reporting limits for explosives). The associated number indicates the approximate sample concentration necessary to be detected.
UJ = Not detected, quantitation limit may be inaccurate or imprecise.
Bold values exceed EPA Ecological Sediment Screening Values.
Red concentrations exceed EPA Residential Soil RSLs.
Concentrations highlighted in yellow meet or exceed USEPA Industrial Soil RSLs.
Shaded values indicate detection limits are higher than screening values.

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Table 1-6 Protected Animal Species at Iona Island

Group	Species	Common Name	Status	Jurisdiction
Fish	*Acipenser brevirostrum*	shortnose sturgeon	Endangered	Federal/State
Fish	*Acipenser oxyrhynchus*	Atlantic sturgeon	Endangered	Federal/State
Birds	*Haliaeetus leucocephalus*	Bald eagle	Threatened[1]	State
Birds	*Ixobrychus exilis*	Least bittern	Threatened	State
Birds	*Setophaga cerulea*	Cerulean warbler	Special Concern	State
Birds	*Vermivora chrysoptera*	Golden-winged warbler	Special Concern	State
Birds	*Pandion haliaetus*	Osprey	Special Concern	State
Birds	*Circus cyaneus*	Northern harrier	Threatened	State
Birds	*Podilymbus podiceps*	Pied-billed grebe	Threatened	State
Plants	*Isotria medeoloides*	Small whorled pogonia	Threatened/Endangered	Federal/State
Mammals	*Myotis sodalis*	Indiana bat	Endangered	Federal/State
Mammals	*Myotis septentrionalis*	Northern long-eared bat	Endangered[2]	Federal/State
Reptiles	*Clemmys muhlenbergii*	Bog turtle	Threatened/Endangered	Federal/State

Sources:
USFWS ECOS-IPaC system Iona Island project request 10/8/2018 (USFWS 2018b).
NYSDEC Environmental Resource Mapper (NYDEC 2019)
NOAA 2023a

1. Bald eagles are also federally protected under the Bald and Golden Eagle Protection Act.
2. On November 29, 2022, the USFWS published a ruling reclassifying Northern Long-eared Bat from Threatened to Endangered under the federal Endangered Species Act. This rule is effective January 30, 2023. The change to Endangered in New York will take place at the same time as the Federal listing.

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Table 3-1 HTRW RI Phase I Sample Collection

Sample Location	Sample Type	Sample Identification Code	Analyses	Sample Date	Sample Time	QA/QC Sample	Analytical Laboratory	Laboratory Report
Phase I Investigation Area: Surface and Subsurface Soil, Groundwater								
DU-1	Surface soil triplicate incremental sample	IINY-DU-1A-SSIS-20200318	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH by field screening	3/18/2020	1500	MS/MSD	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J134722-1
		IINY-DU-1B-SSIS-20200318		3/18/2020	1500	Not applicable		280-J134722-1
		IINY-DU-1C-SSIS-20200318		3/18/2020	1500	Not applicable		280-J134722-1
	Subsurface soil triplicate incremental sample	Not Collected		Advanced 6 hand auger borings at DU-1. Soil depth to refusal ranged from 6 to 8 inches bgs (<1 ft). Did not collect subsurface soil.				
DU-2	Surface soil triplicate incremental sample	IINY-DU-2A-SSIS-20200319	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH by field screening	3/19/2020	815	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J134777-1
		IINY-DU-2B-SSIS-20200319		3/19/2020	815	Not applicable		280-J134777-1
		IINY-DU-2C-SSIS-20200319		3/19/2020	815	Not applicable		280-J134777-1
	Subsurface soil triplicate incremental sample	Not Collected		Advanced 5 hand auger borings at DU-2. Hard to locate areas to advance borings due to exposed bedrock and shallow bedrock/refusal. Soil depth to refusal less than 8 inches bgs (<1 ft). Did not collect subsurface soil.				
DU-3	Surface soil triplicate incremental sample	IINY-DU-3A-SSIS-20200318	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH by field screening	3/18/2020	1545	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J134722-1
		IINY-DU-3B-SSIS-20200318		3/18/2020	1545	Not applicable		280-J134722-1
		IINY-DU-3C-SSIS-20200318		3/18/2020	1545	Not applicable		280-J134722-1
	Subsurface soil triplicate incremental sample	Not Collected		Advanced 5 hand auger borings at DU-3. Hard to locate areas to advance borings due to exposed bedrock and shallow bedrock/refusal. Soil depth to refusal less than 8 inches bgs (<1 ft). Did not collect subsurface soil.				
DU-4	Surface soil triplicate incremental sample	IINY-DU-4A-SSIS-20200318	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH by field screening	3/18/2020	1430	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J134722-1
		IINY-DU-4B-SSIS-20200318		3/18/2020	1430	Not applicable		280-J134722-1
		IINY-DU-4C-SSIS-20200318		3/18/2020	1430	Not applicable		280-J134722-1
	Subsurface soil triplicate incremental sample	Not Collected		Advanced 6 hand auger borings at DU-4. Significant anomalies in 1-acre DU. Soil depth to refusal at one boring was 12 inches bgs, soil depth to refusal at remaining borings ranged from 4 to 8 inches bgs (<1 ft). Did not collect subsurface soil.				
DU-5	Surface soil triplicate incremental sample	IINY-DU-5A-SSIS-20200319	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH by field screening	3/19/2020	900	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J134777-1
		IINY-DU-5B-SSIS-20200319		3/19/2020	900	Not applicable		280-J134777-1
		IINY-DU-5C-SSIS-20200319		3/19/2020	900	Not applicable		280-J134777-1
	Subsurface soil triplicate incremental sample	Not Collected		Advanced 5 hand auger borings at DU-5. Hard to locate areas to advance borings due to exposed bedrock and shallow bedrock/refusal. Soil depth to refusal less than 8 inches bgs (<1 ft). Did not collect subsurface soil.				
DU-6	Surface soil triplicate incremental sample	IINY-DU-6A-SSIS-20200319	TAL Metals by EPA Methods 6010C/6020A, pH by field screening	3/19/2020	1500	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J134777-1
		IINY-DU-6B-SSIS-20200319		3/19/2020	1500	Not applicable		280-J134777-1
		IINY-DU-6C-SSIS-20200319		3/19/2020	1500	Not applicable		280-J134777-1
	Subsurface soil triplicate incremental sample	Not Collected		Advanced 5 hand auger borings at DU-6. Exposed bedrock / bedrock wall in DU-6. Soil depth to refusal less than 8 inches bgs (<1 ft). Did not collect subsurface soil.				
DU-7	Surface soil triplicate incremental sample	IINY-DU-7A-SSIS-20200319	TAL Metals by EPA Methods 6010C/6020A, pH by field screening	3/19/2020	1345	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J134777-1
		IINY-DU-7B-SSIS-20200319		3/19/2020	1345	Not applicable		280-J134777-1
		IINY-DU-7C-SSIS-20200319		3/19/2020	1345	Not applicable		280-J134777-1
	Subsurface soil triplicate incremental sample	Not Collected		Advanced 5 hand auger borings at DU-7. Soil depth to refusal less than 8 inches bgs (<1 ft). Did not collect subsurface soil.				
DU-8	Surface soil triplicate incremental sample	Not Collected	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH by field screening	DU-8 Deletion – DU-8 was placed at former Building 207 that was a small garage located between existing Buildings 222, 201, and 212. Building 207 is also known as HTRW AOC #5. DU-8 is a 200x200 ft decision unit that was established around former Building 207 to determine whether former operations at this building served as a source of contaminants to the environment at concentrations that may result in potential risks to human and ecological receptors. Following mark-out DU-8 in the field and site reconnaissance conducted on 18 March 2020, numerous rusted and deteriorating 55-gallon drums, deteriorating pallets, piles of roofing shingles, chain link fencing, and other debris were observed in DU-8. Several empty 55-gallon drums were lying on their sides, while other drums were upright and filled with fluid. The material contained within the drums is not known. Residue indicative of roofing tar was observed on the outside of several drums, and staining was noted on the ground surface.					
	Subsurface soil triplicate incremental sample							

Table 3-1 HTRW RI Phase I Sample Collection

Sample Location	Sample Type	Sample Identification Code	Analyses	Sample Date	Sample Time	QA/QC Sample	Analytical Laboratory	Laboratory Report
DU-9	Surface soil triplicate incremental sample	IINY-DU-9A-SSIS-20200319	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH by field screening	3/19/2020	1040	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J134777-1
		IINY-DU-9B-SSIS-20200319		3/19/2020	1040	Not applicable		280-J134777-1
		IINY-DU-9C-SSIS-20200319		3/19/2020	1040	MS/MSD		280-J134777-1
	Subsurface soil triplicate incremental sample	Not Collected		Advanced 5 hand auger borings at DU-9. Soil depth to refusal less than 8 inches bgs (<1 ft). Did not collect subsurface soil.				
DU-10	Surface soil triplicate incremental sample	IINY-DU-10A-SSIS-20200319	TAL Metals by EPA Methods 6010C/6020A, pH by field screening	3/19/2020	1120	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J134777-1
		IINY-DU-10B-SSIS-20200319		3/19/2020	1120	Not applicable		280-J134777-1
		IINY-DU-10C-SSIS-20200319		3/19/2020	1120	Not applicable		280-J134777-1
	Subsurface soil triplicate incremental sample	Not Collected		Advanced 5 hand auger borings at DU-10. Exposed bedrock and bedrock wall within DU. Soil depth to refusal less than 8 inches bgs (<1 ft). Did not collect subsurface soil.				
DU-11	Surface soil triplicate incremental sample	IINY-DU-11A-SSIS-20200330	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH by field screening	3/30/2020	1115	MS/MSD	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J135113-1
		IINY-DU-11B-SSIS-20200330		3/30/2020	1115	Not applicable		280-J135113-1
		IINY-DU-11C-SSIS-20200330		3/30/2020	1115	Not applicable		280-J135113-1
	Subsurface soil triplicate incremental sample	Not Collected		Advanced 5 hand auger borings at DU-11. Soil depth to refusal less than 8 inches bgs (<1 ft). Did not collect subsurface soil.				
DU-12	Surface soil triplicate incremental sample	IINY-DU-12A-SSIS-20200330	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH by field screening	3/30/2020	1215	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J135113-1
		IINY-DU-12B-SSIS-20200330		3/30/2020	1215	Not applicable		280-J135113-1
		IINY-DU-12C-SSIS-20200330		3/30/2020	1215	Not applicable		280-J135113-1
	Subsurface soil triplicate incremental sample	Not Collected		Advanced 5 hand auger borings at DU-12. Soil depth to refusal less than 2 inches bgs (<1 ft). Did not collect subsurface soil.				
DU-13	Surface soil triplicate incremental sample	IINY-DU-13A-SSIS-20200330	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH by field screening	3/30/2020	1340	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J135113-1
		IINY-DU-13B-SSIS-20200330		3/30/2020	1340	Not applicable		280-J135113-1
		IINY-DU-13C-SSIS-20200330		3/30/2020	1340	Not applicable		280-J135113-1
	Subsurface soil triplicate incremental sample	Not Collected		Advanced 5 hand auger borings at DU-13. Soil depth to refusal less than 2 inches bgs (<1 ft). Did not collect subsurface soil.				
DU-14	Surface soil triplicate incremental sample	IINY-DU-14A-SSIS-20200320	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, pH by field screening	3/20/2020	830	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J134848-1
		IINY-DU-14B-SSIS-20200320		3/20/2020	830	Not applicable		280-J134848-1
		IINY-DU-14C-SSIS-20200320		3/20/2020	830	Not applicable		280-J134848-1
	Subsurface soil triplicate incremental sample	Not Collected		Advanced 5 hand auger borings at DU-9. Soil depth to refusal less than 8 inches bgs (<1 ft). Did not collect subsurface soil.				
DU-15	Surface soil triplicate incremental sample	IINY-DU-15A-SSIS-20200401	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, pH by field screening	4/1/2020	820	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J135166-1
		IINY-DU-15B-SSIS-20200401		4/1/2020	820	Not applicable		280-J135166-1
		IINY-DU-15C-SSIS-20200401		4/1/2020	820	Not applicable		280-J135166-1
	Subsurface soil triplicate incremental sample	Not Collected		Advanced 5 hand auger borings at DU-15. Soil depth to refusal less than 12 inches bgs (<1 ft). Did not collect subsurface soil.				
DU-16	Surface soil triplicate incremental sample	IINY-DU-16A-SSIS-20200331	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH by field screening	3/31/2020	950	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J135117-1
		IINY-DU-16B-SSIS-20200331		3/31/2020	950	Not applicable		280-J135117-1
		IINY-DU-16C-SSIS-20200331		3/31/2020	950	Not applicable		280-J135117-1
	Subsurface soil triplicate incremental sample	Not Collected		Advanced 5 hand auger borings at DU-16. Soil depth to refusal less than 12 inches bgs (<1 ft). Did not collect subsurface soil.				

Table 3-1 HTRW RI Phase I Sample Collection

Sample Location	Sample Type	Sample Identification Code	Analyses	Sample Date	Sample Time	QA/QC Sample	Analytical Laboratory	Laboratory Report
DU-17	Surface soil triplicate incremental sample	IINY-DU-17A-SSIS-20200331	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, Aroclor PCBs by EPA Method 8082A, explosives by EPA Method 8330B, and pH by field screening	3/31/2020	815	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J135117-1
		IINY-DU-17B-SSIS-20200331		3/31/2020	815	Not applicable		280-J135117-1
		IINY-DU-17C-SSIS-20200331		3/31/2020	815	Not applicable		280-J135117-1
	Subsurface soil triplicate incremental sample	IINY-DU-17A-SBIS1-20200331		3/31/2020	845	Not applicable		280-J135117-1
		IINY-DU-17B-SBIS1-20200331		3/31/2020	845	Not applicable		280-J135117-1
		IINY-DU-17C-SBIS1-20200331		3/31/2020	845	Not applicable		280-J135117-1
DU-18	Surface soil triplicate incremental sample	IINY-DU-18A-SSIS-20200331	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, Aroclor PCBs by EPA Method 8082A, explosives by EPA Method 8330B, and pH by field screening	3/31/2020	1345	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J135117-1
		IINY-DU-18B-SSIS-20200331		3/31/2020	1345	Not applicable		280-J135117-1
		IINY-DU-18C-SSIS-20200331		3/31/2020	1345	Not applicable		280-J135117-1
	Subsurface soil triplicate incremental sample	IINY-DU-18A-SBIS1-20200331		3/31/2020	1420	Not applicable		280-J135117-1
		IINY-DU-18B-SBIS1-20200331		3/31/2020	1420	Not applicable		280-J135117-1
		IINY-DU-18C-SBIS1-20200331		3/31/2020	1420	Not applicable		280-J135117-1
DU-19	Surface soil triplicate incremental sample	IINY-DU-19A-SSIS-20200331	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, Aroclor PCBs by EPA Method 8082A, explosives by EPA Method 8330B, and pH by field screening	3/31/2020	1045	MS/MSD	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J135117-1
		IINY-DU-19B-SSIS-20200331		3/31/2020	1045	Not applicable		280-J135117-1
		IINY-DU-19C-SSIS-20200331		3/31/2020	1045	Not applicable		280-J135117-1
	Subsurface soil triplicate incremental sample	IINY-DU-19A-SBIS1-20200331		3/31/2020	1100	Not applicable		280-J135117-1
		IINY-DU-19B-SBIS1-20200331		3/31/2020	1100	Not applicable		280-J135117-1
		IINY-DU-19C-SBIS1-20200331		3/31/2020	1100	Not applicable		280-J135117-1
DU-20	Surface soil triplicate incremental sample	IINY-DU-20A-SSIS-20200316	PAHs by EPA Method 8270 SIM (surface and subsurface soil), BTEX by EPA Method 8260B (subsurface soil only), and pH by field screening	3/16/2020	1530	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing of PAH samples; Eurofins TestAmerica, Denver, CO for processing of BTEX samples; Eurofins TestAmerica, Denver, CO for analysis	280-J134674-1
		IINY-DU-20B-SSIS-20200316		3/16/2020	1530	Not applicable		280-J134674-1
		IINY-DU-20C-SSIS-20200316		3/16/2020	1530	Not applicable		280-J134674-1
	Subsurface soil triplicate incremental sample	IINY-DU-20A-SBIS1-20200317		3/17/2020	930	MS/MSD		280-280-J134677-1/280-J134675-1
		IINY-DU-20B-SBIS1-20200317		3/17/2020	930	Not applicable		280-280-J134677-1/280-J134675-1
		IINY-DU-20C-SBIS1-20200317		3/17/2020	930	Not applicable		280-280-J134677-1/280-J134675-1
DU-21	Surface soil triplicate incremental sample	IINY-DU-21A-SSIS-20200317	PAHs by EPA Method 8270 SIM (surface and subsurface soil), BTEX by EPA Method 8260B (subsurface soil only), and pH by field screening	3/17/2020	1240	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing of PAH samples; Eurofins TestAmerica, Denver, CO for processing of BTEX samples; Eurofins TestAmerica, Denver, CO for analysis	280-J134675-1
		IINY-DU-21B-SSIS-20200317		3/17/2020	1240	Not applicable		280-J134675-1
		IINY-DU-21C-SSIS-20200317		3/17/2020	1240	Not applicable		280-J134675-1
	Subsurface soil triplicate incremental sample	IINY-DU-21A-SBIS1-20200317		3/17/2020	1145	Not applicable		280-280-J134677-1/280-J134675-1
		IINY-DU-21B-SBIS1-20200317		3/17/2020	1145	Not applicable		280-280-J134677-1/280-J134675-1
		IINY-DU-21C-SBIS1-20200317		3/17/2020	1145	Not applicable		280-280-J134677-1/280-J134675-1
DU-22	Surface soil triplicate incremental sample	IINY-DU-22A-SSIS-20200316	PAHs by EPA Method 8270 SIM (surface and subsurface soil), BTEX by EPA Method 8260B (subsurface soil only), and pH by field screening	3/16/2020	1530	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J134674-1
		IINY-DU-22B-SSIS-20200316		3/16/2020	1530	Not applicable		280-J134674-1
		IINY-DU-22C-SSIS-20200316		3/16/2020	1530	Not applicable		280-J134674-1
	Subsurface soil triplicate incremental sample	Not Collected	Advanced 6 hand auger borings at DU-22. Soil depth to refusal ranged from 6 to 8 inches bgs (<1 ft). Did not collect subsurface soil.					

Table 3-1 HTRW RI Phase I Sample Collection

Sample Location	Sample Type	Sample Identification Code	Analyses	Sample Date	Sample Time	QA/QC Sample	Analytical Laboratory	Laboratory Report
DU-23	Surface soil triplicate incremental sample	IINY-DU-23A-SSIS-20200320	Aroclor PCBs by EPA Method 8082A, and pH by field screening	3/20/2020	915	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J134848-1
		IINY-DU-23B-SSIS-20200320		3/20/2020	915	Not applicable		280-J134848-1
		IINY-DU-23C-SSIS-20200320		3/20/2020	915	Not applicable		280-J134848-1
	Subsurface soil triplicate incremental sample	Not Collected		Advanced 5 hand auger borings at DU-23. Soil depth to refusal less than 6 inches bgs (<1 ft). Majority of DU is exposed bedrock. Very shallow soil. Did not collect subsurface soil.				
DU-24	Surface soil triplicate incremental sample	Not Collected	Aroclor PCBs by EPA Method 8082A, and pH by field screening	DU-24 Deletion – Historical documents indicate that a former transformers on a pole was located along the former eastern sentry path from Iona Island onto Round Island. A 60x60 ft decision unit, DU-24, was established on Round Island to evaluate the presence/absence of PCBs associated with the former transformer. DU-24 was one of three transformer decision units that is known as HTRW AOC #19 on Iona Island (Note: the other two transformer decision units were collect). DU-24 is bounded by the Hudson River to east/northeast and the former dump area between Iona and Round Islands to the northwest. A downed former electric pole was noted during a reconnaissance on 20 March 2020. The majority of DU-24 is exposed bedrock with little to thin soil cover. Sediment and soil was noted along the northeastern edge of DU-24 off the bedrock outcrop of Round Island, however this sediment/soil is along the shoreline of the tidally influenced Hudson River. Per a call with USACE on 24 March 2020, DU-24 will not be sampled. There is little/no soil available for sampling in the area of the former transformer. Any PCBs that may have been released from former transformers would have been transported via runoff and overland flow across the bedrock outcrop of Round Island to the Hudson River. However, as the Hudson River itself is a PCB source, collecting PCBs from soil/sediment along the Hudson River will not provide information that could be used to evaluate a potential release related to former transformers.					
	Subsurface soil triplicate incremental sample							
DU-25	Surface soil triplicate incremental sample	IINY-DU-25A-SSIS-20200320	Aroclor PCBs by EPA Method 8082A, and pH by field screening	3/20/2020	1030	MS/MSD	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J134848-1
		IINY-DU-25B-SSIS-20200320		3/20/2020	1030	Not applicable		280-J134848-1
		IINY-DU-25C-SSIS-20200320		3/20/2020	1030	Not applicable		280-J134848-1
	Subsurface soil triplicate incremental sample	Not Collected		Advanced 5 hand auger borings at DU-25. Exposed bedrock and bedrock wall within DU. Soil depth to refusal less than 8 inches bgs (<1 ft). Did not collect subsurface soil.				
Former Buildings Identified as Having Significant Potential for Explosive Hazard (EXDU; pending direction of contracting offer): Surface and Subsurface Soil								
EXDU-1	Surface soil triplicate incremental sample	IINY-DU-1A-SSIS-20200317	Explosives residues by EPA Method 8330B, and pH by field screening	3/17/2020	1535	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J134675-1
		IINY-DU-1B-SSIS-20200317		3/17/2020	1535	Not applicable		280-J134675-1
		IINY-DU-1C-SSIS-20200317		3/17/2020	1535	Not applicable		280-J134675-1
EXDU-2	Surface soil triplicate incremental sample	IINY-DU-2A-SSIS-20200317	Explosives residues by EPA Method 8330B, and pH by field screening	3/17/2020	1610	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J134675-1
		IINY-DU-2B-SSIS-20200317		3/17/2020	1610	Not applicable		280-J134675-1
		IINY-DU-2C-SSIS-20200317		3/17/2020	1610	Not applicable		280-J134675-1
EXDU-3	Surface soil triplicate incremental sample	IINY-DU-3A-SSIS-20200318	Explosives residues by EPA Method 8330B, and pH by field screening	3/18/2020	800	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J134722-1
		IINY-DU-3B-SSIS-20200318		3/18/2020	800	Not applicable		280-J134722-1
		IINY-DU-3C-SSIS-20200318		3/18/2020	800	Not applicable		280-J134722-1
EXDU-4	Surface soil triplicate incremental sample	IINY-DU-4A-SSIS-20200317	Explosives residues by EPA Method 8330B, and pH by field screening	3/17/2020	1430	MS/MSD	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J134675-1
		IINY-DU-4B-SSIS-20200317		3/17/2020	1430	Not applicable		280-J134675-1
		IINY-DU-4C-SSIS-20200317		3/17/2020	1430	Not applicable		280-J134675-1
EXDU-5	Surface soil triplicate incremental sample	IINY-DU-5A-SSIS-20200318	Explosives residues by EPA Method 8330B, and pH by field screening	3/18/2020	930	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J134722-1
		IINY-DU-5B-SSIS-20200318		3/18/2020	930	Not applicable		280-J134722-1
		IINY-DU-5C-SSIS-20200318		3/18/2020	930	Not applicable		280-J134722-1
EXDU-6	Surface soil triplicate incremental sample	IINY-DU-6A-SSIS-20200318	Explosives residues by EPA Method 8330B, and pH by field screening	3/18/2020	1015	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J134722-1
		IINY-DU-6B-SSIS-20200318		3/18/2020	1015	Not applicable		280-J134722-1
		IINY-DU-6C-SSIS-20200318		3/18/2020	1015	Not applicable		280-J134722-1
EXDU-7	Surface soil triplicate incremental sample	IINY-DU-7A-SSIS-20200318	Explosives residues by EPA Method 8330B, and pH by field screening	3/18/2020	1145	MS/MSD	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J134722-1
		IINY-DU-7B-SSIS-20200318		3/18/2020	1145	Not applicable		280-J134722-1
		IINY-DU-7C-SSIS-20200318		3/18/2020	1145	Not applicable		280-J134722-1

Table 3-1 HTRW RI Phase I Sample Collection

Sample Location	Sample Type	Sample Identification Code	Analyses	Sample Date	Sample Time	QA/QC Sample	Analytical Laboratory	Laboratory Report
Phase I Background: Surface and Subsurface Soil								
BDU-1	Surface Soil Incremental Sample	IINY-BADU-1-SSIS-20200401	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM	4/1/2020	1145	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J135166-1
	Subsurface Soil Incremental Sample	Not Collected		<12" to refusal. Did not collect subsurface soil.				
BDU-2	Surface Soil Incremental Sample	IINY-BADU-2-SSIS-20200401	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM	4/1/2020	1215	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J135166-1
	Subsurface Soil Incremental Sample	Not Collected		<12" to refusal. Portions of DU is rock outcrop. Soil typically only 3" to 8" in depth. Did not collect subsurface soil.				
BDU-3	Surface Soil Incremental Sample	IINY-BADU-3-SSIS-20200401	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM	4/1/2020	1245	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J135166-1
	Subsurface Soil Incremental Sample	Not Collected		<12" to refusal. Portions of DU is rock outcrop. Soil typically only 3" to 8" in depth. Did not collect subsurface soil.				
BDU-4	Surface Soil Incremental Sample	IINY-BADU-4-SSIS-20200401	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM	4/1/2020	1320	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J135166-1
	Subsurface Soil Incremental Sample	Not Collected		<12" to refusal. Portions of DU is rock outcrop. Soil typically only 3" to 8" in depth. Did not collect subsurface soil.				
BDU-5	Surface Soil Incremental Sample	IINY-BADU-5-SSIS-20200401	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM	4/1/2020	955	MS/MSD	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J135166-1
	Subsurface Soil Incremental Sample	Not Collected		<12" to refusal. Portions of DU is rock outcrop. Soil typically only 3" to 8" in depth. Did not collect subsurface soil.				
BDU-6	Surface Soil Incremental Sample	IINY-BADU-6-SSIS-20200401	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM	4/1/2020	920	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J135166-1
	Subsurface Soil Incremental Sample	Not Collected		<12" to refusal. Portions of DU is rock outcrop. Soil typically only 3" to 8" in depth. Did not collect subsurface soil.				
BDU-7	Surface Soil Incremental Sample	IINY-BADU-7-SSIS-20200401	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM	4/1/2020	900	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J135166-1
	Subsurface Soil Incremental Sample	Not Collected		<12" to refusal. Portions of DU is rock outcrop. Soil typically only 3" to 8" in depth. Did not collect subsurface soil.				
BDU-8	Surface Soil Incremental Sample	IINY-BADU-8-SSIS-20200401	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM	4/1/2020	925	Not applicable	Eurofins TestAmerica St. Louis, MO for ISM processing; Eurofins TestAmerica, Denver, CO for analysis	280-J135166-1
	Subsurface Soil Incremental Sample	Not Collected		<12" to refusal. Portions of DU is rock outcrop. Soil typically only 3" to 8" in depth. Did not collect subsurface soil.				
QA/QC samples								
TB	Soil BTEX Trip Blank Sample	TB03172020	VOCs by 8260B	3/17/2020	1500	Trip Blank (VOCs)	Eurofins TestAmerica, Denver, CO for analysis	280-J134677-1
FB	Soil BTEX Field Blank Sample	FB03172020	VOCs by 8260B	3/17/2020	1545	Field Blank (VOCs)		280-J134677-1
Phase I Sediment Samples								
SD-01	Discrete Sediment Sample	IINY-SD01-20200407	TOC by Walkley-Black, grain size by ASTM D422	4/7/2020	1040	Not applicable	Katahdin Analytical Services, LLC, Scarborough, ME for analysis	SN2805
SD-02	Discrete Sediment Sample	IINY-SD02-20200407	TOC by Walkley-Black, grain size by ASTM D422	4/7/2020	1700	Not applicable		SN2805
SD-03	Discrete Sediment Sample	IINY-SD03-20200407	TOC by Walkley-Black, grain size by ASTM D422	4/7/2020	1600	Not applicable		SN2805
SD-04	Discrete Sediment Sample	IINY-SD04-20200407	TOC by Walkley-Black, grain size by ASTM D422	4/7/2020	235 (1435)	Not applicable		SN2805
SD-05	Discrete Sediment Sample	IINY-SD05-20200407	TOC by Walkley-Black, grain size by ASTM D422	4/7/2020	319 (1519)	Not applicable		SN2805
SD-06	Discrete Sediment Sample	IINY-SD06-20200407	TOC by Walkley-Black, grain size by ASTM D422	4/7/2020	247 (1447)	Not applicable		SN2805
SD-07	Discrete Sediment Sample	IINY-SD07-20200407	TOC by Walkley-Black, grain size by ASTM D423	4/7/2020	1630	Not applicable		SN2805

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Table 3-2 HTRW RI Phase II Sample Collection

Sample Location		Sample Type	Sample Identification Code	Analyses	Sample Date	Sample Time	QA/QC Sample	Analytical Laboratory	Laboratory Report
Phase II Investigation Area: Surface Soil									
DU-04		Surface Soil Incremental Sample collected in triplicate	IINY-DU-04A-SSIS-041822	TOC by Walkley Black, Grain Size by ASTM D422, Cation Exchange Capacity (CEC) by EPA SW-846 Method 9081, ORP by field screening (both field and standard hydrogen electrode corrected values)	4/18/2022	1450		EurofinTestAmerica Canton, OH for ISM processing; Eurofins TestAmerica, Corpus Christi, TX for CEC analysis; Katahdin Analytical Services, LLC, Scarborough, ME for TOC and grain size analysis	280-J161296-1 for TOC and grain size, 280-J161296-2 for CEC
			IINY-DU-04B-SSIS-041822		4/18/2022	1450			
			IINY-DU-04C-SSIS-041822		4/18/2022	1450			
DU-07		Surface Soil Incremental Sample collected in triplicate	IINY-DU-07A-SSIS-041822		4/18/2022	1325			
			IINY-DU-07B-SSIS-041822		4/18/2022	1325			
			IINY-DU-07C-SSIS-041822		4/18/2022	1325			
DU-09		Surface Soil Incremental Sample collected in triplicate	IINY-DU-09A-SSIS-041822		4/18/2022	1620			
			IINY-DU-09B-SSIS-041822		4/18/2022	1620			
			IINY-DU-09C-SSIS-041822		4/18/2022	1620			
DU-11		Surface Soil Incremental Sample collected in triplicate	IINY-DU-11A-SSIS-041822		4/18/2022	1400	MS/MSD		
			IINY-DU-11B-SSIS-041822		4/18/2022	1400			
			IINY-DU-11C-SSIS-041822		4/18/2022	1400			
DU-13		Surface Soil Incremental Sample collected in triplicate	IINY-DU-13A-SSIS-041822		4/18/2022	1540			
			IINY-DU-13B-SSIS-041822		4/18/2022	1540			
			IINY-DU-13C-SSIS-041822		4/18/2022	1540			
DU-17		Surface Soil Incremental Sample collected in triplicate	IINY-DU-17A-SSIS-041922		4/19/2022	950			
			IINY-DU-17B-SSIS-041922		4/19/2022	950			
			IINY-DU-17C-SSIS-041922		4/19/2022	950			
DU-18		Surface Soil Incremental Sample collected in triplicate	IINY-DU-18A-SSIS-041922		4/19/2022	1015			
			IINY-DU-18B-SSIS-041922		4/19/2022	1015			
			IINY-DU-18C-SSIS-041922		4/19/2022	1015			
DU-19		Surface Soil Incremental Sample collected in triplicate	IINY-DU-19A-SSIS-041922		4/19/2022	925			
			IINY-DU-19B-SSIS-041922		4/19/2022	925			
			IINY-DU-19C-SSIS-041922		4/19/2022	925	MS/MSD		
Phase II Investigation Area: Surface Water									
AOC #16 – Area D (former Dumping Area)	DUMP-SW-01	Discrete Surface Water Sample	IINY-DUMP-SW-01-041922	Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, Hardness by SM2340B	4/19/2022	1610		Eurofins TestAmerica, Denver, CO for analysis	280-J161371-1 for metals and mercury, 280-J161371-2 for hardness
	DUMP-SW-02	Discrete Surface Water Sample	IINY-DUMP-SW-02-041922		4/19/2022	1500			
	DUMP-SW-03	Discrete Surface Water Sample	IINY-DUMP-SW-03-041922		4/19/2022	1415			
	DUMP-SW-04	Discrete Surface Water Sample	IINY-DUMP-SW-04-041922		4/19/2022	1550			
	DUMP-SW-05	Discrete Surface Water Sample	IINY-DUMP-SW-05-041922		4/19/2022	1525			
	DUMP-SW-06	Discrete Surface Water Sample	IINY-DUMP-SW-06-041922		4/19/2022	1455			
	DUMP-SW-07	Discrete Surface Water Sample	IINY-DUMP-SW-07-041922		4/19/2022	1405			
	DUMP-SW-08	Discrete Surface Water Sample	IINY-DUMP-SW-08-041922		4/19/2022	1330			
	DUMP-SW-09	Discrete Surface Water Sample	IINY-DUMP-SW-09-041922		4/19/2022	1545			
	DUMP-SW-10	Discrete Surface Water Sample	IINY-DUMP-SW-10-041922		4/19/2022	1520			
	DUMP-SW-11	Discrete Surface Water Sample	IINY-DUMP-SW-11-041922		4/19/2022	1450			
	DUMP-SW-12	Discrete Surface Water Sample	IINY-DUMP-SW-12-041922		4/19/2022	1400			
	DUMP-SW-13	Discrete Surface Water Sample	IINY-DUMP-SW-13-041922		4/19/2022	1325			
	DUMP-SW-14	Discrete Surface Water Sample	IINY-DUMP-SW-14-041922		4/19/2022	1540			
	DUMP-SW-15	Discrete Surface Water Sample	IINY-DUMP-SW-15-041922		4/19/2022	1515			
	DUMP-SW-16	Discrete Surface Water Sample	IINY-DUMP-SW-16-041922		4/19/2022	1445			
	DUMP-SW-17	Discrete Surface Water Sample	IINY-DUMP-SW-17-041922		4/19/2022	1350			
	DUMP-SW-18	Discrete Surface Water Sample	IINY-DUMP-SW-18-041922		4/19/2022	1320	Parent		
		Discrete Surface Water Sample	IINY-DUMP-SW-FD1-041922		4/19/2022	800	Duplicate, MS/MSD		
	DUMP-SW-19	Discrete Surface Water Sample	IINY-DUMP-SW-19-041922		4/19/2022	1345			
	DUMP-SW-20	Discrete Surface Water Sample	IINY-DUMP-SW-20-041922		4/19/2022	1535			
Hudson River shoreline adjacent to AOC #16 – Area D	IHRS-SW-01	Discrete Surface Water Sample	IINY-IHRS-SW-01-041922	Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, Hardness by SM2340B	4/19/2022	1630		Eurofins TestAmerica, Denver, CO for analysis	280-J161368-1 for metals and mercury, 280-J161368-2 for hardness
	IHRS-SW-02	Discrete Surface Water Sample	IINY-IHRS-SW-02-041922		4/19/2022	1632			
	IHRS-SW-03	Discrete Surface Water Sample	IINY-IHRS-SW-03-041922		4/19/2022	1635			
	IHRS-SW-04	Discrete Surface Water Sample	IINY-IHRS-SW-04-041922		4/19/2022	1638	Parent		
		Discrete Surface Water Sample	IINY-IHRS-SW-FD1-041922		4/19/2022	800	Duplicate, MS/MSD		
	IHRS-SW-05	Discrete Surface Water Sample	IINY-IHRS-SW-05-041922		4/19/2022	1642			
	IHRS-SW-06	Discrete Surface Water Sample	IINY-IHRS-SW-06-041922		4/19/2022	1645			
	IHRS-SW-07	Discrete Surface Water Sample	IINY-IHRS-SW-07-041922		4/19/2022	1648			
	IHRS-SW-08	Discrete Surface Water Sample	IINY-IHRS-SW-08-041922		4/19/2022	1653			
	IHRS-SW-09	Discrete Surface Water Sample	IINY-IHRS-SW-09-041922		4/19/2022	1656			
	IHRS-SW-10	Discrete Surface Water Sample	IINY-IHRS-SW-10-041922		4/19/2022	1700			
	IHRS-SW-11	Discrete Surface Water Sample	IINY-IHRS-SW-11-041922		4/19/2022	1703			
	IHRS-SW-12	Discrete Surface Water Sample	IINY-IHRS-SW-12-041922		4/19/2022	1707			
	IHRS-SW-13	Discrete Surface Water Sample	IINY-IHRS-SW-13-041922		4/19/2022	1710			
	IHRS-SW-14	Discrete Surface Water Sample	IINY-IHRS-SW-14-041922		4/19/2022	1714			
	IHRS-SW-15	Discrete Surface Water Sample	IINY-IHRS-SW-15-041922		4/19/2022	1719			
	IHRS-SW-16	Discrete Surface Water Sample	IINY-IHRS-SW-16-041922		4/19/2022	1722			
	IHRS-SW-17	Discrete Surface Water Sample	IINY-IHRS-SW-17-041922		4/19/2022	1725			
	IHRS-SW-18	Discrete Surface Water Sample	IINY-IHRS-SW-18-041922		4/19/2022	1730			
	IHRS-SW-19	Discrete Surface Water Sample	IINY-IHRS-SW-19-041922		4/19/2022	1735			
	IHRS-SW-20	Discrete Surface Water Sample	IINY-IHRS-SW-20-041922		4/19/2022	1740			

Table 3-2 HTRW RI Phase II Sample Collection

Sample Location		Sample Type	Sample Identification Code	Analyses	Sample Date	Sample Time	QA/QC Sample	Analytical Laboratory	Laboratory Report
Iona Marsh shoreline at outlet of riprap filled drainage swale	RRDS-SW-01	Discrete Surface Water Sample	IINY-RRDS-SW-01-042022	Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, Hardness by SM2340B	4/20/2022	1500		Eurofins TestAmerica, Denver, CO for analysis	280-J161508-1 for metals and mercury, 280-J161508-2 for hardness
	RRDS-SW-02	Discrete Surface Water Sample	IINY-RRDS-SW-02-042022		4/20/2022	1505			
	RRDS-SW-03	Discrete Surface Water Sample	IINY-RRDS-SW-03-042022		4/20/2022	1510			
	RRDS-SW-04	Discrete Surface Water Sample	IINY-RRDS-SW-04-042022		4/20/2022	1515			
	RRDS-SW-05	Discrete Surface Water Sample	IINY-RRDS-SW-05-042022		4/20/2022	1520			
	RRDS-SW-06	Discrete Surface Water Sample	IINY-RRDS-SW-06-042022		4/20/2022	1525			
	RRDS-SW-07	Discrete Surface Water Sample	IINY-RRDS-SW-07-042022		4/20/2022	1530			
	RRDS-SW-08	Discrete Surface Water Sample	IINY-RRDS-SW-08-042022		4/20/2022	1535			
	RRDS-SW-09	Discrete Surface Water Sample	IINY-RRDS-SW-09-042022		4/20/2022	1540			
	RRDS-SW-10	Discrete Surface Water Sample	IINY-RRDS-SW-10-042022		4/20/2022	1545	Parent		
			IINY-RRDS-SW-FD1-042022		4/20/2022	800	Duplicate, MS/MSD		
Iona Marsh shoreline at outlet of tidal wetland swale	TWS-SW-01	Discrete Surface Water Sample	IINY-TWS-SW-01-042022	Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, Hardness by SM2340B	4/20/2022	1340		Eurofins TestAmerica, Denver, CO for analysis	
	TWS-SW-02	Discrete Surface Water Sample	IINY-TWS-SW-02-042022		4/20/2022	1345			
	TWS-SW-03	Discrete Surface Water Sample	IINY-TWS-SW-03-042022		4/20/2022	1350			
	TWS-SW-04	Discrete Surface Water Sample	IINY-TWS-SW-04-042022		4/20/2022	1355			
	TWS-SW-05	Discrete Surface Water Sample	IINY-TWS-SW-05-042022		4/20/2022	1400			
	TWS-SW-06	Discrete Surface Water Sample	IINY-TWS-SW-06-042022		4/20/2022	1405			
	TWS-SW-07	Discrete Surface Water Sample	IINY-TWS-SW-07-042022		4/20/2022	1410			
	TWS-SW-08	Discrete Surface Water Sample	IINY-TWS-SW-08-042022		4/20/2022	1415			
	TWS-SW-09	Discrete Surface Water Sample	IINY-TWS-SW-09-042022		4/20/2022	1420			
	TWS-SW-10	Discrete Surface Water Sample	IINY-TWS-SW-10-042022		4/20/2022	1425			
Phase II Investigation Area: ISM Sediment									
Hudson River shoreline adjacent to AOC #16 – Area D	IHRS-DU-01	Sediment Incremental Sample collected in triplicate	IINY-IHRS-DU-01A-SEDIS-041922	Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, TOC by Walkley Black, Grain Size by ASTM D422, pH by field screening, ORP by field screening (both field and standard hydrogen electrode corrected values)	4/19/2022	1045	MS/MSD	EurofinTestAmerica Canton, OH for ISM processing; Eurofins TestAmerica, Denver, CO for metals and mercury analysis; Katahdin Analytical Services, LLC, Scarborough, ME for TOC and grain size analysis	280-161297-1
			IINY-IHRS-DU-01B-SEDIS-041922		4/19/2022	1045			
			IINY-IHRS-DU-01C-SEDIS-041922		4/19/2022	1045			
Iona Marsh shoreline at outlet of riprap filled drainage swale	RRDS-DU-01	Sediment Incremental Sample collected in triplicate	IINY-RRDS-DU-01A-SEDIS-041922		4/19/2022	1130			
			IINY-RRDS-DU-01B-SEDIS-041922		4/19/2022	1130			
			IINY-RRDS-DU-01C-SEDIS-041922		4/19/2022	1130			
Iona Marsh shoreline at outlet of tidal wetland swale	TWS-DU-01	Sediment Incremental Sample collected in triplicate	IINY-TWS-DU-01A-SEDIS-041922		4/19/2022	1210			
			IINY-TWS-DU-01B-SEDIS-041922		4/19/2022	1210			
			IINY-TWS-DU-01C-SEDIS-041922		4/19/2022	1210			
Phase II Investigation Area: Discrete Sediment									
Hudson River shoreline adjacent to AOC #16 – Area D	IHRS-SED-01	Discrete Sediment Sample	IINY-IHRS-SED-01-041922	AVS/SEM by 4500-S2D and EPA Method 6010C	4/19/2022	1050		Eurofins-Lancaster, PA for analysis	280-J161283-1
	IHRS-SED-02	Discrete Sediment Sample	IINY-IHRS-SED-02-041922		4/19/2022	1055			
	IHRS-SED-03	Discrete Sediment Sample	IINY-IHRS-SED-03-041922		4/19/2022	1045			
Iona Marsh shoreline at outlet of riprap filled drainage swale	RRDS-SED-01	Discrete Sediment Sample	IINY-RRDS-SED-01-041922		4/19/2022	1130			
	RRDS-SED-02	Discrete Sediment Sample	IINY-RRDS-SED-02-041922		4/19/2022	1135			
	RRDS-SED-03	Discrete Sediment Sample	IINY-RRDS-SED-03-041922		4/19/2022	140	Parent		
			IINY-RRDS-FD1-041922		4/19/2022	800	Duplicate		
Iona Marsh shoreline at outlet of tidal wetland swale	TWS-SED-01	Discrete Sediment Sample	IINY-TWS-SED-01-041922		4/19/2022	1210	MS/MSD		
	TWS-SED-02	Discrete Sediment Sample	IINY-TWS-SED-02-041922		4/19/2022	125			
	TWS-SED-03	Discrete Sediment Sample	IINY-TWS-SED-03-041922		4/19/2022	1220			
Phase II Background: ISM Sediment									
Con Hook Hudson River Shoreline	CHHRS-SU-01	Sediment Incremental Sample collected in single	IINY-CHHRS-SU-01-SEDIS-042122	Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, TOC by Walkley Black, Grain Size by ASTM D422,pH by field screening, ORP by field screening (both field and standard hydrogen electrode corrected values)	4/21/2022	1300		EurofinTestAmerica Canton, OH for ISM processing; Eurofins TestAmerica, Denver, CO for metals and mercury analysis; Katahdin Analytical Services, LLC, Scarborough, ME for TOC and grain size analysis	280-161477-1
	CHHRS-SU-02	Sediment Incremental Sample collected in single	IINY-CHHRS-SU-02-SEDIS-042122		4/21/2022	1240			
	CHHRS-SU-03	Sediment Incremental Sample collected in single	IINY-CHHRS-SU-03-SEDIS-042122		4/21/2022	1220			
	CHHRS-SU-04	Sediment Incremental Sample collected in single	IINY-CHHRS-SU-04-SEDIS-042122		4/21/2022	1140			
	CHHRS-SU-05	Sediment Incremental Sample collected in single	IINY-CHHRS-SU-05-SEDIS-042122		4/21/2022	1125			
	CHHRS-SU-06	Sediment Incremental Sample collected in single	IINY-CHHRS-SU-06-SEDIS-042122		4/21/2022	1040			
	CHHRS-SU-07	Sediment Incremental Sample collected in single	IINY-CHHRS-SU-07-SEDIS-042122		4/21/2022	1015	MS/MSD		
	CHHRS-SU-08	Sediment Incremental Sample collected in single	IINY-CHHRS-SU-08-SEDIS-042122		4/21/2022	1005			
Con Hook Marsh Shoreline	CHMS-SU-1	Sediment Incremental Sample collected in single	IINY-CHMS-SU-01-SEDIS-042122	Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, TOC by Walkley Black, Grain Size by ASTM D422, pH by field screening, ORP by field screening (both field and standard hydrogen electrode corrected values)	4/21/2022	1444		EurofinTestAmerica Canton, OH for ISM processing; Eurofins TestAmerica, Denver, CO for metals and mercury analysis; Katahdin Analytical Services, LLC, Scarborough, ME for TOC and grain size analysis	
	CHMS-SU-2	Sediment Incremental Sample collected in single	IINY-CHMS-SU-02-SEDIS-042122		4/21/2022	1437			
	CHMS-SU-3	Sediment Incremental Sample collected in single	IINY-CHMS-SU-03-SEDIS-042122		4/21/2022	1429			
	CHMS-SU-4	Sediment Incremental Sample collected in single	IINY-CHMS-SU-04-SEDIS-042122		4/21/2022	1420			
	CHMS-SU-5	Sediment Incremental Sample collected in single	IINY-CHMS-SU-05-SEDIS-042122		4/21/2022	1407			
	CHMS-SU-6	Sediment Incremental Sample collected in single	IINY-CHMS-SU-06-SEDIS-042122		4/21/2022	1355			
	CHMS-SU-7	Sediment Incremental Sample collected in single	IINY-CHMS-SU-07-SEDIS-042122		4/21/2022	1345			
	CHMS-SU-8	Sediment Incremental Sample collected in single	IINY-CHMS-SU-08-SEDIS-042122		4/21/2022	1330			

Table 3-2 HTRW RI Phase II Sample Collection

Sample Location		Sample Type	Sample Identification Code	Analyses	Sample Date	Sample Time	QA/QC Sample	Analytical Laboratory	Laboratory Report
Phase II Background: Surface Water									
Con Hook Hudson River Shoreline	CHHRS-SW-01	Discrete Surface Water Sample	IINY-CHHRS-SW-01-042122	Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, Hardness by SM2340B	4/21/2022	955		Eurofins TestAmerica, Denver, CO for analysis	208-J161508-5 for metals and mercury, 280-J161508-6 for hardness
	CHHRS-SW-02	Discrete Surface Water Sample	IINY-CHHRS-SW-02-042122		4/21/2022	1005	Parent		
			IINY-CHHRS-SW-FD1-042122		4/21/2022	800	Duplicate, MS/MSD		
	CHHRS-SW-03	Discrete Surface Water Sample	IINY-CHHRS-SW-03-042122		4/21/2022	1015			
	CHHRS-SW-04	Discrete Surface Water Sample	IINY-CHHRS-SW-04-042122		4/21/2022	1025			
	CHHRS-SW-05	Discrete Surface Water Sample	IINY-CHHRS-SW-05-042122		4/21/2022	1050			
	CHHRS-SW-06	Discrete Surface Water Sample	IINY-CHHRS-SW-06-042122		4/21/2022	1100			
	CHHRS-SW-07	Discrete Surface Water Sample	IINY-CHHRS-SW-07-042122		4/21/2022	1115			
	CHHRS-SW-08	Discrete Surface Water Sample	IINY-CHHRS-SW-08-042122		4/21/2022	1140			
	CHHRS-SW-09	Discrete Surface Water Sample	IINY-CHHRS-SW-09-042122		4/21/2022	1200			
	CHHRS-SW-10	Discrete Surface Water Sample	IINY-CHHRS-SW-10-042122		4/21/2022	1210			
	CHHRS-SW-11	Discrete Surface Water Sample	IINY-CHHRS-SW-11-042122		4/21/2022	1235			
	CHHRS-SW-12	Discrete Surface Water Sample	IINY-CHHRS-SW-12-042122		4/21/2022	1300			
	CHHRS-SW-13	Discrete Surface Water Sample	IINY-CHHRS-SW-13-042122		4/21/2022	1315			
	CHHRS-SW-14	Discrete Surface Water Sample	IINY-CHHRS-SW-14-042122		4/21/2022	1325			
	CHHRS-SW-15	Discrete Surface Water Sample	IINY-CHHRS-SW-15-042122		4/21/2022	1335			
	CHHRS-SW-16	Discrete Surface Water Sample	IINY-CHHRS-SW-16-042122		4/21/2022	1345			
	CHHRS-SW-17	Discrete Surface Water Sample	IINY-CHHRS-SW-17-042122		4/21/2022	1400			
	CHHRS-SW-18	Discrete Surface Water Sample	IINY-CHHRS-SW-18-042122		4/21/2022	1410			
	CHHRS-SW-19	Discrete Surface Water Sample	IINY-CHHRS-SW-19-042122		4/21/2022	1420			
	CHHRS-SW-20	Discrete Surface Water Sample	IINY-CHHRS-SW-20-042122		4/21/2022	1430			
Con Hook Marsh Shoreline	CHMS-SW-01	Discrete Surface Water Sample	IINY-CHMS-SW-01-042122	Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, Hardness by SM2340B	4/21/2022	1730		Eurofins TestAmerica, Denver, CO for analysis	280-J161508-3 for metals and mercury, 280-J161508-4 for hardness
	CHMS-SW-02	Discrete Surface Water Sample	IINY-CHMS-SW-02-042122		4/21/2022	1725			
	CHMS-SW-03	Discrete Surface Water Sample	IINY-CHMS-SW-03-042122		4/21/2022	1715			
	CHMS-SW-04	Discrete Surface Water Sample	IINY-CHMS-SW-04-042122		4/21/2022	1710			
	CHMS-SW-05	Discrete Surface Water Sample	IINY-CHMS-SW-05-042122		4/21/2022	1705			
	CHMS-SW-06	Discrete Surface Water Sample	IINY-CHMS-SW-06-042122		4/21/2022	1640			
	CHMS-SW-07	Discrete Surface Water Sample	IINY-CHMS-SW-07-042122		4/21/2022	1635			
	CHMS-SW-08	Discrete Surface Water Sample	IINY-CHMS-SW-08-042122		4/21/2022	1632			
	CHMS-SW-09	Discrete Surface Water Sample	IINY-CHMS-SW-09-042122		4/21/2022	1631			
	CHMS-SW-10	Discrete Surface Water Sample	IINY-CHMS-SW-10-042122		4/21/2022	1630			
	CHMS-SW-11	Discrete Surface Water Sample	IINY-CHMS-SW-11-042122		4/21/2022	1620			
	CHMS-SW-12	Discrete Surface Water Sample	IINY-CHMS-SW-12-042122		4/21/2022	1615			
	CHMS-SW-13	Discrete Surface Water Sample	IINY-CHMS-SW-13-042122		4/21/2022	1610			
	CHMS-SW-14	Discrete Surface Water Sample	IINY-CHMS-SW-14-042122		4/21/2022	1600			
	CHMS-SW-15	Discrete Surface Water Sample	IINY-CHMS-SW-15-042122		4/21/2022	1555			
	CHMS-SW-16	Discrete Surface Water Sample	IINY-CHMS-SW-16-042122		4/21/2022	1540			
	CHMS-SW-17	Discrete Surface Water Sample	IINY-CHMS-SW-17-042122		4/21/2022	1525	Parent		
			IINY-CHMS-SW-FD1-042122		4/21/2022	1525	Duplicate, MS/MSD		
	CHMS-SW-18	Discrete Surface Water Sample	IINY-CHMS-SW-18-042122		4/21/2022	1535			
	CHMS-SW-19	Discrete Surface Water Sample	IINY-CHMS-SW-19-042122		4/21/2022	1515			
	CHMS-SW-20	Discrete Surface Water Sample	IINY-CHMS-SW-20-042122		4/21/2022	1510			

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Table 5-1 Shoreline Reconnaissance Wild Observations

Common Name	Scientific Name	Recon Area Observed				
		Area 1	Area 2	Area 3	Area 4	Upland
White tailed deer	*Odocoileus virginianus*		X	X		X
Grey squirrel	*Sciurus carolinensis*				X	X
Northern water snake	*Nerodia sipedon*			X		
Black rat snake	*Panthrophis obsoletus*		X	X		
Painted turtle	*Chrysemys picta*		X			
Terrestrial snail	--	X				
Aquatic snail	--	X				
Amphipod	--	X				
Turkey vulture	*Cathartes aura*	X	X	X	X	X
Osprey	*Pandion haliaethus*	X	X	X		X
American crow	*Corvus brachyrhynchos*	X			X	X
Red-winged blackbird	*Agelaius phoeniceus*		X	X		
Mourning dove	*Agelaius phoeniceus*					X
Northern cardinal	*Cardinalis*					X
Northern bluejay	*Cyanocitta cristata*			X		X
Great scaup	*Aythya marila*	X				
Pileated woodpecker	*Dryocopus pileatus*					X
Ring-billed gull	*Larus delawarensis*	X				X

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Table 5-2 Soil Field Observations and Field Screening Results

Decision Unit #	Sample Type	Depth of sample	Depth to Refusal	Soil Description	USCS Code[1]	Phase I Field pH					
						Screening Result	Mean	Median	Range	Arithmetic Standard Deviation	% Relative Standard Deviation
Onsite Soil											
DU-1	Surface Soil	0-6 inches	8 inches	Brown, dry silt and organic material with trace fine- to coarse-grained sand and gravel	OL	5.6 6.5 6.8	6.3	6.5	5.6 to 6.8	0.6	9.9
DU-2	Surface Soil	0-6 inches	8 inches	Brown, dry silt and organic material with trace fine- to coarse-grained sand and gravel	OL	5.6 6.6 6.8	6.3	6.6	5.6 to 6.8	0.6	10.2
DU-3	Surface Soil	0-6 inches	8 inches	Brown, dry silt with organics and trace fine- to coarse-grained sand and gravel	OL	7.0 7.0 7.1	7.0	7.0	7 to 7.1	0.1	0.8
DU-4	Surface Soil	0-6 inches	12 inches	Brown, dry silt with organics and trace fine- to coarse-grained sand and gravel	OL	6.9 7.0 7.1	7.0	7.0	6.9 to 7.1	0.1	1.4
DU-5	Surface Soil	0-6 inches	8 inches	Brown, dry silt with organics and trace fine- to coarse-grained sand and gravel	OL	7.1 7.1 7.1	7.1	7.1	7.1 to 7.1	0.0	0.0
DU-6	Surface Soil	0-6 inches	8 inches	Brown with some light brown and yellow coloring, slightly moist silt with trace clay and very fine-grained sand	ML	7.5 7.5 7.5	7.5	7.5	7.5 to 7.5	0.0	0.0
DU-7	Surface Soil	0-6 inches	8 inches	Brown, dry silt with organics, trace clay and very fine-grained sand	OL	7.4 7.4 7.5	7.4	7.4	7.4 to 7.5	0.1	0.8
DU-9	Surface Soil	0-6 inches	8 inches	Brown, slightly moist silt with organics, trace clay and very fine-grained sand	OL	7.1 6.9 7.0	7.0	7.0	6.9 to 7.1	0.1	1.4
DU-10	Surface Soil	0-6 inches	8 inches	Brown, slightly moist silt with organics, trace clay and very fine-grained sand	OL	7.1 7.1 7.2	7.1	7.1	7.1 to 7.2	0.1	0.8
DU-11	Surface Soil	0-6 inches	12 inches	Brown, moist, well sorted silt with trace fine-grained sand	ML	7.0 7.0 7.2	7.1	7.0	7 to 7.2	0.1	1.6
DU-12	Surface Soil	0-6 inches	2 inches	Dark brown, moist, well sorted silt and organic material with trace fine-grained sand	OL	5.5 6.1 6.3	6.0	6.1	5.5 to 6.3	0.4	7.0
DU-13	Surface Soil	0-6 inches	2 inches	Dark brown, moist, well sorted silt with trace fine-grained sand	ML	6.8 7.0 6.9	6.9	6.9	6.8 to 7	0.1	1.4
DU-14	Surface Soil	0-6 inches	8 inches	Dark brown, dry, well sorted silt with trace fine-grained sand	ML	6.7 6.9 7.0	6.9	6.9	6.7 to 7	0.2	2.2
DU-15	Surface Soil	0-6 inches	12 inches	Dark brown, dry, well sorted silt with trace fine-grained sand	ML	6.2 6.3 6.6	6.4	6.3	6.2 to 6.6	0.2	3.3
DU-16	Surface Soil	0-6 inches	12 inches	Dark brown, dry, well sorted silt and organic material with trace fine-grained sand	OL	6.9 6.9 7.4	7.1	6.9	6.9 to 7.4	0.3	4.1
DU-17	Surface Soil	0-6 inches	>36 inches	Dark brown, moist, well sorted silt and organic material with trace fine-grained sand	OL	7.2 7.2 7.1	7.2	7.2	7.1 to 7.2	0.1	0.8
	Subsurface Soil	6-36 inches		Black, very moist, poorly sorted sand	SW	7.0 7.4 7.7	7.4	7.4	7 to 7.7	0.4	4.8
DU-18	Surface Soil	0-6 inches	>36 inches	Dark brown, moist, moderately sorted silt with trace fine-grained sand	ML	7.5 8.0 7.8	7.8	7.8	7.5 to 8	0.3	3.2
	Subsurface Soil	6-36 inches		Very moist, dark brown to grey silt with trace fine-grained sand	ML	8.1 8.1 8.0	8.1	8.1	8 to 8.1	0.1	0.7
DU-19	Surface Soil	0-6 inches	>36 inches	Dark brown, moist, moderately sorted silt and organic material with trace fine-grained sand	OL	7.7 7.5 7.4	7.5	7.5	7.4 to 7.7	0.2	2.0
	Subsurface Soil	6-36 inches		Very moist, dark grey (with a bluish tint), well sorted silt with trace fine-grained sand	ML	7.0 7.4 7.7	7.4	7.4	7 to 7.7	0.4	4.8

Decision Unit #	Sample Type	Depth of sample	Depth to Refusal	Soil Description	USCS Code[1]	Phase I Field pH					
						Screening Result	Mean	Median	Range	Arithmetic Standard Deviation	% Relative Standard Deviation
DU-20	Surface Soil	0-6 inches	18 inches	Dry, brown, poorly sorted silt with trace fine- to coarse grained sand and fine to medium gravel	ML	6.1 6.5 6.6	6.4	6.5	6.1 to 6.6	0.3	4.1
	Subsurface Soil	6-18 inches		Dry, brown, poorly sorted silt with trace fine- to coarse grained sand and fine to medium gravel	ML	6.8 6.9 6.8	6.8	6.8	6.8 to 6.9	0.1	0.8
DU-21	Surface Soil	0-6 inches	24 inches	Dry, brown, poorly sorted silt with trace fine- to coarse grained sand and fine- to coarse-grained gravel	ML	6.3 6.8 6.8	6.6	6.8	6.3 to 6.8	0.3	4.4
	Subsurface Soil	6-24 inches		Dry, brown, poorly sorted silt with trace fine- to coarse grained sand and fine to medium gravel	ML	7.0 7.1 7.3	7.1	7.1	7 to 7.3	0.2	2.1
DU-22	Surface Soil	0-6 inches	8 inches	Dry, brown, poorly sorted silt with trace fine- to coarse grained sand and fine- to coarse-grained gravel	ML	6.7 6.8 6.8	6.8	6.8	6.7 to 6.8	0.1	0.9
DU-23	Surface Soil	0-6 inches	6 inches	Dry, dark brown, moderately sorted silt with trace fine-grained sand	ML	6.0 5.4 5.5	5.6	5.5	5.4 to 6	0.3	5.7
DU-25	Surface Soil	0-6 inches	8 inches	Dry, brown, moderately sorted silt with organic material	OL	6.2 6.4 6.4	6.3	6.4	6.2 to 6.4	0.1	1.8
EXDU-1	Surface Soil	0-6 inches	Not applicable	Brown, dry silt with trace fine- to coarse-grained sand and gravel	ML	7.0 6.9 6.9	6.9	6.9	6.9 to 7	0.1	0.8
EXDU-2	Surface Soil	0-6 inches	Not applicable	Brown, dry silt with trace fine- to coarse-grained sand and gravel	ML	7.0 6.8 6.9	6.9	6.9	6.8 to 7	0.1	1.4
EXDU-3	Surface Soil	0-6 inches	Not applicable	Brown, slightly moist silt and organics with trace clay and very fine to fine-grained sand	OL	6.3 6.5 5.5	6.1	6.3	5.5 to 6.5	0.5	8.7
EXDU-4	Surface Soil	0-6 inches	Not applicable	Brown, dry silt with trace fine- to coarse-grained sand and gravel	OL	6.5 6.3 6.8	6.5	6.5	6.3 to 6.8	0.3	3.9
EXDU-5	Surface Soil	0-6 inches	Not applicable	Brown, slightly moist silt with organics and trace clay	OL	7.1 7.2 7.3	7.2	7.2	7.1 to 7.3	0.1	1.4
EXDU-6	Surface Soil	0-6 inches	Not applicable	Brown, slightly moist silt with organics and trace clay and coarse gravel	OL	7.2 7.3 7.3	7.3	7.3	7.2 to 7.3	0.1	0.8
EXDU-7	Surface Soil	0-6 inches	Not applicable	Brown, slightly moist silt with organics and trace very fine sand and clay	OL	7.0 7.0 7.1	7.0	7.0	7 to 7.1	0.1	0.8
Background Soil											
BADU-1	Surface Soil	0-6 inches	<12 inches	Brown, slightly moist silt with organics, trace clay and very fine-grained sand	OL	6.3	6.2	6.1	5.9 to 6.7	0.3	4.0
BADU-2	Surface Soil	0-6 inches	8 inches	Brown, slightly moist silt with organics, trace clay and very fine-grained sand	OL	6.7					
BADU-3	Surface Soil	0-6 inches	8 inches	Brown, slightly moist silt with organics, trace clay and very fine-grained sand	OL	6.0					
BADU-4	Surface Soil	0-6 inches	8 inches	Brown, slightly moist silt with organics, trace clay and very fine-grained sand	OL	6.1					
BADU-5	Surface Soil	0-6 inches	8 inches	Brown, slightly moist silt with organics, trace clay and very fine-grained sand	OL	6.1					
BADU-6	Surface Soil	0-6 inches	8 inches	brown, slightly moist silt with organics, trace clay and very fine-grained sand	OL	5.9					
BADU-7	Surface Soil	0-6 inches	8 inches	Brown, slightly moist silt with organics, trace clay and very fine-grained sand	OL	6.1					
BADU-8	Surface Soil	0-6 inches	8 inches	Brown, slightly moist silt with organics, trace clay and very fine-grained sand	OL	6.0					

1. Unified Soil Classification System (USCS) (ASTM 2006)

Table 5-3 Phase II Soil Physical Parameter Results

	Location	DU-4																		
	Sample ID	IINY-DU-04A-SSIS-041822		IINY-DU-04B-SSIS-041822		IINY-DU-04C-SSIS-041822					IINY-DU-07A-SSIS-041822		IINY-DU-07B-SSIS-041822		IINY-DU-07C-SSIS-041822				
	Depth (in)	0-6		0-6		0-6					0-6		0-6		0-6				
	Matrix	Surface Soil		Surface Soil		Surface Soil					Surface Soil		Surface Soil		Surface Soil				
	Sample Date / Time	4/18/2022 14:50		4/18/2022 14:50		4/18/2022 14:50					4/18/2022 13:25		4/18/2022 13:25		4/18/2022 13:25				
Analyte	**Unit**							Mean	Arithmetic Standard Deviation	% Relative Standard Deviation							Mean	Arithmetic Standard Deviation	% Relative Standard Deviation
General Chemistry																			
pH (from Phase I)	N/A	6.9		7.0		7.0		6.97	0.06	0.829	7.4		7.4		7.5		7.43	0.0577	0.777
ORP by Field Screening	mV	284		275		269		276	7.55	3	402		310		307		340	54	16
Standard hydrogen electrode corrected ORP	mV	489		480		474		481	7.55	2	607		515		512		545	54	10
TOC	mg/kg	13,000		37,000		36,000		28,667	13,576.94	47.4	34,000		32,000		33,000		33,000	1,000	3.03
CEC Analytical[1]	meq/100g	R		R		R		N/A	N/A	N/A	R		R		R		N/A	N/A	N/A
CEC Re-analysis[2]	meq/100g	33	J	33	J	34	J	33	0.58	2	24	J	25	J	24	J	24	0.58	2
Grain Size																			
Gravel	%	6.38		10.76		10.47		9.2	2.45	26.6	8.39		8.89		11.70		9.66	1.78	18.5
Sand Coarse	%	0.57		1.78		3.04		1.8	1.24	68.7	4.16		4.69		6.91		5.25	1.46	27.8
Sand Medium	%	18.51		17.48		18.30		18.1	0.544	3.01	26.85		23.36		27.30		25.8	2.16	8.35
Sand Fine	%	25.22		24.44		22.06		23.9	1.65	6.89	20.46		20.53		19.42		20.1	0.622	3.09
Silt	%	41.97		39.51		37.57		39.7	2.21	5.56	30.51		33.52		25.95		30.0	3.81	12.7
Clay	%	7.36		6.03		8.57		7.32	1.27	17.4	9.64		9.00		8.72		9.12	0.472	5.2

1. Initial laboratory CEC results were deemed abnormally high by several orders of magnitude. Analytical results were rejected during data validation.
2. The laboratory re-analyzed CEC samples after correcting an error with reagents. Analytical results are from re-analysis. However, laboratory holding times and conditions are unknown.

Notes:
% = Percent
CEC = Cation-exchange capacity
ID = Identification
in. = Inches
MEQ/100g = Milli-equivalents per 100 grams
mV = millivoltt
N/A = Not applicable
ORP = Oxidation Reduction Potential
TOC = Total organic carbon

Table 5-3 Phase II Soil Analytical Results

Location		DU-9										DU-11								
	Sample ID	IINY-DU-09A-SSIS-041822		IINY-DU-09B-SSIS-041822		IINY-DU-09C-SSIS-041822		Mean	Arithmetic Standard Deviation	% Relative Standard Deviation (RSD)		IINY-DU-11A-SSIS-041822		IINY-DU-11B-SSIS-041822		IINY-DU-11C-SSIS-041822		Mean	Arithmetic Standard Deviation	% Relative Standard Deviation (RSD)
	Depth (in)	0-6		0-6		0-6						0-6		0-6		0-6				
	Matrix	Surface Soil		Surface Soil		Surface Soil						Surface Soil		Surface Soil		Surface Soil				
	Sample Date / Time	4/18/2022 16:20		4/18/2022 16:20		4/18/2022 16:20						4/18/2022 16:20		4/18/2022 16:20		4/18/2022 16:20				
Analyte	**Unit**																			
General Chemistry																				
pH (from Phase I)	N/A	7.1		6.9		7.0		7.0	0.1	1.43		7.0		7.0		7.2		7.07	0.115	1.63
Oxidation Reduction Potential (ORP) by Field Screening	mV	242		245		240		242	3	1		239		252		225		239	14	6
Standard hydrogen electrode corrected ORP	mV	447		450		445		447	3	1		444		457		430		444	14	3
Total Organic Carbon (TOC)	mg/kg	30,000		30,000		34,000		31,333	2,309	7.37		30,000		30,000		NA		30,000	0	0
CEC Analytical[1]	MEQ/100g	R		R		R		N/A	N/A	N/A		R		R		NA		N/A	N/A	N/A
CEC Re-analysis[3]	MEQ/100g	27	J	28	J	28	J	28	0.58	2		23	J	25	J	NA		24	1.41	6
Grain Size																				
Gravel	%	4.92		4.83		10.76		6.84	3.40	49.7		1.34		2.35		NA		2.01	0.58	29.0
Sand Coarse	%	0.48		0.89		0.72		0.70	0.21	29.6		3.64		0.76		NA		1.72	1.66	96.7
Sand Medium	%	14.43		17.22		14.59		15.4	1.57	10.2		23.48		30.51		NA		28.2	4.06	14.4
Sand Fine	%	26.12		28.00		24.39		26.2	1.806	6.90		19.45		19.92		NA		19.8	0.271	1.37
Silt	%	49.20		45.53		45.90		46.9	2.02	4.3		49.17		43.57		NA		45.4	3.23	7.1
Clay	%	4.85		3.54		3.64		4.01	0.729	18.2		2.91		2.88		NA		2.89	0.017	0.6

1. Initial laboratory CEC results were deemed abnormally high by several orders of magnitude. Analytical results were rejected during data validation.
2. The laboratory re-analyzed CEC samples after correcting an error with reagents. Analytical results are from re-analysis. However, laboratory holding times and conditions are unknown.

Table 5-3 Phase II Soil Analytical Results

Location		DU-13										DU-17								
	Sample ID	IINY-DU-13A-SSIS-041822		IINY-DU-13B-SSIS-041822		IINY-DU-13C-SSIS-041822		Mean	Arithmetic Standard Deviation	% Relative Standard Deviation (RSD)	IINY-DU-17A-SSIS-041922		IINY-DU-17B-SSIS-041922		IINY-DU-17C-SSIS-041922		Mean	Arithmetic Standard Deviation	% Relative Standard Deviation (RSD)
	Depth (in)	0-6		0-6		0-6					0-6		0-6		0-6				
	Matrix	Surface Soil		Surface Soil		Surface Soil					Surface Soil		Surface Soil		Surface Soil				
	Sample Date / Time	4/18/2022 14:00		4/18/2022 14:00		4/18/2022 14:00					4/18/2022 15:40		4/18/2022 15:40		4/18/2022 15:40				
Analyte	**Unit**																		
General Chemistry																			
pH (from Phase I)	N/A	6.8		7.0		6.9		6.90	0.1	1.45	7.2		7.2		7.1		7.17	0.0577	0.806
Oxidation Reduction Potential (ORP) by Field Screening	mV	307		298		322		309	12	4	294		297		288		293	5	2
Standard hydrogen electrode corrected ORP	mV	512		503		527		514	12	2	499		502		493		498	5	1
Total Organic Carbon (TOC)	mg/kg	42,000		46,000		43,000		43,667	2,082	4.77	47,000		44,000		29,000		40,000	9,644	24.1
CEC Analytical[1]	MEQ/100g	R		R		R		N/A	N/A	N/A	R		R		R		N/A	N/A	N/A
CEC Re-analysis[3]	MEQ/100g	32	J	26	J	39	J	32	6.51	20	41	J	38	J	36	J	38	3	7
Grain Size																			
Gravel	%	7.23		5.64		5.63		6.17	0.921	14.9	8.56		5.20		16.15		9.97	5.61	56.3
Sand Coarse	%	11.84		3.16		1.43		5.48	5.58	102	11.33		10.23		13.84		11.8	1.85	15.7
Sand Medium	%	32.80		26.57		29.84		29.7	3.12	10.5	34.09		39.91		34.37		36.1	3.28	9.09
Sand Fine	%	17.35		20.93		21.44		19.9	2.23	11.2	15.49		15.59		12.01		14.4	2.04	14.2
Silt	%	29.07		41.76		39.35		36.7	6.74	18.4	28.99		27.57		22.18		26.2	3.59	13.7
Clay	%	1.70		1.94		2.31		1.98	0.307	15.5	1.54		1.51		1.45		1.5	0.0458	3.06

1. Initial laboratory CEC results were deemed abnormally high by several orders of magnitude. Analytical results were rejected during data validation.
2. The laboratory re-analyzed CEC samples after correcting an error with reagents. Analytical results are from re-analysis. However, laboratory holding times and conditions are unknown.

Table 5-3 Phase II Soil Physical Parameter Results

Location		DU-18										DU-19								
	Sample ID	IINY-DU-18A-SSIS-041922		IINY-DU-18B-SSIS-041922		IINY-DU-18C-SSIS-041922		Mean	Arithmetic Standard Deviation	% Relative Standard Deviation (RSD)	IINY-DU-19A-SSIS-041922		IINY-DU-19B-SSIS-041922		IINY-DU-19C-SSIS-041922		Mean	Arithmetic Standard Deviation	% Relative Standard Deviation (RSD)
	Depth (in)	0-6		0-6		0-6					0-6		0-6		0-6				
	Matrix	Surface Soil		Surface Soil		Surface Soil					Surface Soil		Surface Soil		Surface Soil				
	Sample Date / Time	4/19/2022 10:15		4/19/2022 10:15		4/19/2022 10:15					4/19/2022 9:25		4/19/2022 9:25						
Analyte	**Unit**																		
General Chemistry																			
pH (from Phase I)	N/A	7.5		8.0		7.8		7.77	0.252	3.24	7.7		7.5		7.4		7.53	0.153	2.03
Oxidation Reduction Potential (ORP) by Field Screening	mV	300		290		299		296	6	2	275		292		297		288	12	4
Standard hydrogen electrode corrected ORP	mV	505		495		504		501	6	1	480		497		502		493	12	2
Total Organic Carbon (TOC)	mg/kg	120,000		280,000		300,000		233,333	98,658	42.3	38,000		36,000		25,000		33,000	7,000	21.2
CEC Analytical[1]	MEQ/100g	R		R		R		N/A	N/A	N/A	R		R		R		N/A	N/A	N/A
CEC Re-analysis[3]	MEQ/100g	91	J	39	J	30	J	53	33	62	33	J	31	J	34	J	33	2	5
Grain Size																			
Gravel	%	9.98		0.47		1.45		3.97	5.23	132	0.75		1.23		3.61		1.86	1.53	82.2
Sand Coarse	%	15.96		9.31		6.30		10.5	4.94	47	0.25		0.16		4.78		1.73	2.64	153
Sand Medium	%	38.14		71.21		74.43		61.3	20.09	32.8	34.05		27.71		34.47		32.1	3.79	11.8
Sand Fine	%	6.87		6.28		9.94		7.7	1.97	25.5	24.49		25.90		18.75		23	3.79	16.4
Silt	%	26.71		9.59		7.43		14.6	10.6	72.5	40.02		42.60		36.00		39.5	3.33	8.41
Clay	%	2.34		3.14		0.44		1.97	1.39	70.3	0.43		2.39		2.38		1.73	1.13	65.1

1. Initial laboratory CEC results were deemed abnormally high by several orders of magnitude. Analytical results were rejected during data validation.
2. The laboratory re-analyzed CEC samples after correcting an error with reagents. Analytical results are from re-analysis. However, laboratory holding times and conditions are unknown.

Table 5-4 Surface Soil Physical Parameter Summary Statistics

Location		Upland Surface Soil			AOC #16 – Area D (former Dumping Area) Surface Soil			Sitewide Surface Soil			Background Surface Soil		
Summary Statistics		Mean	Median	Range	Mean	Median	Range	Mean	Median	Range	Mean	Median	Range
General Chemistry													
pH	N/A	6.8	6.9	5.4 to 7.5	7.5	7.5	7.1 to 8.0	6.8	7.0	5.4 to 8.0	6.2	6.1	5.9 to 6.7
ORP by Field Screening	mV	281	275	225 to 402	292	294	275 to 300	285	291	225 to 402	Not recorded		
Standard hydrogen electrode corrected ORP	mV	486	480	430 to 607	497	499	480 to 505	490	496	430 to 607	Not recorded		
TOC	mg/kg	33,571	33,500	13,000 to 46,000	102,111	44,000	25,000 to 300,000	60,391	36,000	13,000 to 300,000	Not analyzed		
CEC Calculation[1]	meq/100g	150.50	105.00	75.529 to 300.932	285.33	136.00	108 to 750	201.06	134.50	75.529 to 750	Not calculated		
CEC Re-analysis[2]	meq/100g	29	28	23 to 39	41	36.00	30 to 91	34	32.00	23 to 91	Not analyzed		
Grain Size													
Gravel	%	7.1	6.8	1.34 to 11.7	5.27	3.61	0.47 to 16.15	6.38	5.64	0.47 to 16.15	Not analyzed		
Sand Coarse	%	3.1	2.4	0.48 to 11.84	8.02	9.31	0.16 to 15.96	5.05	3.64	0.16 to 15.96			
Sand Medium	%	22.9	23.4	14.43 to 32.8	43.2	34.47	27.71 to 74.43	30.9	27.71	14.43 to 74.43			
Sand Fine	%	22.1	21.2	17.35 to 28	15.0	15.490	6.28 to 25.9	19.4	20.460	6.28 to 28			
Silt	%	39.5	40.6	25.95 to 49.2	26.8	27.57	7.43 to 42.6	34.5	37.57	7.43 to 49.2			
Clay	%	5.22	4.25	1.7 to 9.64	1.74	1.540	0.43 to 3.14	3.86	2.880	0.43 to 9.64			

1. CEC for onsite soil was calculated using Phase I metals analytical results (calcium, magnesium, potassium, sodium).
2. The laboratory re-analyzed CEC samples after correcting an error with reagents. Analytical results are from re-analysis. However, laboratory holding times and conditions are unknown.

Notes:
% = Percent
CEC = Cation-exchange capacity
ID = Identification
in. = Inches
MEQ/100g = Milli-equivalents per 100 grams
mV = millivoltt
N/A = Not applicable
ORP = Oxidation Reduction Potential
TOC = Total organic carbon

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Table 5-5 Phase II Surface Water Quality Parameter Results

Sample Location		Temperature (degrees Celsius)	pH	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Field ORP (mV)	Standard Hydrogen Electrode ORP (mV)	Turbidity (NTU)	Salinity (ppt)	Hardness (as CaCO3)
AOC #16 – Area D (former Dumping Area)	DUMP-SW-01	10.8	7.24	0.3014	9.12	208.6	408.6	31	0.22	71
	DUMP-SW-02	9.9	7.19	0.2246	10.01	213.4	413.4	13.98	0.2	63
	DUMP-SW-03	12.7	7.13	0.3789	7.45	114	314	17.04	0.24	64
	DUMP-SW-04	10.8	7.24	0.2329	8.44	184.4	384.4	17.4	0.17	70
	DUMP-SW-05	11.4	7.18	0.2209	8	221.8	421.8	19.7	0.18	66
	DUMP-SW-06	9.8	7.22	0.2099	10.42	219.1	419.1	18.43	0.18	67
	DUMP-SW-07	10.1	7.1	0.2304	9.21	64.8	264.8	30.99	0.15	71
	DUMP-SW-08	9.8	7.22	0.2035	11.27	205.7	405.7	27.62	0.11	59
	DUMP-SW-09	11.4	7.11	0.2555	9.73	210	410	19.8	0.19	71
	DUMP-SW-10	10.9	7.4	0.2413	7.18	207.7	407.7	27.8	0.14	67
	DUMP-SW-11	9.8	7.24	0.2147	8.98	207.4	407.4	23.19	0.18	67
	DUMP-SW-12	9.31	7.25	0.2614	7.26	58.9	258.9	44.6	0.18	70
	DUMP-SW-13	10.1	7.18	0.2386	8.04	215.1	415.1	28.11	0.16	68
	DUMP-SW-14	10.9	6.99	0.2394	8.14	198.8	398.8	26.5	0.16	70
	DUMP-SW-15	11.5	7.18	0.1849	7.24	111.91	311.91	88.4	0.12	66
	DUMP-SW-16	10.2	7.18	0.2398	9.1	222.3	422.3	19.41	0.22	67
	DUMP-SW-17	10.01	7.69	0.2414	9.11	222.4	422.4	25.01	0.18	71
	DUMP-SW-18	9.5	7.4	0.2321	8.38	236.5	436.5	11.83	0.16	75
	DUMP-SW-19	10.7	6.65	0.3111	9.12	219	419	10.11	0.25	73
	DUMP-SW-20	10.3	7.3	0.2655	7.98	215.3	415.3	27.4	0.17	53
Hudson River shoreline adjacent to AOC #16 – Area D	IHRS-SW-01	10.2	7.73	0.1705	11.01	154.8	354.8	105.11	0.12	59
	IHRS-SW-02	10.2	7.74	0.1785	11	156	356	104.22	0.12	72
	IHRS-SW-03	10.3	7.74	0.1773	11	155.8	355.8	104.18	0.12	72
	IHRS-SW-04	10.3	7.73	0.1804	11.04	156.9	356.9	104.2	0.12	73
	IHRS-SW-05	10.3	7.74	0.1748	11.02	156.9	356.9	104.2	0.12	73
	IHRS-SW-06	10.2	7.72	0.1757	11.03	154.3	354.3	109.4	0.13	72
	IHRS-SW-07	9.6	7.69	0.1749	11.08	166.6	366.6	89.45	0.12	71
	IHRS-SW-08	9.6	7.7	0.1752	11.17	167.2	367.2	107.42	0.12	71
	IHRS-SW-09	9.9	7.74	0.1748	11.19	168.4	368.4	97.8	0.12	73
	IHRS-SW-10	9.9	7.74	0.1709	11.24	169.5	369.5	98.9	0.12	74
	IHRS-SW-11	10.1	7.71	0.1717	11	170.5	370.5	105.8	0.12	73
	IHRS-SW-12	10.2	7.7	0.1754	11.15	164.3	364.3	109.8	0.12	75
	IHRS-SW-13	10.3	7.69	0.1718	11.9	162.9	362.9	99.8	0.12	79
	IHRS-SW-14	10.3	7.72	0.1774	11.74	158.3	358.3	98.4	0.12	79
	IHRS-SW-15	10.3	7.73	0.1803	11.74	159.7	359.7	107.8	0.12	78
	IHRS-SW-16	9.8	7.68	0.1794	11.64	166	366	106.4	0.13	82
	IHRS-SW-17	10.1	7.72	0.1795	11.58	167.9	367.9	109.7	0.13	74
	IHRS-SW-18	9.9	7.73	0.171	11.19	158.2	358.2	99.8	0.12	73
	IHRS-SW-19	9.8	7.7	0.1723	11.24	172.3	372.3	99.8	0.12	78
	IHRS-SW-20	10	7.78	0.1784	11.32	149.1	349.1	102.1	0.13	75
Iona Marsh shoreline at outlet of riprap filled drainage swale	RRDS-SW-01	13.2	8.01	0.1941	11.64	228	428	72.45	0.12	93
	RRDS-SW-02	12.8	7.96	0.1894	11.58	215.6	415.6	76.53	0.12	69
	RRDS-SW-03	11.7	7.86	0.1833	11.31	203.1	403.1	68.86	0.12	68
	RRDS-SW-04	13	7.8	0.1877	11.25	198.4	398.4	63.94	0.12	70
	RRDS-SW-05	12.2	7.97	0.1923	11.36	204.5	404.5	64.97	0.12	70
	RRDS-SW-06	12.3	7.85	0.1847	11.42	208.4	408.4	68.97	0.12	71
	RRDS-SW-07	12.8	7.79	0.1893	11.58	213.9	413.9	69.77	0.12	70
	RRDS-SW-08	12	7.92	0.1812	11.53	205.8	405.8	70.99	0.12	70
	RRDS-SW-09	11.9	7.8	0.181	11.33	179.8	379.8	67.89	0.12	67
	RRDS-SW-10	11.8	7.75	0.1823	11.5	182.3	382.3	66	0.12	69
Iona Marsh shoreline at outlet of tidal wetland swale	TWS-SW-01	13.2	7.66	0.3382	10.98	154.8	354.8	99.62	0.17	91
	TWS-SW-02	13.5	7.63	0.2789	9.95	187.9	387.9	99.79	0.19	85
	TWS-SW-03	13.3	7.68	0.2976	11.01	172.2	372.2	98.54	0.17	86
	TWS-SW-04	13.4	7.62	0.3048	10.57	179	379	103.99	0.2	84
	TWS-SW-05	13.5	7.59	0.3397	10.28	168.4	368.4	110.44	0.17	84
	TWS-SW-06	13.1	7.57	0.3376	9.98	155	355	98.76	0.21	80
	TWS-SW-07	13.5	7.68	0.3043	11.04	172.8	372.8	107.24	0.2	79
	TWS-SW-08	13.6	7.61	0.3274	10.46	170.4	370.4	112.31	0.2	82
	TWS-SW-09	13.2	7.7	0.2687	10.98	179.5	379.5	108.42	0.17	83
	TWS-SW-10	13.2	7.7	0.2705	11.07	180.6	380.6	105.22	0.17	82

Table 5-5 Phase II Surface Water Quality Parameter Results

Sample Location		Temperature (degrees Celsius)	pH	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Field ORP (mV)	Standard Hydrogen Electrode ORP (mV)	Turbidity (NTU)	Salinity (ppt)	Hardness (as CaCO3)
Con Hook Hudson River Shoreline	CHHRS-SW-01	9.9	7.91	0.1794	11.63	96.4	296.4	57	0.12	69
	CHHRS-SW-02	10.1	7.68	0.1673	11.36	124.1	324.1	57	0.11	70
	CHHRS-SW-03	9.8	7.67	0.125	11.19	125	325	237.1	0.11	70
	CHHRS-SW-04	9.8	7.61	0.1342	11.18	134.2	334.2	100.7	0.11	69
	CHHRS-SW-05	9.6	7.58	0.1505	11.08	150.5	350.5	61.8	0.11	71
	CHHRS-SW-06	9.8	7.55	0.1481	11.14	148.1	348.1	54.7	0.11	71
	CHHRS-SW-07	10	7.58	0.1406	11.19	140.6	340.6	61.4	0.11	71
	CHHRS-SW-08	10.1	7.66	0.1722	11.16	172.2	372.2	46.4	0.11	71
	CHHRS-SW-09	10.9	7.6	0.1826	11.2	168.5	368.5	54.3	0.11	70
	CHHRS-SW-10	10.3	7.47	0.1579	11.06	169.1	369.1	198.7	0.11	71
	CHHRS-SW-11	10.1	7.54	0.1948	11.27	194.8	394.8	52.5	0.11	73
	CHHRS-SW-12	10.1	7.53	0.1834	11.25	168	368	47.5	0.11	74
	CHHRS-SW-13	9.9	7.5	0.1937	11.21	167.3	367.3	42.7	0.11	73
	CHHRS-SW-14	10	7.62	0.1852	11.69	172.1	372.1	50.1	0.11	73
	CHHRS-SW-15	10.1	7.71	0.2281	11.45	168.3	368.3	49.2	0.11	71
	CHHRS-SW-16	10.1	7.77	0.2077	11.19	168.1	368.1	62.1	0.11	71
	CHHRS-SW-17	10.3	7.53	0.2232	11.11	168.9	368.9	52.9	0.11	72
	CHHRS-SW-18	10.3	7.57	0.2384	11.35	168.7	368.7	53.9	0.11	71
	CHHRS-SW-19	10.3	7.52	0.2349	11.14	169.1	369.1	53.9	0.11	71
	CHHRS-SW-20	10.4	7.49	0.2269	11.1	169.3	369.3	60.3	0.11	72
Con Hook Marsh Shoreline	CHMS-SW-01	11	7.09	0.2231	9.18	182.7	382.7	30.9	0.15	76
	CHMS-SW-02	10.7	7.31	0.1794	10.76	193.9	393.9	44	0.12	72
	CHMS-SW-03	10.5	7.32	0.1878	10.85	174.8	374.8	69.9	0.12	70
	CHMS-SW-04	10.6	7.27	0.1898	10.49	184.2	384.2	40.3	0.12	70
	CHMS-SW-05	10.9	7.12	0.2274	10.02	114.2	314.2	98.21	0.16	68
	CHMS-SW-06	14.7	7	0.634	9.93	113.5	313.5	83.4	0.38	110
	CHMS-SW-07	14.8	7.18	0.614	10.09	135.9	335.9	155	0.33	110
	CHMS-SW-08	14.6	7.06	0.633	9.61	135.1	335.1	122.5	0.34	110
	CHMS-SW-09	14.7	7.09	0.62	10.57	138.2	338.2	275.6	0.38	110
	CHMS-SW-10	14.6	7.18	0.596	10.5	138.2	338.2	102.2	0.37	110
	CHMS-SW-11	14.7	7.1	0.578	10.58	126.4	326.4	46.9	0.35	100
	CHMS-SW-12	14.3	7.11	0.551	10.64	126	326	19.3	0.34	110
	CHMS-SW-13	13.9	6.92	0.693	10.63	140.8	340.8	18.1	0.43	120
	CHMS-SW-14	13.4	6.68	0.2098	6.81	85.2	285.2	8.8	0.13	36
	CHMS-SW-15	13.1	6.52	0.2286	3.68	52.7	252.7	568.4	0.14	31
	CHMS-SW-16	12.3	6.83	0.2286	2.67	82.4	282.4	102.2	0.12	48
	CHMS-SW-17	12	7.42	0.2916	10.68	79.3	279.3	134.2	0.11	65
	CHMS-SW-18	12	7.39	0.2991	10.61	179.7	379.7	214.6	0.11	65
	CHMS-SW-19	11.9	7.51	0.2593	10.7	178.3	378.3	127.2	0.11	65
	CHMS-SW-20	13.3	7.57	0.2636	9.61	88.7	288.7	639	0.12	62

NOTES:
CaCO3 = Calcium carbonate
mg/L = milligrams per liter
mV = millivolts
NTU = Nephelometric turbidity unit
ppt = parts per trillion

Table 5-6 Phase II Surface Water Quality Parameter Summary Statistics

Parameter	Units	AOC #16 – Area D (former Dumping Area)			Hudson River adjacent to AOC #16 – Area D			Con Hook Hudson River Shoreline		
		Mean	Median	Range	Mean	Median	Range	Mean	Median	Range
Temperature	degrees Celsius	10.496	10.25	9.31 to 12.7	10.065	10.15	9.6 to 10.3	10.095	10.1	9.6 to 10.9
pH	---	7.20	7.21	6.65 to 7.69	7.72	7.73	7.68 to 7.78	7.60	7.58	7.47 to 7.91
Specific Conductivity	mS/cm	0.24641	0.239	0.1849 to 0.3789	0.17551	0.1753	0.1705 to 0.1804	0.183705	0.183	0.125 to 0.2384
Dissolved Oxygen	mg/L	8.71	8.71	7.18 to 11.27	11.26	11.18	11 to 11.9	11.25	11.19	11.06 to 11.69
Field ORP	mV	187.86	209.30	58.9 to 236.5	161.78	161.30	149.1 to 172.3	157.17	168.20	96.4 to 194.8
Standard Hydrogen Electrode ORP	mV	387.86	409.30	258.9 to 436.5	361.78	361.30	349.1 to 372.3	357.17	368.20	296.4 to 394.8
Turbidity	NTU	26.42	24.10	10.11 to 88.4	103.21	104.20	89.45 to 109.8	72.71	54.50	42.7 to 237.1
Salinity	ppt	0.18	0.18	0.11 to 0.25	0.12	0.12	0.12 to 0.13	0.11	0.11	0.11 to 0.12
Hardness	as CaCO3	67.45	67.5	53 to 75	73.8	73	59 to 82	71.2	71	69 to 74

Parameter	Units	Iona Marsh			Con Hook Marsh Shoreline		
		Mean	Median	Range	Mean	Median	Range
Temperature	degrees Celsius	12.86	13.15	11.7 to 13.6	12.9	13.2	10.5 to 14.8
pH	---	7.76	7.73	7.57 to 8.01	7.13	7.12	6.52 to 7.57
Specific Conductivity	mS/cm	0.24665	0.2314	0.181 to 0.3397	0.385355	0.2776	0.1794 to 0.693
Dissolved Oxygen	mg/L	11.04	11.16	9.95 to 11.64	9.43	10.50	2.67 to 10.85
Field ORP	mV	188.02	181.45	154.8 to 228	132.51	135.50	52.7 to 193.9
Standard Hydrogen Electrode ORP	mV	388.02	381.45	354.8 to 428	332.51	335.50	252.7 to 393.9
Turbidity	NTU	86.74	87.54	63.94 to 112.31	145.04	100.21	8.8 to 639
Salinity	ppt	0.15	0.15	0.12 to 0.21	0.22	0.15	0.11 to 0.43
Hardness	as CaCO3	77.65	79.5	67 to 93	80.4	71	31 to 120

NOTES:
CaCO3 = Calcium carbonate
mg/L = milligrams per liter
mV = millivolts
NTU = Nephelometric turbidity unit
ppt = parts per trillion

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Table 5-7 Phase I Discrete Sediment Sample Grain Size and Total Organic Carbon Analytical Results and Summary Statistics

Sample Number		IINY-SD-01		IINY-SD-02		IINY-SD-03		IINY-SD-04		IINY-SD-05		IINY-SD-06		IINY-SD-07		Hudson River Shoreline Summary Statistics			Iona Marsh Summary Statistics		
Sample ID		IINY-SD01-20200407		IINY-SD02-20200407		IINY-SD03-20200407		IINY-SD04-20200407		IINY-SD05-20200407		IINY-SD06-20200407		IINY-SD07-20200407							
Depth (in.)		0-6		0-6		0-6		0-6		0-6		0-6		0-6							
Matrix		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment							
Location		Intertidal Marsh Shoreline		Iona Marsh Shoreline		Iona Marsh Shoreline, Tidal Wetland Swale Outlet		Hudson River Shoreline, Macroinvertebrate Observation Area		Hudson River Shoreline		Hudson River Shoreline		Iona Marsh Shoreline, Drainage Swale Outlet							
Sample Date / Time		4/7/2020 10:40		4/7/2020 17:00		4/7/2020 16:00		4/7/2020 2:35		4/7/2020 3:19		4/7/2020 2:47		4/7/2020 16:30		Average	Median	Range	Average	Median	Range
Analyte	**Unit**																				
Grain Size																					
Gravel	%	0.00		8.76		0.00		22.73		2.89		4.28		0.00		9.97	4.28	2.89 to 22.73	2.19	0.00	0 to 8.76
Sand Coarse	%	0.00		1.82		0.00		14.84		1.08		14.46		0.00		10.13	14.46	1.08 to 14.84	0.46	0.00	0 to 1.82
Sand Medium	%	7.83		4.01		3.22		36.45		15.34		69.17		3.94		40.32	36.45	15.34 to 69.17	4.75	3.98	3.22 to 7.83
Sand Fine	%	10.24		10.58		9.13		21.89		80.69		12.08		6.57		38.22	21.89	12.08 to 80.69	9.13	9.69	6.57 to 10.58
Silt	%	77.50		70.29		82.64		2.94		-1.69		-0.14		80.25		0.37	-0.14	-1.69 to 2.94	77.67	78.88	70.29 to 82.64
Clay	%	4.44		4.55		5.01		1.16		1.69		0.14		9.23		1.00	1.16	0.14 to 1.69	5.81	4.78	4.44 to 9.23
Total Organic Carbon																					
Total Organic Carbon	mg/kg	95,000		150,000		110,000		4,700		31,000		960		62,000		12,220	4,700	960 to 31,000	104,250	102,500	62,000 to 150,000

Note:
% = Percent
ID = Identification
in. = Inches
mg/kg = micrograms per kilogram

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Table 5-8 Phase II ISM Sediment Physical Parameter Results

Location		Iona Island Hudson River Shoreline								Riprap Filled Drainage Swale								Tidal Wetland Swale							
Sample ID		IINY-IHRS-DU-01A-SEDIS-041922		IINY-IHRS-DU-01B-SEDIS-041922		IINY-IHRS-DU-01C-SEDIS-041922		Arithmetic Standard Deviation	% Relative Standard Deviation	IINY-RRDS-DU-01A-SEDIS-041922		IINY-RRDS-DU-01B-SEDIS-041922		IINY-RRDS-DU-01C-SEDIS-041922		Arithmetic Standard Deviation	% Relative Standard Deviation	IINY-TWS-DU-01A-SEDIS-041922		IINY-TWS-DU-01B-SEDIS-041922		IINY-TWS-DU-01C-SEDIS-041922		Arithmetic Standard Deviation	% Relative Standard Deviation
Depth (in.)		0-6		0-6		0-6				0-6		0-6		0-6				0-6		0-6		0-6			
Matrix		Sediment		Sediment		Sediment				Sediment		Sediment		Sediment				Sediment		Sediment		Sediment			
Sample Date		4/19/2022		4/19/2022		4/19/2022				4/19/2022		4/19/2022		4/19/2022				4/19/2022		4/19/2022		4/19/2022			
Analyte	**Unit**	10:45:00 AM		10:45:00 AM		10:45:00 AM				11:30:00 AM		11:30:00 AM		11:30:00 AM				12:10:00 PM		12:10:00 PM		12:10:00 PM			
General Chemistry																									
pH	N/A	6.8		6.6		6.9		0.15	2.260	7.3		7.1		7.1		0.115	1.6	7.0		7.4		7.2		0.2	2.8
ORP by Field Screening	mV	754		493		512		146.00	25	322		342		310		16	5.0	333		296		312		19	5.9
Standard hydrogen electrode corrected ORP	mV	959		698		717		146.00	18	527		547		515		16	3.1	538		501		517		19	3.6
TOC	mg/kg	2,600		4,500		3,500		950.00	26.9	74,000		73,000		88,000		8,390	10.7	63,000		60,000		64,000		2,080	3.3
Grain Size																									
Gravel	%	8.27		7.21		11.73		2.36	26.1	0.89		1.52		1.32		0.322	25.9	6.99		2.79		13.48		5.39	69.5
Sand Coarse	%	21.34		20.28		25.00		2.48	11.2	1.29		0.34		0.33		0.551	84.4	1.33		1.31		2.66		0.774	43.8
Sand Medium	%	53.61		51.41		45.99		3.92	7.79	5.99		6.27		4.47		0.969	17.4	5.89		6.73		8.82		1.51	21.1
Sand Fine	%	10.56		16.14		12.03		2.89	22.4	8.50		5.67		5.71		1.62	24.5	7.38		7.47		10.81		1.95	22.9
Silt	%	4.45		-2.82		-2.94		4.23	-969	54.37		49.03		53.10		2.79	5.35	46.23		48.01		38.90		4.83	10.9
Clay	%	1.78		7.79		8.20		3.59	60.7	28.95		37.17		35.06		4.27	12.7	32.18		33.70		25.33		4.46	14.7

NOTES:
% = percent
ID = Identification
in. = Inches
mg/kg = milligrams per kilogram
mV = millivolts
N/A = Not applicable
ORP = Oxidation-reduction potential
TOC = Total organic carbon

Table 5-8 Phase II ISM Sediment Physical Parameter Results

Location		Con Hook Hudson River Shoreline																	
Sample ID		IINY-CHHRS-SU-01-SEDIS-042122		IINY-CHHRS-SU-02-SEDIS-042122		IINY-CHHRS-SU-03-SEDIS-042122		IINY-CHHRS-SU-04-SEDIS-042122		IINY-CHHRS-SU-05-SEDIS-042122		IINY-CHHRS-SU-06-SEDIS-042122		IINY-CHHRS-SU-07-SEDIS-042122		IINY-CHHRS-SU-08-SEDIS-042122		Arithmetic Standard Deviation	% Relative Standard Deviation
Depth (in.)		0-6		0-6		0-6		0-6		0-6		0-6		0-6		0-6			
Matrix		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment			
Sample Date		4/21/2022 13:00		4/21/2022 12:40		4/21/2022 12:20		4/21/2022 11:40		4/21/2022 11:25		4/21/2022 10:40		4/21/2022 10:15		4/21/2022 10:05			
Analyte	**Unit**																		
Field Parameters																			
pH	N/A	6.6		6.6		6.8		6.6		6.5		6.6		6.6		6.7		0.0886	1.3
ORP by Field Screening	mV	452		448		576		576		512		550		612		493		61	11.5
Standard hydrogen electr	mV	657		653		781		781		717		755		817		698		61	8.3
TOC	mg/kg	46,000	J, P2	42,000	J, P2	36,000	J, P2	32,000	J, P2	34,000	J, P2	7,200	J, P2	25,000	J, P2	12,000	J, P2	13,700	46.9
Grain Size																			
Gravel	%	1.44		0.00		0.00		0.63		0.00		17.03		22.63		32.83		14	93
Sand Coarse	%	0.48		0.16		0.16		0.00		0.08		27.43		21.59		21.18		13	124
Sand Medium	%	2.32		0.72		0.72		0.39		0.54		43.36		20.48		24.96		16	139
Sand Fine	%	4.79		3.18		3.66		2.45		2.80		2.58		6.27		6.20		2	39
Silt	%	59.74		65.87		62.12		63.50		63.27		7.16		21.62		7.83		27	61
Clay	%	31.24		30.07		33.35		33.03		33.30		2.44		7.40		6.99		13.9	62.5

Table 5-8 Phase II ISM Sediment Physical Parameter Results

Location		Con Hook Marsh Shoreline																	
Sample ID		IINY-CHMS-SU-01-SEDIS-042122		IINY-CHMS-SU-02-SEDIS-042122		IINY-CHMS-SU-03-SEDIS-042122		IINY-CHMS-SU-04-SEDIS-042122		IINY-CHMS-SU-05-SEDIS-042122		IINY-CHMS-SU-06-SEDIS-042122		IINY-CHMS-SU-07-SEDIS-042122		IINY-CHMS-SU-08-SEDIS-042122		Arithmetic Standard Deviation	% Relative Standard Deviation
Depth (in.)		0-6		0-6		0-6		0-6		0-6		0-6		0-6		0-6			
Matrix		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment			
Sample Date		4/21/2022 14:44		4/21/2022 14:37		4/21/2022 14:29		4/21/2022 14:20		4/21/2022 14:07		4/21/2022 13:55		4/21/2022 13:45		4/21/2022 13:30			
Analyte	**Unit**																		
Field Parameters																			
pH	N/A	6.9		6.8		7		6.8		6.8		6.5		6.8		6.9		0.146	2.1
ORP by Field Screening	mV	375		422		412		426		399		402		405		427		17	4.3
Standard hydrogen electr	mV	580		627		617		631		604		607		610		632		17	2.8
TOC	mg/kg	220,000	J, P2	250,000	J, P2	220,000	J, P2	200,000	J, P2	110,000	J, P2	140,000	J, P2	130,000	J, P2	150,000	J, P2	51,200	28.8
Grain Size																			
Gravel	%	0.67		1.53		1.53		0.83		0.69		1.60		3.07		0.73		1	61
Sand Coarse	%	1.67		1.87		2.83		2.66		1.76		3.27		6.82		1.09		2	65
Sand Medium	%	11.37		6.67		16.05		18.82		8.41		10.64		15.17		9.61		4	35
Sand Fine	%	16.38		21.60		18.17		17.65		9.10		10.79		13.97		14.96		4	27
Silt	%	43.09		40.42		45.35		44.58		47.83		46.59		44.19		55.83		5	10
Clay	%	26.82		17.91		16.07		15.45		32.20		27.11		16.79		17.78		6.42	30.2

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Table 5-9 Phase II ISM Sediment Physical Parameter Summary Statistics

Location		Iona Island Hudson River Shoreline			Con Hook Hudson River Shoreline		
Summary Statistics		Mean	Median	Range	Mean	Median	Range
General Chemistry							
pH	N/A	6.77	6.80	6.6 to 6.9	6.63	6.6	6.5 to 6.8
ORP by Field Screening	mV	586	512	493 to 754	527	531	448 to 612
Standard hydrogen electrode corrected ORP	mV	791	717	698 to 959	732	736	653 to 817
TOC	mg/kg	3,533	3,500	2,600 to 4,500	29,275	33,000	7,200 to 46,000
Grain Size							
Gravel	%	9.1	8.3	7.21 to 11.73	9.32	1.04	0 to 32.83
Sand Coarse	%	22.2	21.3	20.28 to 25	8.89	0.32	0 to 27.43
Sand Medium	%	50.3	51.4	45.99 to 53.61	11.7	1.52	0.39 to 43.36
Sand Fine	%	12.9	12.0	10.56 to 16.14	4.0	3.420	2.45 to 6.27
Silt	%	-0.4	-2.8	-2.94 to 4.45	43.9	60.93	7.16 to 65.87
Clay	%	5.92	7.79	1.78 to 8.2	22.23	30.655	2.44 to 33.35
Location		**Iona Marsh Shoreline**			**Con Hook Marsh Shoreline**		
Summary Statistics		Mean	Median	Range	Mean	Median	Range
General Chemistry							
pH	N/A	7.18	7.15	7 to 7.4	6.81	6.8	6.5 to 7
ORP by Field Screening	mV	319	317	296 to 342	409	409	375 to 427
Standard hydrogen electrode corrected ORP	mV	524	522	501 to 547	614	614	580 to 632
TOC	mg/kg	70,333	68,500	60,000 to 88,000	177,500	175,000	110,000 to 250,000
Grain Size							
Gravel	%	4.5	2.2	0.89 to 13.48	1.33	1.18	0.67 to 3.07
Sand Coarse	%	1.2	1.3	0.33 to 2.66	2.75	2.27	1.09 to 6.82
Sand Medium	%	6.4	6.1	4.47 to 8.82	12.1	11.01	6.67 to 18.82
Sand Fine	%	7.6	7.4	5.67 to 10.81	15.3	15.670	9.1 to 21.6
Silt	%	48.3	48.5	38.9 to 54.37	46.0	44.97	40.42 to 55.83
Clay	%	32.07	32.94	25.33 to 37.17	21.27	17.845	15.45 to 32.2

Notes:
% = Percent
in. = Inches
mV = millivoltt
N/A = Not applicable
ORP = Oxidation Reduction Potential
TOC = Total organic carbon

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Table 5-10 Phase II AVS/SEM Analytical Results

Location			Iona Island Hudson River Shoreline						Iona Marsh Shoreline											
									Riprap Drainage Swale						Riprap Drainage Swale					
		Sample ID	IINY-IHRS-SED-01-041922		IINY-IHRS-SED-02-041922		IINY-IHRS-SED-03-041922		IINY-RRDS-SED-01-041922		IINY-RRDS-SED-02-041922		IINY-RRDS-SED-03-041922		IINY-TWS-SED-01-041922		IINY-TWS-SED-02-041922		IINY-TWS-SED-03-041922	
		Depth (in.)	0-6		0-6		0-6		0-6		0-6		0-6		0-6		0-6		0-6	
		Matrix	Sediment		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment	
		Sample Date	4/19/2022 10:50		4/19/2022 10:55		4/19/2022 10:45		4/19/2022 11:30		4/19/2022 11:35		4/19/2022 11:40		4/19/2022 12:10		4/19/2022 12:15		4/19/2022 12:20	
Analyte	**CAS #**	**Unit**																		
Acid Volatile Sulfide (AVS)																				
AVS	N/A	µmoles/g	0.43	UJ	0.44	UJ	0.49	UJ	0.95	UJ	1.1	UJ	1.2	UJ	0.86	UJ	0.55	UJ	0.93	UJ
Metals																				
Cadmium	7440-43-9	µmoles/g	0.042		0.043		0.04		0.0014	J	0.002	J	0.0023	J	0.0023	J	0.0071		0.0024	J
Copper	7440-50-8	µmoles/g	35		190		130		0.12	J	0.14		0.24		0.17	J	0.23		0.18	
Lead	7439-92-1	µmoles/g	14		27		25		0.061	J	0.063		0.24		0.1		0.25		0.083	
Nickel	7440-02-0	µmoles/g	0.33		0.4		0.55		0.03	J	0.074		0.8	J	0.049	J	0.16		0.045	
Zinc	7440-66-6	µmoles/g	18		34		18		0.28	J	0.4		0.71		0.64	J	0.62		0.59	
Organic Carbon																				
TOC	N/A	mg/kg	2,600		4,500		3,500		74,000		73,000		88,000		63,000		60,000		64,000	
TOC	N/A	%	0.26		0.45		0.35		7.4		7.3		8.8		6.3		6		6.4	
f_{OC}	N/A	N/A	0.0026		0.0045		0.0035		0.074		0.073		0.088		0.063		0.06		0.064	
AVS / Simultaneously Extracted Metals (SEM)																				
SEM/AVS	N/A	N/A	156.68		571.46		354.27		0.52		0.62		1.66		1.12		2.30		0.97	
∑SEM	N/A	µmoles/g	67.372		251.443		173.59		0.4924		0.679		1.9923		0.9613		1.2671		0.9004	
∑SEM - AVS	N/A	µmoles/g	66.942		251.003		173.1		-0.4576		-0.421		0.7923		0.1013		0.7171		-0.0296	
$(\sum SEM-AVS)/f_{OC}$	N/A	µmoles/g	25,747		55,778		49,457		-6		-6		9		2		12		-0.5	

NOTES:
% = Percent
µmoles/g = micromoles per gram
f_{OC} = Fraction of organic carbon
CAS= Chemical Abstracts Service
EPA = United States Environmental Protection Agency
ID = Identification
in. = Inches
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
UJ = Analyte not detected, and associated numerical value (LOD) is approximate
Red font indicates SEM:AVS ratio > 1
Highlighted cells indicate $(\sum SEM-AVS)/f_{OC}$ > 3000 µmoles/g and metals are bioavailable/toxic.

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Table 6-1 DU-1 Through DU-16 Incremental Soil Sampling Analytical Results

Location			DU-1 (AOC #17: Area E – Former Coal Trestle and Storage Area [Located Near Former Building 410] and AOC #10: Former Building 406 – Tin, Electrical, and Annealing Building Shop)							DU-2 (AOC #17: Area E – Former Coal Trestle and Storage Area [Located Near Former Building 410])								DU-3 (AOC #12: Former Building 410 – Power House and AOC #11: Former Building 407 – Paint Shop and Pipe Shop							
Sample ID			IINY-DU-1A-SSIS-20200318		IINY-DU-1B-SSIS-20200318		IINY-DU-1C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-2A-SSIS-20200319		IINY-DU-2B-SSIS-20200319		IINY-DU-2C-SSIS-20200319		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-3A-SSIS-20200318		IINY-DU-3B-SSIS-20200318		IINY-DU-3C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in.)			0-6		0-6		0-6				0-6		0-6		0-6				0-6		0-6		0-6			
Matrix			Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date			3/18/2020 15:00		3/18/2020 15:00		3/18/2020 15:00				3/19/2020 8:15		3/19/2020 8:15		3/19/2020 8:15				3/18/2020 15:45		3/18/2020 15:45		3/18/2020 15:45			
Analyte	**CAS #**	**Unit**																								
Target Analyte List Metals																										
Aluminum	7429-90-5	mg/kg	**11,000**		**11,000**		**11,000**		0	11,000	**13,000**		**13,000**		**13,000**		0	13,000	**13,000**		**13,000**		**13,000**		0	13,000
Antimony	7440-36-0	mg/kg	**0.52**		**0.51**		**0.47**		5.29	0.567	**0.61**		**0.62**		**0.68**		5.95	0.732	**0.7**		**0.63**		**0.65**		5.46	0.751
Arsenic	7440-38-2	mg/kg	**11**		**12**		**8.9**	J/TR	14.9	14.6	**14**		**13**		**14**		4.22	15.1	**15**		**13**		**12**		11.5	17.2
Barium	7440-39-3	mg/kg	**71**		**66**		**65**		4.77	75.4	**68**		**74**		**79**		7.48	87.5	**85**		**75**		**79**		6.32	92.3
Beryllium	7440-41-7	mg/kg	**0.52**		**0.5**		**0.55**		4.81	0.587	**0.54**		**0.55**		**0.65**		10.5	0.733	**0.57**		**0.56**		**0.54**		2.74	0.595
Cadmium	7440-43-9	mg/kg	**0.35**		**0.26**		**0.24**		20.7	0.431	**0.2**		**0.23**		**0.25**		11.1	0.29	**0.26**		**0.24**		**0.26**		4.56	0.282
Calcium	7440-70-2	mg/kg	**3,700**		**5,100**		**4,800**		16.3	6,390	**13,000**		**11,000**		**7,800**		24.7	17,200	**3,100**		**8,200**		**7,400**		44	13,100
Chromium, Total	7440-47-3	mg/kg	**14**		**13**		**13**		4.33	14.8	**15**		**15**		**15**		0	15	**16**		**15**		**15**		3.77	16.8
Cobalt	7440-48-4	mg/kg	**7**		**6.8**		**7.5**		5.08	8.01	**7.6**		**7.4**		**7.7**		2.02	7.95	**8**		**7.3**		**7.6**		4.6	8.52
Copper	7440-50-8	mg/kg	**21**		**22**		**21**		2.71	22.8	**27**		**26**		**28**		3.7	29.5	**28**		**25**		**27**		5.73	30.5
Iron	7439-89-6	mg/kg	**16,000**		**16,000**		**15,000**		3.69	17,100	**19,000**		**18,000**		**19,000**		3.09	20,100	**19,000**		**18,000**		**19,000**		3.09	20,100
Lead	7439-92-1	mg/kg	**84**		**57**		**52**		26.8	108	**78**		**93**		**110**		17.1	134	**150**		**120**		**120**		13.3	174
Magnesium	7439-95-4	mg/kg	**3800**		**4700**		**4300**		10.6	5400	**10,000**		**9,000**		**7,300**		15.6	12,200	**4,400**		**7,200**		**6,600**		24.3	9,780
Manganese	7439-96-5	mg/kg	**470**		**470**		**480**		1.22	488	**620**		**660**		**640**		3.12	690	**670**		**580**		**630**		7.2	740
Mercury	7439-97-6	mg/kg	**0.084**		**0.08**		**0.078**		4	0.0884	**0.091**		**0.092**		**0.11**		11	0.125	**0.14**		**0.13**		**0.11**		12	0.165
Nickel	7440-02-0	mg/kg	**14**		**14**		**14**		0	14	**17**		**16**		**18**		5.88	19.5	**18**		**16**		**16**		6.93	19.6
Potassium	2023695	mg/kg	**1,200**		**1,200**		**1,200**		0	1,200	**1,400**		**1,300**		**1,200**		7.69	1,550	**1200**		**1300**		**1400**		7.69	1550
Selenium	7782-49-2	mg/kg	**0.44**	J/TR	**0.32**	J/TR	**0.31**	J/TR	20.3	0.539	**0.31**	J/TR	**0.33**	J/TR	**0.32**	J/TR	3.13	0.345	**0.45**	J/TR	**0.41**	J/TR	**0.39**	J/TR	7.33	0.494
Silver	7440-22-4	mg/kg	0.093	U (LOQ)/L	0.099	U (LOQ)/L	0.099	U (LOQ)/L	ND	ND	0.097	U (LOQ)/L	0.097	U (LOQ)/L	0.1	U (LOQ)/L	ND	ND	**0.098**		0.094	U (LOQ)/L	0.099	U (LOQ)/L	2.73	0.104
Sodium	7440-23-5	mg/kg	**95**	J/TR	**100**	J/TR	**110**	J/TR	7.51	121	**75**	J/TR	**75**	J/TR	**71**	J/TR	3.13	79.5	**68**	J/TR	**88**	J/TR	**110**	J/TR	23.7	142
Thallium	7440-28-0	mg/kg	**0.14**		**0.12**		**0.12**		9.12	0.156	**0.13**		**0.13**		**0.13**		0	0.13	**0.13**		**0.14**		**0.13**		4.33	0.148
Vanadium	7440-62-2	mg/kg	**23**		**21**		**22**		4.55	24.5	**21**		**21**		**23**		5.33	24.6	**25**		**23**		**24**		4.17	26.5
Zinc	7440-66-6	mg/kg	**92**	J/TR	**76**	J/TR	**67**	J/TR	16.2	110	**72**		**74**		**80**		5.53	85.8	**98**	J/TR	**130**		**99**	J/TR	16.7	155
Polycyclic Aromatic Hydrocarbons																										
1-Methylnaphthalene	90-12-0	mg/kg	**0.0058**	J-/H2/TR	**0.0044**	J-/H2/TR	**0.0036**	J-/H2/TR	24.2	0.0074	**0.075**		**0.036**		**0.046**		38.7	0.103	**0.015**	J-/H2/TR	**0.01**	J-/H2/TR	**0.0071**	J-/H2/TR	37.3	0.0208
2-Methylnaphthalene	91-57-6	mg/kg	**0.0098**	J-/H2	**0.0062**	J-/H2/TR	**0.0053**	J-/H2/TR	33.500	0.0131	**0.055**		**0.031**		**0.04**		28.9	0.0725	**0.017**	J-/H2/TR	**0.011**	J-/H2/TR	**0.0088**	J-/H2/TR	34.600	0.0229
Acenaphthene	83-32-9	mg/kg	**0.007**	J-/H2/TR	**0.0068**	J-/H2/TR	**0.0054**	J-/H2/TR	13.600	0.00859	**0.26**		**0.12**		**0.15**		41.7	0.362	**0.036**	J-/H2/TR	**0.028**	J-/H2/TR	**0.015**	J-/H2/TR	40.200	0.053
Acenaphthylene	208-96-8	mg/kg	**0.041**	J-/H2	**0.027**	J-/H2	**0.026**	J-/H2	26.800	0.0524	**0.14**		**0.1**		**0.09**		24.1	0.177	**0.06**	J-/H2/TR	**0.031**	J-/H2/TR	**0.028**	J-/H2/TR	44.600	0.0841
Anthracene	120-12-7	mg/kg	**0.032**	J-/H2	**0.028**	J-/H2	**0.025**	J-/H2	12.400	0.0372	**0.73**		**0.34**	J/TR	**0.36**	J/TR	46.1	1.03	**0.14**	J-/H2/TR	**0.082**	J-/H2/TR	**0.052**	J-/H2/TR	49.000	0.204
Benzo(a)anthracene	56-55-3	mg/kg	**0.15**	J-/H2	**0.13**	J-/H2	**0.11**	J-/H2	15.400	0.18	**3.3**		**1.5**		**1.4**		51.7	4.76	**0.59**	J-/H2	**0.35**	J-/H2	**0.23**	J-/H2	47.000	0.851
Benzo(a)pyrene	50-32-8	mg/kg	**0.17**	J-/H2	**0.15**	J-/H2	**0.13**	J-/H2	13.300	0.2	**2.7**		**1.3**		**1.2**		48.4	3.84	**0.61**	J-/H2	**0.35**	J-/H2	**0.25**	J-/H2	46.100	0.871
Benzo(b)fluoranthene	205-99-2	mg/kg	**0.27**	J-/H2	**0.23**	J-/H2	**0.2**	J-/H2	15.100	0.322	**3.9**		**1.8**		**1.7**		50.4	5.59	**0.93**	J-/H2	**0.48**	J-/H2	**0.37**	J-/H2	50.000	1.34
Benzo(g,h,i)perylene	191-24-2	mg/kg	**0.13**	J-/H2	**0.12**	J-/H2	**0.1**	J-/H2	13.100	0.155	**1.5**		**0.75**		**0.68**		46.5	2.12	**0.43**	J-/H2	**0.26**	J-/H2	**0.18**	J-/H2	44.000	0.611
Benzo(k)fluoranthene	207-08-9	mg/kg	**0.092**	J-/H2	**0.076**	J-/H2	**0.065**	J-/H2	17.500	0.112	**1.2**		**0.61**		**0.48**		50.3	1.73	**0.27**	J-/H2	**0.16**	J-/H2	**0.13**	J-/H2	39.500	0.372
Chrysene	218-01-9	mg/kg	**0.17**	J-/H2	**0.14**	J-/H2	**0.12**	J-/H2	17.600	0.207	**3.1**		**1.5**		**1.3**		50.2	4.45	**0.61**	J-/H2	**0.35**	J-/H2	**0.25**	J-/H2	46.100	0.871
Dibenz(a,h)anthracene	53-70-3	mg/kg	**0.035**	J-/H2	**0.03**	J-/H2	**0.026**	J-/H2	14.900	0.0417	**0.45**		**0.26**		**0.24**		36.6	0.608	**0.11**	J-/H2/TR	**0.064**	J-/H2/TR	**0.055**	J-/H2/TR	38.600	0.151
Fluoranthene	206-44-0	mg/kg	**0.26**	J-/H2	**0.24**	J-/H2	**0.2**	J-/H2	13.100	0.31	**5.6**		**2.7**		**2.6**		46.9	7.92	**1.1**	J-/H2	**0.65**	J-/H2	**0.43**	J-/H2	47.000	1.59
Fluorene	86-73-7	mg/kg	**0.009**	J-/H2	**0.0077**	J-/H2/TR	**0.008**	J-/H2/TR	8.270	0.00995	**0.22**		**0.1**		**0.13**		41.6	0.307	**0.044**	J-/H2/TR	**0.025**	J-/H2/TR	**0.015**	J-/H2/TR	52.600	0.0651
Indeno(1,2,3-c,d)pyrene	193-39-5	mg/kg	**0.15**	J-/H2	**0.14**	J-/H2	**0.12**	J-/H2	11.200	0.175	**1.8**		**0.83**		**0.81**		49.4	2.57	**0.46**	J-/H2	**0.27**	J-/H2	**0.19**	J-/H2	45.200	0.656
Naphthalene	91-20-3	mg/kg	**0.011**	J-/H2	**0.0075**	J-/H2/TR	**0.0063**	J-/H2/TR	29.500	0.0144	**0.067**		**0.044**		**0.056**		20.7	0.0846	**0.023**	J-/H2/TR	**0.013**	J-/H2/TR	**0.012**	J-/H2/TR	38.000	0.0313
Phenanthrene	85-01-8	mg/kg	**0.084**	J-/H2	**0.09**	J-/H2	**0.074**	J-/H2	9.780	0.103	**2.8**		**1.4**		**1.5**		41.1	3.87	**0.53**	J-/H2	**0.34**	J-/H2	**0.21**	J-/H2	44.700	0.765
Pyrene	129-00-0	mg/kg	**0.26**	J-/H2	**0.24**	J-/H2	**0.2**	J-/H2	13.100	0.31	**5.5**		**2.7**		**2.5**		47	7.79	**1.1**	J-/H2	**0.65**	J-/H2	**0.44**	J-/H2	46.200	1.58
Total LMW PAHs	N/A	mg/kg	0.3496		0.3076		0.2636		14	0.415	7.647		3.671		3.772		45.1	10.7	1.455		0.89		0.5779		45.600	2.09
Total HMW PAHs	N/A	mg/kg	1.7766		1.5636		1.3346		14.2	2.11	31.197		14.921		14.182		47.8	44.3	6.565		3.824		2.6629		46.100	9.39

DU-8 (AOC #5: Former Building 207 – Marine Garage Building) was not sampled because it would not be possible to separate metals and PAH contaminants originating from former Building 207, from contaminants originating from drums and other debris observed in DU-8.

NOTES:

mg/kg = milligrams per kilogram
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
PCB = Polychlorinated biphenyl
RSL = regional screening level
U = Analyte not detected. Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate
- Bias low
+ Bias high

Validation Reason Codes:

A Serial dilution
C LCS Recovery
D MS RPD
H2 Prep Hold Time
I Surrogate recovery outside project limits
L Lab Blank
M MS Recovery
M2 Post Spike
P1 Column RPD
TR Trace Level Detect
V2 CCV

Detected results are bolded.

Table 6-1 DU-1 Through DU-16 Incremental Soil Sampling Analytical Results

Location			DU-4 (Previous Sampling Locations II-EA-SD-02-01 and IX407-B1)									DU-5 (AOC #3: Former Building 123 – Garage Building and Previous Sampling Location II-EA-SS-02-06)								DU-6 (Previous Sampling Locations II-EA-SS-02-09 and EA-SS-02-03)							
Sample ID			IINY-DU-4A-SSIS-20200318		IINY-DU-4B-SSIS-20200318		IINY-DU-4C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test		IINY-DU-5A-SSIS-20200319		IINY-DU-5B-SSIS-20200319		IINY-DU-5C-SSIS-20200319		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-6A-SSIS-20200319		IINY-DU-6B-SSIS-20200319		IINY-DU-6C-SSIS-20200319		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in.)			0-6		0-6		0-6					0-6		0-6		0-6				0-6		0-6		0-6			
Matrix			Surface Soil		Surface Soil		Surface Soil					Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date			3/18/2020 14:30		3/18/2020 14:30		3/18/2020 14:30					3/19/2020 9:00		3/19/2020 9:00		3/19/2020 9:00				3/19/2020 15:00		3/19/2020 15:00		3/19/2020 15:00			
Analyte	**CAS #**	**Unit**																									
Target Analyte List Metals																											
Aluminum	7429-90-5	mg/kg	**10,000**		**10,000**		**10,000**		0	10,000		**13,000**		**13,000**		**13,000**		0	13,000	**10,000**		**12,000**		**10,000**		11	13,600
Antimony	7440-36-0	mg/kg	**1.5**		**2.1**		**1.5**		20.4	2.57		**0.49**		**0.47**		**0.59**		12.4	0.678	**1.4**		**0.62**		**0.58**		53.3	2.03
Arsenic	7440-38-2	mg/kg	**23**		**30**		**41**		29	54.2		**11**		**11**		**12**		5.09	12.8	**10**		**11**		**8**		15.8	13.5
Barium	7440-39-3	mg/kg	**74**		**100**		**81**		15.8	119		**75**		**65**		**78**		9.37	89.8	**70**		**72**		**55**		14.1	89
Beryllium	7440-41-7	mg/kg	**0.43**		**0.49**		**0.53**		10.4	0.61		**0.53**		**0.58**		**0.63**		8.62	0.706	**0.58**		**0.55**		**0.46**		11.8	0.687
Cadmium	7440-43-9	mg/kg	**1.1**		**1**		**0.86**		12.2	1.29		**0.23**		**0.2**		**0.2**		8.25	0.254	**0.22**		**0.31**		**0.19**		26	0.397
Calcium	7440-70-2	mg/kg	**12,000**		**9,800**		**7,200**		24.9	15,700		**3,000**	J/M2	**3,800**		**2,900**		15.3	4,470	**14,000**		**14,000**		**15,000**		4.03	15,800
Chromium, Total	7440-47-3	mg/kg	**14**		**19**		**18**		15.6	23.7		**15**		**15**		**15**		0	15	**14**		**14**		**11**		13.3	17.4
Cobalt	7440-48-4	mg/kg	**6.8**		**7.8**		**7.3**		6.85	8.56		**7.9**		**7.8**		**7.7**		1.28	8.05	**7.9**		**7.5**		**6.3**		11.5	9.33
Copper	7440-50-8	mg/kg	**49**		**61**		**58**		11.2	71.7		**25**		**25**		**24**		2.34	26.1	**38**		**42**		**30**		16.7	52
Iron	7439-89-6	mg/kg	**19,000**		**20,000**		**19,000**		2.99	20,800		**20,000**		**20,000**		**19,000**		2.94	21,100	**16,000**		**19000**		**17000**		8.81	21200
Lead	7439-92-1	mg/kg	**250**		**360**		**280**		19.2	440		**82**		**76**		**100**		14.5	117	**93**		**130**		**72**		29.9	172
Magnesium	7439-95-4	mg/kg	**8,100**		**6,200**		**5,100**		23.5	10,300		**4,800**		**5,500**		**4,600**		9.52	6,160	**10,000**		**10,000**		**11,000**		5.59	11,800
Manganese	7439-96-5	mg/kg	**430**		**480**		**510**		8.54	575		**800**		**690**		**700**		8.33	883	**870**		**680**		**520**		25.4	1,130
Mercury	7439-97-6	mg/kg	**0.29**		**0.34**		**0.23**		19	0.425		**0.23**		**0.11**		**0.12**		43	0.321	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Nickel	7440-02-0	mg/kg	**14**		**17**		**16**		9.75	19.5		**18**		**19**		**17**		5.56	20.5	**16**		**16**		**13**		11.5	19.4
Potassium	2023695	mg/kg	**1,200**		**1,300**		**1,300**		4.56	1,410		**1,300**		**1,200**		**1,200**		4.68	1,380	**1,200**		**1,200**		**1,200**		0	1,200
Selenium	7782-49-2	mg/kg	**0.38**	J/TR	**0.5**		**0.58**		20.7	0.74		**0.27**	J/TR	**0.28**	J/TR	**0.31**	J/TR	7.26	0.339	**0.4**	J/TR	**0.36**	J/TR	**0.29**	J/TR	15.9	0.49
Silver	7440-22-4	mg/kg	**0.1**		**0.11**		**0.098**		6.26	0.119		0.099	U (LOQ)/L	0.095	U (LOQ)/L	0.098	U (LOQ)/L	ND	ND	**0.1**		**0.065**	J/TR	**0.066**	J/TR	25.9	0.127
Sodium	7440-23-5	mg/kg	**230**	J/TR	**230**	J/TR	**170**	J/TR	16.5	297		**64**	J/TR	**57**	J/TR	**64**	J/TR	6.55	71.8	**89**	J/TR	**86**	J/TR	**79**	J/TR	6.06	97.6
Thallium	7440-28-0	mg/kg	**0.16**		**0.19**		**0.2**		11.4	0.236		**0.11**		**0.1**		**0.1**		5.59	0.118	**0.14**		**0.15**		**0.12**		11.2	0.175
Vanadium	7440-62-2	mg/kg	**20**		**23**		**23**		7.87	26.4		**20**		**19**		**20**		2.94	21.1	**23**		**21**		**17**		15	28
Zinc	7440-66-6	mg/kg	**280**		**190**		**150**		32.2	374		**74**		**74**		**79**		3.82	82.9	**68**		**79**		**56**		17	96.6
Polycyclic Aromatic Hydrocarbons																											
1-Methylnaphthalene	90-12-0	mg/kg	**0.061**	J-/H2/TR	0.19	UJ (LOD)/H2	**0.021**	J-/H2/TR	97.4	0.313		**0.0056**	J/TR	**0.011**		**0.0069**	J/TR	36	0.0149	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
2-Methylnaphthalene	91-57-6	mg/kg	**0.069**	J-/H2/TR	0.19	UJ (LOD)/H2	**0.039**	J-/H2/TR	80.5	0.301		**0.0082**	J/TR	**0.013**		**0.0092**	J/TR	25.000	0.0165	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Acenaphthene	83-32-9	mg/kg	**0.2**	J-/H2/TR	**0.079**	J-/H2/TR	**0.026**	J-/H2/TR	87.7	0.326		**0.016**		**0.019**		**0.014**		15.400	0.0227	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Acenaphthylene	208-96-8	mg/kg	**0.23**	J-/H2/TR	**0.25**	J-/H2/TR	**0.15**	J-/H2/TR	25.2	0.343		**0.016**		**0.019**		**0.024**		20.500	0.0298	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Anthracene	120-12-7	mg/kg	**0.39**	J-/H2/TR	**0.37**	J-/H2/TR	**0.18**	J-/H2/TR	37	0.605		**0.068**		**0.052**		**0.062**		13.300	0.081	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Benzo(a)anthracene	56-55-3	mg/kg	**1.2**	J-/H2	**1.3**	J-/H2	**0.89**	J-/H2	18.9	1.67		**0.4**		**0.25**		**0.3**		24.100	0.509	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Benzo(a)pyrene	50-32-8	mg/kg	**1.1**	J-/H2	**1.1**	J-/H2	**1.1**	J-/H2	0	1.1		**0.35**		**0.23**		**0.26**		22.300	0.437	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Benzo(b)fluoranthene	205-99-2	mg/kg	**2.9**	J-/H2	**2.7**	J-/H2	**2.1**	J-/H2	16.2	3.61		**0.48**		**0.34**		**0.41**		17.100	0.586	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Benzo(g,h,i)perylene	191-24-2	mg/kg	**0.91**	J-/H2	**0.86**	J-/H2/TR	**0.87**	J-/H2	3.01	0.947		**0.22**		**0.15**		**0.17**		20.000	0.271	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Benzo(k)fluoranthene	207-08-9	mg/kg	**0.92**	J-/H2	**0.83**	J-/H2/TR	**0.66**	J-/H2	16.4	1.14		**0.16**		**0.11**		**0.13**		18.900	0.197	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Chrysene	218-01-9	mg/kg	**2.6**	J-/H2	**1.9**	J-/H2	**1**	J-/H2	43.7	3.85		**0.39**		**0.25**		**0.3**		22.600	0.492	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Dibenz(a,h)anthracene	53-70-3	mg/kg	**0.28**	J-/H2/TR	**0.3**	J-/H2/TR	**0.26**	J-/H2	7.14	0.33		**0.069**		**0.043**		**0.05**		24.900	0.0879	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Fluoranthene	206-44-0	mg/kg	**7.9**	J-/H2	**4.2**	J-/H2	**1.3**	J-/H2	74.1	12.8		**0.62**		**0.45**		**0.55**		15.800	0.755	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Fluorene	86-73-7	mg/kg	**0.27**	J-/H2/TR	**0.11**	J-/H2/TR	**0.043**	J-/H2/TR	82.7	0.435		**0.018**		**0.021**		**0.016**		13.700	0.0247	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Indeno(1,2,3-c,d)pyrene	193-39-5	mg/kg	**1**	J-/H2	**1.1**	J-/H2	**1**	J-/H2	5.59	1.18		**0.25**		**0.17**		**0.21**		19.000	0.311	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Naphthalene	91-20-3	mg/kg	0.18	UJ (LOD)	0.19	UJ (LOD)	**0.051**	J-/H2/TR	55.2	0.335		**0.01**		**0.018**		**0.014**		28.600	0.0241	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Phenanthrene	85-01-8	mg/kg	**3.8**	J-/H2	**1.6**	J-/H2	**0.46**	J-/H2	86.9	6.23		**0.25**		**0.22**		**0.25**		7.220	0.284	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Pyrene	129-00-0	mg/kg	**5.7**	J-/H2	**3.3**	J-/H2	**1.3**	J-/H2	64.2	8.98		**0.68**		**0.48**		**0.57**		17.400	0.829	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Total LMW PAHs	N/A	mg/kg	6.22		3.709		1.86		55.700	9.44		0.7918		0.623		0.6961		12.000	0.917	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Total HMW PAHs	N/A	mg/kg	25.03		17.999		11.04		38.800	35.6		3.7308		2.616		3.0761		17.800	4.55	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A

Table 6-1 DU-1 Through DU-16 Incremental Soil Sampling Analytical Results

Location			DU-7 (Previous Sampling Location II-EA-SS-02-08)								DU-9 (AOC #8: Former Building 219 – Garage Building and AOC #9: Former Building 220 – Garage Building)								DU-10 (Previous Sampling Location II-EA-SS-02-14)						
Sample ID			IINY-DU-7A-SSIS-20200319		IINY-DU-7B-SSIS-20200319		IINY-DU-7C-SSIS-20200319		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-9A-SSIS-20200319		IINY-DU-9B-SSIS-20200319		IINY-DU-9C-SSIS-20200319		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-10A-SSIS-20200319		IINY-DU-10B-SSIS-20200319		IINY-DU-10C-SSIS-20200319		95% Upper Confidence Limit Chebychev Test
Depth (in.)			0-6		0-6		0-6				0-6		0-6		0-6				0-6		0-6		0-6		
Matrix			Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil		
Sample Date			3/19/2020 13:45		3/19/2020 13:45		3/19/2020 13:45				3/19/2020 10:40		3/19/2020 10:40		3/19/2020 10:40				3/19/2020 11:20		3/19/2020 11:20		3/19/2020 11:20		
Analyte	**CAS #**	**Unit**																							
Target Analyte List Metals																									
Aluminum	7429-90-5	mg/kg	**11,000**		**10,000**		**11,000**		5	12,100	**10,000**		**11,000**		**11,000**		5	12,100	**11,000**		**11,000**		**9,300**		12,900
Antimony	7440-36-0	mg/kg	**0.75**		**1.6**		**2.5**		54.1	3.82	**0.44**		**0.42**		**0.44**		2.66	0.462	**0.41**		**0.41**		**0.35**		0.477
Arsenic	7440-38-2	mg/kg	**18**		**17**		**17**		3.33	18.8	**7**		**7.3**		**6.9**		2.95	7.59	**7.5**		**7.2**		**6.5**		8.36
Barium	7440-39-3	mg/kg	**110**		**93**		**110**		9.41	129	**61**		**65**		**59**		4.95	69.4	**57**		**58**		**56**		59.5
Beryllium	7440-41-7	mg/kg	**0.55**		**0.48**		**0.58**		9.56	0.666	**0.48**		**0.51**		**0.5**		3.08	0.535	**0.6**		**0.56**		**0.5**		0.68
Cadmium	7440-43-9	mg/kg	**0.59**	J/TR	**0.48**	J/TR	**0.62**	J/TR	13.1	0.749	**0.23**		**0.22**		**0.26**		8.8	0.289	**0.17**		**0.19**		**0.19**		0.212
Calcium	7440-70-2	mg/kg	**17,000**		**15,000**		**16,000**		6.25	18,500	**7,600**	J-/M	**5,800**	J-/M	**8,700**	J-/MA	19.9	11,100	**14,000**		**14,000**		**17,000**		19,400
Chromium, Total	7440-47-3	mg/kg	**17**		**15**		**16**		6.25	18.5	**13**		**13**		**13**		0	13	**14**		**14**		**13**		15.1
Cobalt	7440-48-4	mg/kg	**6.2**		**5.6**		**6.5**		7.51	7.25	**7.6**		**7.4**		**7.3**		2.05	7.82	**7.9**		**8**		**7.5**		8.47
Copper	7440-50-8	mg/kg	**43**		**60**		**44**		19.5	73	**30**		**28**		**27**		5.39	32.2	**23**		**23**		**23**		23
Iron	7439-89-6	mg/kg	**19,000**		**18,000**		**19,000**		3.09	20,100	**16,000**		**16,000**		**17,000**	J/A	3.53	17,800	**18,000**		**18,000**		**16,000**		20,200
Lead	7439-92-1	mg/kg	**690**		**2,000**		**570**		73	3,080	**63**		**58**		**54**		7.73	69.7	**31**		**35**		**37**		42
Magnesium	7439-95-4	mg/kg	**12,000**		**10,000**		**11,000**		9.09	13,500	**6,100**	J-/M	**5,100**	J-/M	**6,800**	J-/M/A	14.2	8,150	**10,000**	J/A	**9,900**		**11,000**		11,800
Manganese	7439-96-5	mg/kg	**480**		**460**		**630**		17.8	757	**510**		**500**		**470**		4.22	546	**570**		**550**		**520**		610
Mercury	7439-97-6	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.073		0.081		0.074		5.74	0.087	Not analyzed		Not analyzed		Not analyzed		N/A
Nickel	7440-02-0	mg/kg	**14**		**13**		**15**		7.14	16.5	**16**		**14**		**14**		7.87	17.6	**16**		**16**		**15**		17.1
Potassium	2023695	mg/kg	**1,100**		**1,000**		**1,000**		5.59	1,180	**1,200**	J-/M	**1,300**	J-/M	**1,300**	J-/M	4.56	1,410	**1,400**	J/TR	**1,400**		**1,200**		1,620
Selenium	7782-49-2	mg/kg	**0.38**	J/TR	**0.35**	J/TR	**0.43**	J/TR	10.5	0.488	**0.28**	J/TR	**0.28**	J/TR	**0.31**	J/TR	5.97	0.334	**0.27**	J/TR	**0.26**	J/TR	**0.3**	J/TR	0.329
Silver	7440-22-4	mg/kg	**0.09**	J/TR	**0.11**	J/TR	**0.1**	J/TR	10	0.125	0.095	U (LOQ)/L	0.095	U (LOQ)/L	0.094	U (LOQ)/L	ND	ND	0.094	U (LOQ)/L	0.094	U (LOQ)/L	**0.059**	J/TR	0.133
Sodium	7440-23-5	mg/kg	**95**	J/TR	**85**	J/TR	**92**	J/TR	5.66	104	**170**	J-/M/TR	**160**	J/M/TR	**160**	J-/M/TR	3.53	178	500	UJ (LOD)/M2	**83**	J/TR	**88**	J/TR	826
Thallium	7440-28-0	mg/kg	**0.21**		**0.19**		**0.21**		5.68	0.232	**0.11**		**0.12**		**0.14**		12.4	0.162	**0.15**		**0.15**		**0.15**		0.15
Vanadium	7440-62-2	mg/kg	**21**		**18**		**22**		10.2	25.6	**25**	J+/M	**25**	J+/M	**25**	J+/M	0	25	**23**		**24**		**21**		26.5
Zinc	7440-66-6	mg/kg	**200**		**210**		**210**		2.79	221	**69**		**67**		**70**		2.22	72.5	**59**		**60**		**55**		64.7
Polycyclic Aromatic Hydrocarbons																									
1-Methylnaphthalene	90-12-0	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.0075**	J/TR	**0.0057**	J/TR	**0.0057**	J-/I/TR	16.5	0.00892	Not Analyzed		Not Analyzed		Not Analyzed		N/A
2-Methylnaphthalene	91-57-6	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.01**		**0.0082**	J/TR	**0.0078**	J-/I/TR	13.5	0.0116	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Acenaphthene	83-32-9	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.013**		**0.0078**	J/TR	**0.011**	J-/I	24.7	0.0172	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Acenaphthylene	208-96-8	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.036**		**0.03**		**0.026**	J-/I	16.4	0.0433	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Anthracene	120-12-7	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.045**		**0.03**		**0.035**	J-/I	20.8	0.0559	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Benzo(a)anthracene	56-55-3	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.19**	J+/M	**0.13**	J+/M	**0.15**	J-/M/I	19.5	0.234	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Benzo(a)pyrene	50-32-8	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.21**		**0.15**		**0.17**	J-/I	17.3	0.254	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Benzo(b)fluoranthene	205-99-2	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.35**		**0.23**		**0.26**	J-/I	22.3	0.437	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Benzo(g,h,i)perylene	191-24-2	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.15**	J+/M	**0.1**	J+/M	**0.11**	J-/M/I	22	0.187	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Benzo(k)fluoranthene	207-08-9	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.12**		**0.078**		**0.086**	J-/I	23.6	0.151	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Chrysene	218-01-9	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.21**	J+/M	**0.15**	J+/M	**0.17**	J/M/I	17.3	0.254	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Dibenz(a,h)anthracene	53-70-3	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.038**		**0.027**		**0.028**	J-/I	19.6	0.0463	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Fluoranthene	206-44-0	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.44**		**0.27**		**0.34**	J-/I	24.4	0.565	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Fluorene	86-73-7	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.017**		**0.0099**		**0.013**	J-/I	26.8	0.0223	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Indeno(1,2,3-c,d)pyrene	193-39-5	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.18**	J/M	**0.12**	J/M	**0.14**	J-/M/I	20.8	0.224	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Naphthalene	91-20-3	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.013**		**0.011**		**0.0097**	J-/I	14.8	0.0154	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Phenanthrene	85-01-8	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.16**	J+/M	**0.095**	J+/M	**0.12**	J/M/I	26.2	0.208	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Pyrene	129-00-0	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.41**		**0.27**		**0.3**	J-/I	22.6	0.512	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Total LMW PAHs	N/A	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.4915		0.3276		0.3782		21	0.61	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Total HMW PAHs	N/A	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	2.3795		1.5826		1.8322		21.1	2.96	Not Analyzed		Not Analyzed		Not Analyzed		N/A

Table 6-1 DU-1 Through DU-16 Incremental Soil Sampling Analytical Results

Location			DU-11 (AOC #18: Area F – Former Coal Storage Area (Located Near Former Building 215])							DU-12 (AOC #6: Former Building 213 – Paint Locker for Building 202 and AOC #7: Former Building 215 – Garage Building)								DU-13 (AOC #1: Former Building 103 – Paint and Oil Storage and Previous Sampling Location IX 103-B1)							
Sample ID			IINY-DU-11A-SSIS-20200330		IINY-DU-11B-SSIS-20200330		IINY-DU-11C-SSIS-20200330		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-12A-SSIS-20200330		IINY-DU-12B-SSIS-20200330		IINY-DU-12C-SSIS-20200330		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-13A-SSIS-20200330		IINY-DU-13B-SSIS-20200330		IINY-DU-13C-SSIS-20200330		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in.)			0-6		0-6		0-6				0-6		0-6		0-6				0-6		0-6		0-6			
Matrix			Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date			3/30/2020 11:15		3/30/2020 11:15		3/30/2020 11:15				3/30/2020 12:15		3/30/2020 12:15		3/30/2020 12:15				3/30/2020 13:40		3/30/2020 13:40		3/30/2020 13:40			
Analyte	**CAS #**	**Unit**																								
Target Analyte List Metals																										
Aluminum	7429-90-5	mg/kg	**9,700**		**11,000**		**10,000**		7	11,900	**11,000**		**11,000**		**11,000**		0	11,000	**11,000**		**11,000**		**12,000**		5	12,800
Antimony	7440-36-0	mg/kg	**0.74**		**0.83**		**0.9**		9.74	1.03	**0.7**		**0.63**		**0.58**		9.47	0.788	**1.2**		**1.4**		**2.5**		41.2	3.46
Arsenic	7440-38-2	mg/kg	**37**		**43**		**39**		7.7	47.4	**13**		**14**		**14**		4.22	15.1	**9.7**		**11**		**11**		7.1	12.5
Barium	7440-39-3	mg/kg	**76**		**79**		**78**		1.97	81.5	**84**		**79**		**79**		3.58	87.9	**88**		**86**		**96**		5.88	103
Beryllium	7440-41-7	mg/kg	**0.55**		**0.59**		**0.51**		7.27	0.651	**0.69**		**0.62**		**0.63**		5.85	0.742	**0.61**		**0.55**		**0.64**		7.64	0.715
Cadmium	7440-43-9	mg/kg	**0.37**		**0.36**		**0.37**		1.57	0.381	**0.38**		**0.33**		**0.35**		7.12	0.417	**0.74**		**0.77**		**0.75**		2.03	0.792
Calcium	7440-70-2	mg/kg	**28,000**		**25,000**		**27,000**		5.73	30,500	**10,000**		**11,000**		**13,000**		13.5	15,200	**9,200**		**8,500**		**8,900**		3.96	9,750
Chromium, Total	7440-47-3	mg/kg	**15**	J+/M	**15**	J+/M	**15**	J+/M	0	15	**15**		**15**		**15**		0	15	**15**		**14**		**15**		3.94	16.1
Cobalt	7440-48-4	mg/kg	**6.7**		**7**		**6.7**		2.55	7.24	**7.6**		**7.9**		**7.5**		2.72	8.19	**8.6**		**8.2**		**8.5**		2.47	8.96
Copper	7440-50-8	mg/kg	**30**		**37**		**33**		10.5	42.2	**51**		**48**		**47**		4.28	53.9	**220**		**600**		**260**		58	885
Iron	7439-89-6	mg/kg	**17,000**	J/A	**19,000**		**19,000**		6.3	21,200	**17,000**		**17,000**		**17,000**		0	17,000	**18,000**		**18,000**		**19,000**		3.15	19,800
Lead	7439-92-1	mg/kg	**130**		**110**		**130**		9.36	152	**82**		**83**		**89**		4.47	94.2	**190**		**150**		**160**		12.5	219
Magnesium	7439-95-4	mg/kg	**19,000**		**17,000**		**18,000**		5.56	20,500	**7,100**		**7,200**		**8,600**		11	9,740	**5,700**		**5,500**		**5,400**		2.76	5,920
Manganese	7439-96-5	mg/kg	**600**		**600**		**600**		0	600	**940**		**820**		**790**		9.34	1,050	**1,000**		**830**		**1,100**		14	1,320
Mercury	7439-97-6	mg/kg	**0.25**	J-/M	**0.15**	J-/M	**0.15**	J-/M	31.5	0.329	**0.26**		**0.26**		**0.21**		11.9	0.316	**0.28**		**0.31**		**0.36**		12.8	0.418
Nickel	7440-02-0	mg/kg	**16**		**16**		**16**		0	16	**15**		**15**		**15**		0	15	**16**		**16**		**17**		3.53	17.8
Potassium	2023695	mg/kg	**910**		**960**		**1,000**		4.71	1,070	**1,100**		**1,100**		**1,100**		0	1,100	**1,400**		**1,400**		**1,400**		0	1,400
Selenium	7782-49-2	mg/kg	**0.47**	J/TR	**0.61**		**0.57**		13.1	0.731	**0.51**		**0.54**		**0.24**	J/TR	38.4	0.846	**0.55**		**0.6**		**0.68**		10.7	0.775
Silver	7440-22-4	mg/kg	**0.073**	J/TR	**0.082**	J/TR	**0.084**	J/TR	7.35	0.0944	**0.069**	J/TR	**0.069**	J/TR	**0.075**	J/TR	4.88	0.0797	**0.086**	J/TR	**0.094**	J/TR	**0.089**	J/TR	4.51	0.0998
Sodium	7440-23-5	mg/kg	**61**	J/TR	**56**	J/TR	**64**	J/TR	6.7	70.5	**73**	J/TR	**67**	J/TR	**68**	J/TR	4.64	77.4	**120**	J/TR	**120**	J/TR	**130**	J/TR	4.68	138
Thallium	7440-28-0	mg/kg	**0.19**		**0.22**		**0.22**		8.25	0.254	**0.15**		**0.14**		**0.15**		3.94	0.161	**0.16**		**0.16**		**0.18**		6.93	0.196
Vanadium	7440-62-2	mg/kg	**22**	J+/M	**24**	J+/M	**23**	J+/M	4.35	25.5	**28**		**26**		**27**		3.7	29.5	**30**		**30**		**31**		1.9	31.8
Zinc	7440-66-6	mg/kg	**87**		**100**		**110**		11.6	128	**95**		**100**		**93**		3.76	105	**140**		**150**		**170**		9.96	192
Polycyclic Aromatic Hydrocarbons																										
1-Methylnaphthalene	90-12-0	mg/kg	**0.028**	J-/H2/TR	**0.027**	J-/H2/TR	**0.023**	J-/H2/TR	10.2	0.0327	**0.073**	J-/H2/TR	**0.044**	J-/H2/TR	**0.053**	J-/H2/TR	26.2	0.094	**0.38**	J-/H2/TR	**0.45**	J-/H2/TR	**0.26**	J-/H2/TR	26.4	0.605
2-Methylnaphthalene	91-57-6	mg/kg	**0.043**	J-/H2/TR	**0.044**	J-/H2/TR	**0.036**	J-/H2/TR	10.6	0.052	**0.098**	J-/H2/TR	**0.055**	J-/H2/TR	**0.053**	J-/H2/TR	37	0.133	**0.43**	J-/H2/TR	**0.5**	J-/H2/TR	**0.31**	J-/H2/TR	23.2	0.655
Acenaphthene	83-32-9	mg/kg	**0.02**	J-/H2/TR	**0.029**	J-/H2/TR	**0.015**	J-/H2/TR	33.3	0.0392	**0.54**	J-/H2	**0.36**	J-/H2/TR	**0.39**	J-/H2	22.4	0.673	**4.5**	J-/H2	**4.7**	J-/H2	**2.6**	J-/H2	29.5	6.85
Acenaphthylene	208-96-8	mg/kg	**0.17**	J-/H2/TR	**0.23**	J-/H2	**0.16**	J-/H2/TR	20.3	0.282	**0.088**	J-/H2/TR	**0.029**	J-/H2/TR	**0.062**	J-/H2/TR	49.6	0.134	0.21	UJ (LOD)/H2	**1.3**	J-/H2/TR	0.2	UJ (LOD)/H2	111	2.16
Anthracene	120-12-7	mg/kg	**0.13**	J-/H2/TR	**0.15**	J-/H2/TR	**0.097**	J-/H2	21.3	0.193	**0.86**	J-/H2	**0.59**	J-/H2	**0.75**	J-/H2	18.5	1.08	**6.6**	J-/H2	**8**	J-/H2	**3.9**	J-/H2	33.8	11.4
Benzo(a)anthracene	56-55-3	mg/kg	**0.67**	J-/H2	**0.97**	J-/H2	**0.52**	J-/H2	31.8	1.3	**2.2**	J-/H2	**1.5**	J-/H2	**2.1**	J-/H2	19.6	2.89	**16**	J-/H2	**17**	J-/H2	**9.4**	J-/H2	29.2	24.5
Benzo(a)pyrene	50-32-8	mg/kg	**0.87**	J-/H2	**1.2**	J-/H2	**0.75**	J-/H2	24.8	1.53	**1.8**	J-/H2	**1.2**	J-/H2	**1.8**	J-/H2	21.7	2.47	**12**	J-/H2	**13**	J-/H2	**7.1**	J-/H2	29.5	18.6
Benzo(b)fluoranthene	205-99-2	mg/kg	**1.2**	J-/H2	**1.6**	J-/H2	**1.1**	J-/H2	20.4	1.97	**2.8**	J-/H2	**1.6**	J-/H2	**2.6**	J-/H2	27.6	3.95	**17**	J-/H2	**17**	J-/H2	**9.7**	J-/H2	28.9	25.2
Benzo(g,h,i)perylene	191-24-2	mg/kg	**0.82**	J-/H2	**1.2**	J-/H2	**0.78**	J-/H2	24.8	1.52	**1.4**	J-/H2	**0.69**	J-/H2	**1.3**	J-/H2	34	2.1	**7.2**	J-/H2	**7.9**	J-/H2	**4.2**	J-/H2	30.6	11.4
Benzo(k)fluoranthene	207-08-9	mg/kg	**0.43**	J-/H2	**0.57**	J-/H2	**0.36**	J-/H2	23.6	0.722	**1.1**	J-/H2	**0.62**	J-/H2	**0.97**	J-/H2	27.7	1.52	**6.4**	J-/H2	**7.4**	J-/H2	**3.8**	J-/H2	31.7	10.5
Chrysene	218-01-9	mg/kg	**0.96**	J-/H2	**1.3**	J-/H2	**0.75**	J-/H2	27.7	1.7	**2.4**	J-/H2	**1.5**	J-/H2	**2.2**	J-/H2	23.2	3.22	**16**	J-/H2	**16**	J-/H2	**9.3**	J-/H2	28.1	23.5
Dibenz(a,h)anthracene	53-70-3	mg/kg	**0.18**	J-/H2/TR	**0.23**	J-/H2	**0.16**	J-/H2	19	0.281	**0.38**	J-/H2	**0.2**	J-/H2/TR	**0.37**	J-/H2	31.9	0.571	**2.3**	J-/H2	**2.4**	J-/H2	**1.2**	J-/H2/TR	33.9	3.64
Fluoranthene	206-44-0	mg/kg	**1.1**	J-/H2	**1.3**	J-/H2	**0.71**	J-/H2	28.9	1.79	**4.2**	J-/H2	**3.1**	J-/H2	**4.3**	J-/H2	17.2	5.54	**34**	J-/H2	**38**	J-/H2	**21**	J-/H2	28.7	53.4
Fluorene	86-73-7	mg/kg	**0.043**	J-/H2/TR	**0.061**	J-/H2/TR	**0.028**	J-/H2	37.6	0.0856	**0.44**	J-/H2	**0.28**	J-/H2/TR	**0.32**	J-/H2/TR	24	0.556	**3.2**	J-/H2	**3.9**	J-/H2	**2**	J-/H2	31.7	5.45
Indeno(1,2,3-c,d)pyrene	193-39-5	mg/kg	**0.78**	J-/H2	**1.1**	J-/H2	**0.74**	J-/H2	22.6	1.37	**1.5**	J-/H2	**0.76**	J-/H2	**1.4**	J-/H2	32.9	2.23	**7.9**	J-/H2	**9.2**	J-/H2	**4.9**	J-/H2	30.1	12.9
Naphthalene	91-20-3	mg/kg	**0.098**	J-/H2/TR	**0.092**	J-/H2/TR	**0.068**	J-/H2/TR	18.5	0.126	**0.25**	J-/H2/TR	**0.12**	J-/H2/TR	**0.086**	J-/H2/TR	56.9	0.37	**0.95**	J-/H2/TR	**1.1**	J-/H2/TR	**0.75**	J-/H2/TR	18.8	1.38
Phenanthrene	85-01-8	mg/kg	**0.42**	J-/H2	**0.42**	J-/H2	**0.22**	J-/H2	32.7	0.644	**3.2**	J-/H2	**2.3**	J-/H2	**2.7**	J-/H2	16.5	3.87	**26**	J-/H2	**27**	J-/H2	**15**	J-/H2	29.4	39.4
Pyrene	129-00-0	mg/kg	**1.2**	J-/H2	**1.6**	J-/H2	**0.87**	J-/H2	29.9	2.14	**3.5**	J-/H2	**2.5**	J-/H2	**3.6**	J-/H2	19	4.73	**27**	J-/H2	**30**	J-/H2	**17**	J-/H2	27.6	41.8
Total LMW PAHs	N/A	mg/kg	1.622		2.023		1.167		26.7	2.68	7.749		5.278		6.514		19	9.62	58.06		63.95		34.22		30.2	91.7
Total HMW PAHs	N/A	mg/kg	8.632		11.493		7.037		24.9	14.7	25.529		16.448		23.554		21.9	33.9	176.86		191.85		104.82		29.5	275

Table 6-1 DU-1 Through DU-16 Incremental Soil Sampling Analytical Results

Location			DU-14 (Previous Sampling Location II-EA-SS-02-13)							DU-15 (Previous Sampling Location II-EA-SS-02-15)								DU-16 (AOC #4: Former Building 124 to 128 – Sewage Disposal Plant [and Suspected Outfall])							
Sample ID			IINY-DU-14A-SSIS-20200320		IINY-DU-14B-SSIS-20200320		IINY-DU-14C-SSIS-20200320		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-15A-SSIS-20200401		IINY-DU-15B-SSIS-20200401		IINY-DU-15C-SSIS-20200401		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-16A-SSIS-20200331		IINY-DU-16B-SSIS-20200331		IINY-DU-16C-SSIS-20200331		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in.)			0-6		0-6		0-6				0-6		0-6		0-6				0-6		0-6		0-6			
Matrix			Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date			3/20/2020 8:30		3/20/2020 8:30		3/20/2020 8:30				4/1/2020 8:20		4/1/2020 8:20		4/1/2020 8:20				3/31/2020 9:50		3/31/2020 9:50		3/31/2020 9:50			
Analyte	**CAS #**	**Unit**																								
Target Analyte List Metals																										
Aluminum	7429-90-5	mg/kg	**10,000**		**11,000**		**10,000**		6	11,800	**11,000**		**11,000**		**11,000**		0	11,000	**15,000**		**14,000**		**13,000**		7	16,500
Antimony	7440-36-0	mg/kg	**0.6**		**0.56**		**0.59**		3.57	0.636	**1.1**		**0.7**		**0.7**		27.7	1.41	**0.44**		**0.4**		**0.42**		4.76	0.47
Arsenic	7440-38-2	mg/kg	**16**		**18**		**17**		5.88	19.5	**7**		**6.5**		**7.1**		4.68	7.68	**7.1**		**6.8**		**7.2**		2.96	7.56
Barium	7440-39-3	mg/kg	**76**		**81**		**78**		3.21	84.7	**58**		**61**		**62**		3.45	65.6	**61**		**56**		**59**		4.29	65
Beryllium	7440-41-7	mg/kg	**0.53**		**0.57**		**0.55**		3.64	0.6	**0.47**		**0.5**		**0.47**		3.61	0.524	**0.6**		**0.6**		**0.53**		7.01	0.678
Cadmium	7440-43-9	mg/kg	**0.28**		**0.27**		**0.28**		2.09	0.291	**0.58**		**0.38**		**0.58**		22.5	0.804	**0.25**		**0.33**		**0.27**		14.7	0.388
Calcium	7440-70-2	mg/kg	**9,500**	J+/M	**8,900**	J+/M	**6,800**	J+/M/A	16.9	12,000	**7,100**		**7,500**		**9,900**		18.5	12,000	**8,000**		**7,600**		**7,200**		5.26	8,610
Chromium, Total	7440-47-3	mg/kg	**13**		**14**		**14**		4.22	15.1	**15**		**15**		**15**		0	15	**15**		**15**		**14**		3.94	16.1
Cobalt	7440-48-4	mg/kg	**6.8**		**6.9**		**7.3**		3.78	7.67	**6.8**		**6.7**		**6.8**		0.853	6.91	**8.5**		**8**		**8.4**		3.19	8.97
Copper	7440-50-8	mg/kg	**23**		**26**		**25**		6.19	28.5	**30**	J/TR	**31**	J/TR	**33**	J/TR	4.88	35.2	**38**		**33**		**39**		8.77	44.8
Iron	7439-89-6	mg/kg	**16,000**		**17,000**		**16,000**	J/A	3.53	17,800	**19,000**		**18,000**		**18,000**		3.15	19,800	**22,000**		**20,000**		**21,000**		4.76	23,500
Lead	7439-92-1	mg/kg	**96**		**120**		**110**		11.1	139	**130**		**130**		**120**		4.56	141	**38**		**42**		**46**		9.52	52.1
Magnesium	7439-95-4	mg/kg	**7,100**	J+/M	**6,800**	J+/M	**5,500**	J+/M	13.2	8,610	**6,000**		**5,900**		**7,700**		15.5	9,080	**6,500**		**6,200**		**6,100**		3.32	6,790
Manganese	7439-96-5	mg/kg	**670**		**720**		**700**		3.61	760	**410**		**480**		**430**		8.19	531	**450**		**430**		**440**		2.27	465
Mercury	7439-97-6	mg/kg	**0.16**		**0.18**		**0.19**		8.65	0.215	**0.14**		**0.21**		**0.29**		35.2	0.402	**0.097**		**0.096**		**0.096**		0.599	0.0978
Nickel	7440-02-0	mg/kg	**15**		**16**		**16**		3.69	17.1	**14**		**14**		**15**		4.03	15.8	**16**		**16**		**16**		0	16
Potassium	2023695	mg/kg	**980**		**1,000**		**1,000**		1.16	1,020	**1,200**		**1,200**		**1,200**		0	1,200	**1,700**		**1,600**		**1,400**		9.75	1,950
Selenium	7782-49-2	mg/kg	**0.38**	J/TR	**0.38**	J/TR	**0.4**	J/TR	2.99	0.416	**0.52**		**0.62**		**0.47**	J/TR	14.2	0.729	**0.4**	J/TR	**0.4**	J/TR	**0.35**	J/TR	7.53	0.456
Silver	7440-22-4	mg/kg	**0.08**	J/TR	**0.063**	J/TR	**0.087**	J/TR	16.1	0.108	**0.079**	J/TR	**0.089**		**0.073**	J/TR	10.1	0.101	**0.055**	J/TR	**0.063**	J/TR	**0.057**	J/TR	7.14	0.0688
Sodium	7440-23-5	mg/kg	**72**	J-/M/TR	**70**	J-/M/TR	**73**	J-/M/TR	2.13	75.5	**75**	J/TR	**81**	J/TR	**77**	J/TR	3.93	85.4	**440**	J/TR	**360**	J/TR	**330**	J/TR	15.1	520
Thallium	7440-28-0	mg/kg	**0.11**		**0.13**		**0.12**		8.33	0.145	**0.16**		**0.15**		**0.16**		3.69	0.171	**0.13**		**0.12**		**0.12**		4.68	0.138
Vanadium	7440-62-2	mg/kg	**20**		**20**		**20**		0	20	**25**		**26**		**25**		2.28	26.8	**28**		**30**		**30**		3.94	32.2
Zinc	7440-66-6	mg/kg	**74**		**74**		**78**		3.07	81.1	**250**		**120**		**120**		46	352	**70**		**71**		**66**		3.83	75.7
Polycyclic Aromatic Hydrocarbons																										
1-Methylnaphthalene	90-12-0	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.026**	J-/I	**0.028**		**0.0077**	J-/TR	54.4	0.0487
2-Methylnaphthalene	91-57-6	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.033**	J-/I	**0.041**		**0.0082**	J-/TR	62.4	0.0704
Acenaphthene	83-32-9	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.15**	J-/I	**0.14**		**0.036**		58.1	0.268
Acenaphthylene	208-96-8	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.032**	J-/I	**0.034**		**0.028**		9.75	0.039
Anthracene	120-12-7	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.18**	J-/I	**0.16**		**0.063**		46.6	0.292
Benzo(a)anthracene	56-55-3	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.5**	J-/I	**0.44**		**0.21**		39.9	0.769
Benzo(a)pyrene	50-32-8	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.47**	J-/I	**0.43**		**0.24**		32.3	0.689
Benzo(b)fluoranthene	205-99-2	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.71**	J-/I	**0.65**		**0.33**		36.3	1.08
Benzo(g,h,i)perylene	191-24-2	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.31**	J-/I	**0.29**		**0.15**		34.9	0.469
Benzo(k)fluoranthene	207-08-9	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.26**	J-/I	**0.23**		**0.12**		36.3	0.389
Chrysene	218-01-9	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.49**	J-/I	**0.44**		**0.21**		39.3	0.756
Dibenz(a,h)anthracene	53-70-3	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.1**	J-/I	**0.085**		**0.042**		39.8	0.151
Fluoranthene	206-44-0	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**1**	J-/I	**0.96**		**0.41**		41.7	1.62
Fluorene	86-73-7	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.1**	J-/I	**0.1**		**0.027**		55.7	0.182
Indeno(1,2,3-c,d)pyrene	193-39-5	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.38**	J-/I	**0.35**		**0.19**		33.3	0.564
Naphthalene	91-20-3	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.064**	J-/I	**0.089**		**0.012**		71.4	0.154
Phenanthrene	85-01-8	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.74**	J-/I	**0.66**		**0.2**		54.6	1.27
Pyrene	129-00-0	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	**0.86**	J-/I	**0.8**		**0.35**		41.6	1.37
Total LMW PAHs	N/A	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	1.825		1.692		0.5919		49.4	3.07
Total HMW PAHs	N/A	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	6.045		5.567		2.4939		41	9.55

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Table 6-2 DU-20 Through DU-22 Incremental Soil Sampling Analytical Results

Location			DU-20 (AOC #13: Area A – One Former Fuel Oil AST [2,500 gallons] Located Near Former Building 223)															
Sample ID			IINY-DU-20A-SSIS-20200316		IINY-DU-20B-SSIS-20200316		IINY-DU-20C-SSIS-20200316		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-20A-SBIS1-20200317		IINY-DU-20B-SBIS1-20200317		IINY-DU-20C-SBIS1-20200317		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)			0-6		0-6		0-6				6-36		6-36		6-36			
Matrix			Surface Soil		Surface Soil		Surface Soil				Subsurface Soil		Subsurface Soil		Subsurface Soil			
Sample Date			3/16/2020 15:30		3/16/2020 15:30		3/16/2020 15:30				3/17/2020 9:30		3/17/2020 9:30		3/17/2020 9:30			
Analyte	**CAS #**	**Unit**																
Polycyclic Aromatic Hydrocarbons																		
1-Methylnaphthalene	90-12-0	mg/kg	**0.0076**	J/TR	**0.011**		**0.0076**	J/TR	22.5	0.0137	**0.0049**	J/TR	**0.005**	J/TR	**0.0049**	J/TR	1.17	0.00508
2-Methylnaphthalene	91-57-6	mg/kg	**0.011**		**0.018**		**0.01**		33.500	0.024	**0.0078**	J/TR	**0.0069**	J/TR	**0.008**	J/TR	7.740	0.00904
Acenaphthene	83-32-9	mg/kg	**0.0063**	J/TR	**0.016**		**0.012**		42.600	0.0237	**0.0067**	J/TR	**0.0079**	J/TR	**0.0035**	J/TR	37.700	0.0118
Acenaphthylene	208-96-8	mg/kg	**0.029**		**0.041**		**0.032**		18.400	0.0497	**0.02**		**0.017**		**0.027**		24.100	0.0342
Anthracene	120-12-7	mg/kg	**0.035**		**0.046**		**0.043**		13.800	0.0556	**0.025**		**0.028**		**0.025**		6.660	0.0304
Benzo(a)anthracene	56-55-3	mg/kg	**0.14**		**0.15**		**0.15**		3.940	0.161	**0.074**		**0.074**		**0.071**		2.370	0.0774
Benzo(a)pyrene	50-32-8	mg/kg	**0.16**		**0.17**		**0.15**		6.250	0.185	**0.074**		**0.071**		**0.079**		5.410	0.0848
Benzo(b)fluoranthene	205-99-2	mg/kg	**0.25**		**0.28**		**0.23**		9.930	0.317	**0.11**		**0.11**		**0.12**		5.090	0.128
Benzo(g,h,i)perylene	191-24-2	mg/kg	**0.13**		**0.13**		**0.11**		9.360	0.152	**0.045**		**0.042**		**0.05**		8.850	0.0558
Benzo(k)fluoranthene	207-08-9	mg/kg	**0.081**		**0.093**		**0.072**		12.800	0.109	**0.033**		**0.032**		**0.036**		6.180	0.0389
Chrysene	218-01-9	mg/kg	**0.17**		**0.19**		**0.16**		8.810	0.212	**0.079**		**0.076**		**0.083**		4.430	0.0882
Dibenz(a,h)anthracene	53-70-3	mg/kg	**0.03**		**0.028**		**0.028**		4.030	0.0316	**0.013**		**0.013**		**0.015**		8.450	0.0166
Fluoranthene	206-44-0	mg/kg	**0.27**		**0.32**		**0.28**		9.120	0.357	**0.14**	J+/M	**0.14**	J+/M	**0.13**	J+/M	4.220	0.151
Fluorene	86-73-7	mg/kg	**0.0098**	J/TR	**0.02**		**0.016**		33.700	0.0282	**0.0087**	J/TR	**0.011**		**0.0072**	J/TR	21.300	0.0138
Indeno(1,2,3-c,d)pyrene	193-39-5	mg/kg	**0.13**		**0.15**		**0.12**		11.500	0.172	**0.049**		**0.045**		**0.053**		8.160	0.0591
Naphthalene	91-20-3	mg/kg	**0.012**		**0.017**		**0.011**		24.100	0.0214	**0.0072**	J/TR	**0.007**	J/TR	**0.0083**	J/TR	9.330	0.00926
Phenanthrene	85-01-8	mg/kg	**0.1**		**0.14**		**0.13**		16.900	0.176	**0.072**		**0.081**		**0.056**		18.200	0.102
Pyrene	129-00-0	mg/kg	**0.25**		**0.31**		**0.27**		11.000	0.354	**0.14**	J+/M	**0.14**	J+/M	**0.14**	J+/M	0.000	0.14
Total LMW PAHs	**N/A**	**mg/kg**	**0.2107**		**0.309**		**0.2616**		**18.900**	**0.384**	**0.1523**		**0.1638**		**0.1399**		**7.860**	**0.182**
Total HMW PAHs	**N/A**	**mg/kg**	**1.611**		**1.821**		**1.57**		**8.080**	**2.01**	**0.757**		**0.743**		**0.777**		**2.250**	**0.802**
Benzene, Toluene, Ethylbenzene, and Xylenes																		
Benzene	71-43-2	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0018	U (LOD)	0.0015	U (LOD)	0.0017	U (LOD)	ND	ND
Ethylbenzene	100-41-4	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0009	U (LOD)	0.00077	U (LOD)	0.00083	U (LOD)	ND	ND
m,p-Xylene	108-38-3	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0018	U (LOD)	0.0015	U (LOD)	0.0017	U (LOD)	ND	ND
o-Xylene	95-47-6	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0009	U (LOD)	0.00077	U (LOD)	0.00083	U (LOD)	ND	ND
Toluene	108-88-3	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0009	U (LOD)	0.00077	U (LOD)	0.00083	U (LOD)	ND	ND
Xylenes, Total	1330-20-7	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0009	U (LOD)	0.00077	U (LOD)	0.00083	U (LOD)	ND	ND

NOTES:

mg/kg = milligrams per kilogram
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
PCB = Polychlorinated biphenyl
RSL = regional screening level
U = Analyte not detected Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate
- Bias low
+ Bias high

Detected results are bolded.

Validation Reason Codes:

A	Serial dilution
C	LCS Recovery
D	MS RPD
H2	Prep Hold Time
I	Surrogate recovery outside project limits
L	Lab Blank
M	MS Recovery
M2	Post Spike
P1	Column RPD
TR	Trace Level Detect
V2	CCV

Table 6-2 DU-20 Through DU-22 Incremental Soil Sampling Analytical Results

Location			DU-21 (AOC #14: Area B – One Former Fuel Oil AST [Size Unknown] Located Near Dock 131)															
Sample ID			IINY-DU-21A-SSIS-20200317		IINY-DU-21B-SSIS-20200317		IINY-DU-21C-SSIS-20200317		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-21A-SBIS1-20200317		IINY-DU-21B-SBIS1-20200317		IINY-DU-21C-SBIS1-20200317		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)			0-6		0-6		0-6				6-36		6-36		6-36			
Matrix			Surface Soil		Surface Soil		Surface Soil				Subsurface Soil		Subsurface Soil		Subsurface Soil			
Sample Date			3/17/2020 12:40		3/17/2020 12:40		3/17/2020 12:40				3/17/2020 11:45		3/17/2020 11:45		3/17/2020 11:45			
Analyte	**CAS #**	**Unit**																
Polycyclic Aromatic Hydrocarbons																		
1-Methylnaphthalene	90-12-0	mg/kg	**0.0083**	J/TR	**0.0044**	J/TR	**0.0041**	J/TR	41.8	0.0115	**0.0063**	J/TR	**0.0053**	J/TR	**0.0052**	J/TR	10.9	0.00713
2-Methylnaphthalene	91-57-6	mg/kg	**0.01**		**0.0067**	J/TR	**0.0063**	J/TR	26.500	0.0128	**0.0083**	J/TR	**0.0081**	J/TR	**0.0074**	J/TR	5.960	0.00912
Acenaphthene	83-32-9	mg/kg	**0.025**		**0.0051**	J/TR	**0.0049**	J/TR	99.000	0.0407	**0.0067**	J/TR	**0.004**	J/TR	**0.0038**	J/TR	33.500	0.00891
Acenaphthylene	208-96-8	mg/kg	**0.028**		**0.019**		**0.021**		20.800	0.0346	**0.012**		**0.0098**		**0.012**		11.300	0.0145
Anthracene	120-12-7	mg/kg	**0.08**		**0.019**		**0.023**		83.900	0.127	**0.021**		**0.013**		**0.013**		29.500	0.0273
Benzo(a)anthracene	56-55-3	mg/kg	**0.26**		**0.088**		**0.098**		64.900	0.392	**0.073**		**0.061**		**0.066**		9.040	0.0818
Benzo(a)pyrene	50-32-8	mg/kg	**0.22**		**0.089**		**0.1**		53.300	0.319	**0.073**		**0.061**		**0.069**		9.030	0.083
Benzo(b)fluoranthene	205-99-2	mg/kg	**0.35**		**0.15**		**0.18**		47.600	0.498	**0.13**		**0.11**		**0.13**		9.360	0.152
Benzo(g,h,i)perylene	191-24-2	mg/kg	**0.12**		**0.058**		**0.063**		42.900	0.167	**0.045**		**0.037**		**0.04**		9.940	0.0508
Benzo(k)fluoranthene	207-08-9	mg/kg	**0.12**		**0.05**		**0.057**		51.000	0.173	**0.043**		**0.036**		**0.036**		10.500	0.0485
Chrysene	218-01-9	mg/kg	**0.25**		**0.097**		**0.11**		55.700	0.366	**0.087**		**0.071**		**0.078**		10.200	0.0989
Dibenz(a,h)anthracene	53-70-3	mg/kg	**0.038**		**0.016**		**0.019**		49.000	0.0544	**0.013**		**0.011**		**0.012**		8.330	0.0145
Fluoranthene	206-44-0	mg/kg	**0.47**		**0.16**		**0.18**		64.300	0.707	**0.15**		**0.11**		**0.12**		16.400	0.179
Fluorene	86-73-7	mg/kg	**0.03**		**0.0068**	J/TR	**0.0077**	J/TR	88.600	0.0479	**0.0074**	J/TR	**0.0051**	J/TR	**0.0046**	J/TR	26.200	0.00946
Indeno(1,2,3-c,d)pyrene	193-39-5	mg/kg	**0.15**		**0.07**		**0.074**		46.000	0.211	**0.053**		**0.042**		**0.047**		11.600	0.0612
Naphthalene	91-20-3	mg/kg	**0.012**		**0.008**	J/TR	**0.007**	J/TR	29.400	0.0157	**0.0086**	J/TR	**0.0076**	J/TR	**0.0073**	J/TR	8.690	0.00955
Phenanthrene	85-01-8	mg/kg	**0.32**		**0.058**		**0.066**		101.000	0.523	**0.077**		**0.047**		**0.046**		31.100	0.101
Pyrene	129-00-0	mg/kg	**0.5**		**0.17**		**0.18**		66.200	0.756	**0.15**		**0.11**		**0.12**		16.400	0.179
Total LMW PAHs	**N/A**	**mg/kg**	**0.5133**		**0.127**		**0.14**		**84.300**	**0.812**	**0.1473**		**0.0999**		**0.0993**		**23.800**	**0.185**
Total HMW PAHs	**N/A**	**mg/kg**	**2.478**		**0.948**		**1.061**		**57.000**	**3.64**	**0.817**		**0.649**		**0.718**		**11.600**	**0.941**
Benzene, Toluene, Ethylbenzene, and Xylenes																		
Benzene	71-43-2	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0026	U (LOD)	0.0018	U (LOD)	0.0026	U (LOD)	ND	ND
Ethylbenzene	100-41-4	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0013	U (LOD)	0.00089	U (LOD)	0.0013	U (LOD)	ND	ND
m,p-Xylene	108-38-3	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0026	U (LOD)	0.0018	U (LOD)	0.0026	U (LOD)	ND	ND
o-Xylene	95-47-6	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0013	U (LOD)	0.00089	U (LOD)	0.0013	U (LOD)	ND	ND
Toluene	108-88-3	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0013	U (LOD)	0.00089	U (LOD)	0.0013	U (LOD)	ND	ND
Xylenes, Total	1330-20-7	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0013	U (LOD)	0.00089	U (LOD)	0.0013	U (LOD)	ND	ND

Table 6-2 DU-20 Through DU-22 Incremental Soil Sampling Analytical Results

		Location	DU-22 (AOC #15: Area C – Two Former Fuel Oil ASTs [Size Unknown] Located Near Former Building 417							
		Sample ID	IINY-DU-22A-SSIS-20200316		IINY-DU-22B-SSIS-20200316		IINY-DU-22C-SSIS-20200316		% RSD	95% Upper Confidence Limit Chebychev Test
		Depth (in)	0-6		0-6		0-6			
		Matrix	Surface Soil		Surface Soil		Surface Soil			
		Sample Date	3/16/2020 16:45		3/16/2020 16:45		3/16/2020 16:45			
Analyte	**CAS #**	**Unit**								
Polycyclic Aromatic Hydrocarbons										
1-Methylnaphthalene	90-12-0	mg/kg	**0.041**		**0.04**		**0.041**		1.420	0.042
2-Methylnaphthalene	91-57-6	mg/kg	**0.064**		**0.057**		**0.063**		6.170	0.071
Acenaphthene	83-32-9	mg/kg	**0.1**		**0.11**		**0.077**		17.700	0.138
Acenaphthylene	208-96-8	mg/kg	**0.26**	J/TR	**0.18**		**0.15**		28.900	0.340
Anthracene	120-12-7	mg/kg	**0.44**		**0.29**		**0.27**		27.900	0.567
Benzo(a)anthracene	56-55-3	mg/kg	**2**		**1.3**		**1.2**		29.100	2.600
Benzo(a)pyrene	50-32-8	mg/kg	**1.9**		**1.3**		**1.1**		29.000	2.480
Benzo(b)fluoranthene	205-99-2	mg/kg	**3.1**		**1.9**		**1.8**		31.900	4.090
Benzo(g,h,i)perylene	191-24-2	mg/kg	**1**		**0.78**		**0.64**		22.500	1.260
Benzo(k)fluoranthene	207-08-9	mg/kg	**1.1**		**0.62**		**0.56**		38.900	1.500
Chrysene	218-01-9	mg/kg	**2.2**		**1.4**		**1.2**		33.100	2.930
Dibenz(a,h)anthracene	53-70-3	mg/kg	**0.38**		**0.23**		**0.2**		35.700	0.513
Fluoranthene	206-44-0	mg/kg	**3.5**		**2.4**		**1.9**		31.500	4.660
Fluorene	86-73-7	mg/kg	**0.13**		**0.12**		**0.069**		30.800	0.189
Indeno(1,2,3-c,d)pyrene	193-39-5	mg/kg	**1.2**		**0.92**		**0.73**		24.900	1.550
Naphthalene	91-20-3	mg/kg	**0.066**		**0.053**		**0.063**		11.200	0.078
Phenanthrene	85-01-8	mg/kg	**1.4**		**1.1**		**0.71**		32.300	1.940
Pyrene	129-00-0	mg/kg	**3.5**		**2.4**		**2**		29.500	4.590
Total LMW PAHs	**N/A**	**mg/kg**	**2.501**		**1.95**		**1.443**		**26.900**	**3.3**
Total HMW PAHs	**N/A**	**mg/kg**	**19.88**		**13.25**		**11.33**		**30.300**	**26.1**
Benzene, Toluene, Ethylbenzene, and Xylenes										
Benzene	71-43-2	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A
Ethylbenzene	100-41-4	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A
m,p-Xylene	108-38-3	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A
o-Xylene	95-47-6	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A
Toluene	108-88-3	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A
Xylenes, Total	1330-20-7	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A

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Table 6-3 DU-23 and DU-25 Incremental Soil Sampling Analytical Results

Location			DU-23 (T1 Northwest of Building 406)								DU-25 (T3 Northeast of Building 220)							
Sample ID			IINY-DU-23A-SSIS-20200320		IINY-DU-23B-SSIS-20200320		IINY-DU-23C-SSIS-20200320		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-25A-SSIS-20200320		IINY-DU-25B-SSIS-20200320		IINY-DU-25C-SSIS-20200320		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)			0-6		0-6		0-6				0-6		0-6		0-6			
Matrix			Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date			3/20/2020 9:15		3/20/2020 9:15		3/20/2020 9:15				3/20/2020 10:30		3/20/2020 10:30		3/20/2020 10:30			
Analyte	**CAS #**	**Unit**																
Polychlorinated Biphenyls																		
PCB, Total	1336-36-3	mg/kg	**0.034**	J/TR	**0.025**	J/TR	**0.019**	J/TR	29.000	0.045	**0.011**	J/TR	**0.016**	J/TR	**0.012**	J/TR	20.400	0.020
PCB-1016 (Aroclor 1016)	12674-11-2	mg/kg	0.03	U (LOD)	0.03	U (LOD)	0.03	U (LOD)	ND	ND	0.03	U (LOD)	0.03	U (LOD)	0.029	U (LOD)	ND	ND
PCB-1221 (Aroclor 1221)	11104-28-2	mg/kg	0.077	U (LOD)	0.077	U (LOD)	0.079	U (LOD)	ND	ND	0.078	U (LOD)	0.077	U (LOD)	0.076	U (LOD)	ND	ND
PCB-1232 (Aroclor 1232)	11141-16-5	mg/kg	0.03	U (LOD)	0.03	U (LOD)	0.03	U (LOD)	ND	ND	0.03	U (LOD)	0.03	U (LOD)	0.029	U (LOD)	ND	ND
PCB-1242 (Aroclor 1242)	53469-21-9	mg/kg	0.046	U (LOD)	0.046	U (LOD)	0.047	U (LOD)	ND	ND	0.047	U (LOD)	0.046	U (LOD)	0.046	U (LOD)	ND	ND
PCB-1248 (Aroclor 1248)	12672-29-6	mg/kg	0.015	U (LOD)	0.015	U (LOD)	0.015	U (LOD)	ND	ND	0.015	U (LOD)	0.014	U (LOD)	0.014	U (LOD)	ND	ND
PCB-1254 (Aroclor 1254)	11097-69-1	mg/kg	0.032	U (LOD)	0.032	U (LOD)	0.033	U (LOD)	ND	ND	0.032	U (LOD)	0.032	U (LOD)	0.032	U (LOD)	ND	ND
PCB-1260 (Aroclor 1260)	11096-82-5	mg/kg	**0.034**	J/TR/P1	**0.025**	J/TR/P1	**0.019**	J/TR/P1	29.000	0.045	**0.011**	J/TR/P1	**0.016**	J/TR	**0.012**	J/TR	20.400	0.020
PCB-1262 (Aroclor 1262)	37324-23-5	mg/kg	0.015	U (LOD)	0.015	U (LOD)	0.016	U (LOD)	ND	ND	0.016	U (LOD)	0.015	U (LOD)	0.015	U (LOD)	ND	ND
PCB-1268 (Aroclor 1268)	11100-14-4	mg/kg	0.0065	U (LOD)	0.0065	U (LOD)	0.0066	U (LOD)	ND	ND	0.0065	U (LOD)	0.0064	U (LOD)	0.0063	U (LOD)	ND	ND

River. While sediment and soil was noted along the northeastern edge of DU-24 off the bedrock outcrop of Round Island, this sediment/soil was along the shoreline of the tidally influenced Hudson River. The Hudson River itself is a PCB source. Therefore, collecting PCBs from soil/sediment along the Hudson River would not

NOTES:

mg/kg = milligrams per kilogram
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
PCB = Polychlorinated biphenyl
RSL = regional screening level
U = Analyte not detected Numerical value is LOD or LOQ, as indicated
- Bias low
+ Bias high
Detected results are bolded.

Validation Reason Codes:

A	Serial dilution
C	LCS Recovery
D	MS RPD
H2	Prep Hold Time
I	Surrogate recovery outside project limits
L	Lab Blank
M	MS Recovery
M2	Post Spike
P1	Column RPD
TR	Trace Level Detect
V2	CCV

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Table 6-4 EXDU-1 Through EXDU-7 Incremental Soil Sampling Analytical Results

Location			EXDU-1 (Building 609 – Mine Loading Plant)								EXDU-2 (Building 506 – Filling House #3)								EXDU-3 (Building 503 – Filling House #6)							
Sample ID			IINY-EXDU-1A-SSIS-20200317		IINY-EXDU-1B-SSIS-20200317		IINY-EXDU-1C-SSIS-20200317		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-EXDU-2A-SSIS-20200317		IINY-EXDU-2B-SSIS-20200317		IINY-EXDU-2C-SSIS-20200317		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-EXDU-3A-SSIS-20200318		IINY-EXDU-3B-SSIS-20200318		IINY-EXDU-3C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)			0-6		0-6		0-6				0-6		0-6		0-6				0-6		0-6		0-6			
Matrix			Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date			3/17/2020 15:35		3/17/2020 15:35		3/17/2020 15:35				3/17/2020 16:10		3/17/2020 16:10		3/17/2020 16:10				3/18/2020 8:00		3/18/2020 8:00		3/18/2020 8:00			
Analyte	**CAS #**	**Unit**																								
Explosives Residues																										
1,3,5-Trinitrobenzene (TNB)	99-35-4	mg/kg	0.039	U (LOD)	0.04	U (LOD)	**0.029**	J/TR/P1	16.9	0.0513	0.04	U (LOD)	0.041	U (LOD)	0.04	U (LOD)	ND	ND	0.037	U (LOD)	0.039	U (LOD)	0.038	U (LOD)	ND	ND
1,3-Dinitrobenzene (DNB)	99-65-0	mg/kg	**0.038**	J/TR	**0.039**	J/TR	**0.051**	J/TR/P1	17	0.0609	0.04	U (LOD)	0.041	U (LOD)	0.04	U (LOD)	ND	ND	0.037	U (LOD)	0.039	U (LOD)	0.038	U (LOD)	ND	ND
2,4,6-Trinitrotoluene (TNT)	118-96-7	mg/kg	**0.28**	J-/C	**0.21**	J-/C	**0.37**	J-/C	28	0.489	0.099	UJ (LOQ)-/C	0.1	UJ (LOQ)-/C	0.1	UJ (LOQ)-/C	ND	ND	0.093	UJ (LOQ)-/C	0.097	UJ (LOQ)-/C	0.096	UJ (LOQ)-/C	ND	ND
2,4-Dinitrotoluene (24DNT)	121-14-2	mg/kg	**0.063**	J/TR	**0.06**	J/TR/P1	**0.22**		80	0.345	0.04	U (LOD)	0.041	U (LOD)	0.04	U (LOD)	ND	ND	0.037	U (LOD)	0.039	U (LOD)	0.038	U (LOD)	ND	ND
2,6-Dinitrotoluene (26DNT)	606-20-2	mg/kg	0.039	U (LOD)	0.04	U (LOD)	0.04	U (LOD)	ND	ND	0.04	U (LOD)	0.041	U (LOD)	0.04	U (LOD)	ND	ND	0.037	U (LOD)	0.039	U (LOD)	0.038	U (LOD)	ND	ND
2-Amino-4,6-dinitrotoluene (2AMDNT)	35572-78-2	mg/kg	0.097	U (LOQ)	0.1	U (LOQ)	0.1	U (LOQ)	ND	ND	0.099	U (LOQ)	0.1	U (LOQ)	0.1	U (LOQ)	ND	ND	0.093	U (LOQ)	0.097	U (LOQ)	0.096	U (LOQ)	ND	ND
2-Nitrotoluene (2NT)	88-72-2	mg/kg	0.097	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.099	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.093	U (LOD)	0.097	U (LOD)	0.096	U (LOD)	ND	ND
3,5-Dinitroaniline	618-87-1	mg/kg	0.019	U (LOD)	0.02	U (LOD)	0.02	U (LOD)	ND	ND	0.02	U (LOD)	0.02	U (LOD)	0.02	U (LOD)	ND	ND	0.019	U (LOD)	0.019	U (LOD)	0.019	U (LOD)	ND	ND
3-Nitrotoluene (3NT)	99-08-1	mg/kg	0.19	U (LOQ)	0.2	U (LOQ)	0.2	U (LOQ)	ND	ND	0.2	U (LOQ)	0.2	U (LOQ)	0.2	U (LOQ)	ND	ND	0.19	U (LOQ)	0.19	U (LOQ)	0.19	U (LOQ)	ND	ND
4-Amino-2,6-dinitrotoluene (4AMDNT)	19406-51-0	mg/kg	0.097	U (LOQ)	0.1	U (LOQ)	0.1	U (LOQ)	ND	ND	0.099	U (LOQ)	0.1	U (LOQ)	0.1	U (LOQ)	ND	ND	0.093	U (LOQ)	0.097	U (LOQ)	0.096	U (LOQ)	ND	ND
4-Nitrotoluene (4NT)	99-99-0	mg/kg	0.097	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.099	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.093	U (LOD)	0.097	U (LOD)	0.096	U (LOD)	ND	ND
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	mg/kg	0.097	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.099	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.093	U (LOD)	0.097	U (LOD)	0.096	U (LOD)	ND	ND
Nitrobenzene (NB)	98-95-3	mg/kg	0.19	U (LOD)	0.2	U (LOD)	0.2	U (LOD)	ND	ND	0.2	U (LOD)	0.2	U (LOD)	0.2	U (LOD)	ND	ND	0.19	U (LOD)	0.19	U (LOD)	0.19	U (LOD)	ND	ND
Nitroglycerin (NG)	55-63-0	mg/kg	0.68	U (LOD)	0.7	U (LOD)	0.7	U (LOD)	ND	ND	0.69	U (LOD)	0.72	U (LOD)	0.71	U (LOD)	ND	ND	0.65	U (LOD)	0.68	U (LOD)	0.67	U (LOD)	ND	ND
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	mg/kg	0.068	U (LOD)	0.07	U (LOD)	0.07	U (LOD)	ND	ND	0.069	U (LOD)	0.072	U (LOD)	0.071	U (LOD)	ND	ND	0.065	U (LOD)	0.068	U (LOD)	0.067	U (LOD)	ND	ND
Pentaerythritol tetranitrate (PETN)	78-11-5	mg/kg	0.97	U (LOD)	1	U (LOD)	1	U (LOD)	ND	ND	0.99	U (LOD)	1	U (LOD)	1	U (LOD)	ND	ND	0.93	U (LOD)	0.97	U (LOD)	0.96	U (LOD)	ND	ND
N-Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	479-45-8	mg/kg	0.097	UJ (LOD)-/C	0.1	UJ (LOD)-/C	0.1	UJ (LOD)-/C	ND	ND	0.099	UJ (LOD)-/C	0.1	UJ (LOD)-/C	0.1	UJ (LOD)-/C	ND	ND	0.093	UJ (LOD)-/C	0.097	UJ (LOD)-/C	0.096	UJ (LOD)-/C	ND	ND

NOTES:
mg/kg = milligrams per kilogram
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
RSL = regional screening level
U = Analyte not detected Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate
- Bias low
+ Bias high
Detected results are bolded.

Validation Reason Codes:
A Serial dilution
C LCS Recovery
D MS RPD
H2 Prep Hold Time
I Surrogate recovery outside project limits
L Lab Blank
M MS Recovery
M2 Post Spike
P1 Column RPD
TR Trace Level Detect
V2 CCV

Table 6-4 EXDU-1 Through EXDU-7 Incremental Soil Sampling Analytical Results

Location			EXDU-4 (Building 404 – Filling House #1)								EXDU-5 (Building 307 – Filling House #5)							
Sample ID			IINY-EXDU-4A-SSIS-20200317		IINY-EXDU-4B-SSIS-20200317		IINY-EXDU-4C-SSIS-20200317		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-EXDU-5A-SSIS-20200318		IINY-EXDU-5B-SSIS-20200318		IINY-EXDU-5C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)			0-6		0-6		0-6				0-6		0-6		0-6			
Matrix			Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date			3/17/2020 14:30		3/17/2020 14:30		3/17/2020 14:30				3/18/2020 9:30		3/18/2020 9:30		3/18/2020 9:30			
Analyte	**CAS #**	**Unit**																
Explosives Residues																		
1,3,5-Trinitrobenzene (TNB)	99-35-4	mg/kg	0.039	U (LOD)	0.04	U (LOD)	0.04	U (LOD)	ND	ND	0.039	U (LOD)	0.037	U (LOD)	0.037	U (LOD)	ND	ND
1,3-Dinitrobenzene (DNB)	99-65-0	mg/kg	0.039	U (LOD)	0.04	U (LOD)	0.04	U (LOD)	ND	ND	0.039	U (LOD)	0.037	U (LOD)	0.037	U (LOD)	ND	ND
2,4,6-Trinitrotoluene (TNT)	118-96-7	mg/kg	0.098	UJ (LOQ)-/C	0.1	UJ (LOQ)-/C	0.1	UJ (LOQ)-/C	ND	ND	0.097	UJ (LOQ)-/C	0.093	UJ (LOQ)-/C	0.092	UJ (LOQ)-/C	ND	ND
2,4-Dinitrotoluene (24DNT)	121-14-2	mg/kg	0.039	U (LOD)	0.04	U (LOD)	0.04	U (LOD)	ND	ND	0.039	U (LOD)	0.037	U (LOD)	0.037	U (LOD)	ND	ND
2,6-Dinitrotoluene (26DNT)	606-20-2	mg/kg	0.039	U (LOD)	0.04	U (LOD)	0.04	U (LOD)	ND	ND	0.039	U (LOD)	0.037	U (LOD)	0.037	U (LOD)	ND	ND
2-Amino-4,6-dinitrotoluene (2AMDNT)	35572-78-2	mg/kg	0.098	U (LOQ)	0.1	U (LOQ)	0.1	U (LOQ)	ND	ND	0.097	U (LOQ)	0.093	U (LOQ)	0.092	U (LOQ)	ND	ND
2-Nitrotoluene (2NT)	88-72-2	mg/kg	0.098	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.097	U (LOD)	0.093	U (LOD)	0.092	U (LOD)	ND	ND
3,5-Dinitroaniline	618-87-1	mg/kg	0.02	UJ (LOD)/M	0.02	UJ (LOD)/M	0.02	UJ (LOD)/M	ND	ND	0.019	U (LOD)	0.019	U (LOD)	0.018	U (LOD)	ND	ND
3-Nitrotoluene (3NT)	99-08-1	mg/kg	0.2	U (LOQ)	0.2	U (LOQ)	0.2	U (LOQ)	ND	ND	0.19	U (LOQ)	0.19	U (LOQ)	0.18	U (LOQ)	ND	ND
4-Amino-2,6-dinitrotoluene (4AMDNT)	19406-51-0	mg/kg	0.098	U (LOQ)	0.1	U (LOQ)	0.1	U (LOQ)	ND	ND	0.097	U (LOQ)	0.093	U (LOQ)	0.092	U (LOQ)	ND	ND
4-Nitrotoluene (4NT)	99-99-0	mg/kg	0.098	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.097	U (LOD)	0.093	U (LOD)	0.092	U (LOD)	ND	ND
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	mg/kg	0.098	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.097	U (LOD)	0.093	U (LOD)	0.092	U (LOD)	ND	ND
Nitrobenzene (NB)	98-95-3	mg/kg	0.2	U (LOD)	0.2	U (LOD)	0.2	U (LOD)	ND	ND	0.19	U (LOD)	0.19	U (LOD)	0.18	U (LOD)	ND	ND
Nitroglycerin (NG)	55-63-0	mg/kg	0.69	U (LOD)	0.7	U (LOD)	0.71	U (LOD)	ND	ND	0.68	U (LOD)	0.65	U (LOD)	0.65	U (LOD)	ND	ND
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	mg/kg	0.069	U (LOD)	0.07	U (LOD)	0.071	U (LOD)	ND	ND	0.068	U (LOD)	0.065	U (LOD)	0.065	U (LOD)	ND	ND
Pentaerythritol tetranitrate (PETN)	78-11-5	mg/kg	0.98	U (LOD)	1	U (LOD)	1	U (LOD)	ND	ND	0.97	U (LOD)	0.93	U (LOD)	0.92	U (LOD)	ND	ND
N-Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	479-45-8	mg/kg	0.098	UJ (LOD)-/C	0.1	UJ (LOD)-/C	0.1	UJ (LOD)-/C	ND	ND	0.097	UJ (LOD)-/C	0.093	UJ (LOD)-/C	0.092	UJ (LOD)-/C	ND	ND

Table 6-4 EXDU-1 Through EXDU-7 Incremental Soil Sampling Analytical Results

Location			EXDU-6 (Building 306 – Filling House #2)								EXDU-7 (Building 202 – Shell House #5 and D Plant)							
Sample ID			IINY-EXDU-6A-SSIS-20200318		IINY-EXDU-6B-SSIS-20200318		IINY-EXDU-6C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-EXDU-7A-SSIS-20200318		IINY-EXDU-7B-SSIS-20200318		IINY-EXDU-7C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)			0-6		0-6		0-6				0-6		0-6		0-6			
Matrix			Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date			3/18/2020 10:15		3/18/2020 10:15		3/18/2020 10:15				3/18/2020 11:45		3/18/2020 11:45		3/18/2020 11:45			
Analyte	**CAS #**	**Unit**																
Explosives Residues																		
1,3,5-Trinitrobenzene (TNB)	99-35-4	mg/kg	0.038	U (LOD)	0.039	U (LOD)	0.039	U (LOD)	ND	ND	0.038	U (LOD)	0.039	U (LOD)	0.037	U (LOD)	ND	ND
1,3-Dinitrobenzene (DNB)	99-65-0	mg/kg	0.038	U (LOD)	0.039	U (LOD)	0.039	U (LOD)	ND	ND	0.038	U (LOD)	0.039	U (LOD)	0.037	U (LOD)	ND	ND
2,4,6-Trinitrotoluene (TNT)	118-96-7	mg/kg	0.094	UJ (LOQ)-/C	0.096	UJ (LOQ)-/C	0.099	UJ (LOQ)-/C	ND	ND	0.094	UJ (LOQ)-/C	0.099	UJ (LOQ)-/C	0.093	UJ (LOQ)-/C	ND	ND
2,4-Dinitrotoluene (24DNT)	121-14-2	mg/kg	0.038	U (LOD)	0.039	U (LOD)	0.039	U (LOD)	ND	ND	0.038	U (LOD)	0.039	U (LOD)	0.037	U (LOD)	ND	ND
2,6-Dinitrotoluene (26DNT)	606-20-2	mg/kg	0.038	U (LOD)	0.039	U (LOD)	0.039	U (LOD)	ND	ND	0.038	U (LOD)	0.039	U (LOD)	0.037	U (LOD)	ND	ND
2-Amino-4,6-dinitrotoluene (2AMDNT)	35572-78-2	mg/kg	0.094	U (LOQ)	0.096	U (LOQ)	0.099	U (LOQ)	ND	ND	0.094	U (LOQ)	0.099	U (LOQ)	0.093	U (LOQ)	ND	ND
2-Nitrotoluene (2NT)	88-72-2	mg/kg	0.094	U (LOD)	0.096	U (LOD)	0.099	U (LOD)	ND	ND	0.094	U (LOD)	0.099	U (LOD)	0.093	U (LOD)	ND	ND
3,5-Dinitroaniline	618-87-1	mg/kg	0.019	U (LOD)	0.019	U (LOD)	0.02	U (LOD)	ND	ND	0.019	U (LOD)	0.02	U (LOD)	0.019	U (LOD)	ND	ND
3-Nitrotoluene (3NT)	99-08-1	mg/kg	0.19	U (LOQ)	0.19	U (LOQ)	0.2	U (LOQ)	ND	ND	0.19	U (LOQ)	0.2	U (LOQ)	0.19	U (LOQ)	ND	ND
4-Amino-2,6-dinitrotoluene (4AMDNT)	19406-51-0	mg/kg	0.094	U (LOQ)	0.096	U (LOQ)	0.099	U (LOQ)	ND	ND	0.094	U (LOQ)	0.099	U (LOQ)	0.093	U (LOQ)	ND	ND
4-Nitrotoluene (4NT)	99-99-0	mg/kg	0.094	U (LOD)	0.096	U (LOD)	0.099	U (LOD)	ND	ND	0.094	U (LOD)	0.099	U (LOD)	0.093	U (LOD)	ND	ND
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	mg/kg	0.094	U (LOD)	0.096	U (LOD)	0.099	U (LOD)	ND	ND	0.094	U (LOD)	0.099	U (LOD)	0.093	U (LOD)	ND	ND
Nitrobenzene (NB)	98-95-3	mg/kg	0.19	U (LOD)	0.19	U (LOD)	0.2	U (LOD)	ND	ND	0.19	U (LOD)	0.2	U (LOD)	0.19	U (LOD)	ND	ND
Nitroglycerin (NG)	55-63-0	mg/kg	0.66	U (LOD)	0.67	U (LOD)	0.69	U (LOD)	ND	ND	0.66	U (LOD)	0.69	U (LOD)	0.65	U (LOD)	ND	ND
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	mg/kg	0.066	U (LOD)	0.067	U (LOD)	0.069	U (LOD)	ND	ND	0.066	U (LOD)	0.069	U (LOD)	0.065	U (LOD)	ND	ND
Pentaerythritol tetranitrate (PETN)	78-11-5	mg/kg	0.94	U (LOD)	0.96	U (LOD)	0.99	U (LOD)	ND	ND	0.94	U (LOD)	0.99	U (LOD)	0.93	U (LOD)	ND	ND
N-Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	479-45-8	mg/kg	0.094	UJ (LOD)-/C	0.096	UJ (LOD)-/C	0.099	UJ (LOD)-/C	ND	ND	0.094	UJ (LOD)-/C	0.099	UJ (LOD)-/C	0.093	UJ (LOD)-/C	ND	ND

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Table 6-5 Upland Soil Detections Summary

Analyte	CAS #	Upland Surface Soil				Upland Subsurface Soil			
		Onsite DU With Detection	Concentration Range (mg/kg)	DU with Minimum Concentration	DU with Maximum Concentration	Onsite DU With Detection	Concentration Range (mg/kg)	DU with Minimum Concentration	DU with Maximum Concentration
TAL Metals									
Mercury	7439-97-6	12 of 12 DUs sampled (DU-01 through DU-05, DU-09, DU-11 through DU-16)	0.073 to 0.36	DU-09	DU-13	Not sampled due to shallow depth to refusal in upland soil (less than 12 in. bgs)			
Silver	7440-22-4	11 of 15 DUs sampled (DU-03, DU-04, DU-06, DU-07, DU-10 through DU-16)	0.055 to 0.11	DU-16	DU-07				
Aluminum	7429-90-5	Each of 15 DUs sampled (DU-01 through DU-07, DU-09 through DU-16)	9,300 to 15,000	DU-10	DU-16				
Antimony	7440-36-0		0.35 to 2.5	DU-10	DU-07, DU-13				
Arsenic	7440-38-2		6.5 to 43	DU-10, DU-15	DU-11				
Barium	7440-39-3		55 to 110	DU-06	DU-07				
Beryllium	7440-41-7		0.43 to 0.69	DU-04	DU-12				
Cadmium	7440-43-9		0.17 to 1.1	DU-10	DU-04				
Calcium	7440-70-2		2,900 to 2,8000	DU-04	DU-11				
Chromium, Total	7440-47-3		11 to 19	DU-06	DU-04				
Cobalt	7440-48-4		5.6 to 8.6	DU-07	DU-13				
Copper	7440-50-8		21 to 600	DU-01	DU-13				
Iron	7439-89-6		15,000 to 2,000	DU-01	DU-16				
Lead	7439-92-1		31 to 2000	DU-10	DU-07				
Magnesium	7439-95-4		3,800 to 19,000	DU-01	DU-11				
Manganese	7439-96-5		410 to 1,100	DU-15	DU-13				
Nickel	7440-02-0		13 to 19	DU-07	DU-04				
Potassium	2023695		910 to 1700	DU-11	DU-16				
Selenium	7782-49-2		0.24 to 0.68	DU-12	DU-13				
Sodium	7440-23-5		56 to 440	DU-11	DU-16				
Thallium	7440-28-0		0.1 to 0.22	DU-05	DU-11				
Vanadium	7440-62-2		17 to 31	DU-06	DU-13				
Zinc	7440-66-6		55 to 280	DU-10	DU-04				
PAHs									
1-Methylnaphthalene	90-12-0	Each of 12 DUs sampled (DU-01 through DU-05, DU-09, DU-11 through DU-13, DU-16, and DU-20 through DU-22)	0.0036 at to 0.45	DU-01	DU-13	Each of 2 DUs sampled (DU-20, DU-21)	0.0049 to 0.0063	DU-20	DU-21
2-Methylnaphthalene	91-57-6		0.0053 to 0.5	DU-01	DU-13		0.0069 to 0.0083	DU-20	DU-21
Acenaphthene	83-32-9		0.0049 to 4.7	DU-21	DU-13		0.0035 to 0.0079	DU-20	DU-20
Acenaphthylene	208-96-8		0.016 to 1.3	DU-05	DU-13		0.0098 to 0.027	DU-21	DU-20
Anthracene	120-12-7		0.019 to 8	DU-21	DU-13		0.013 to 0.028	DU-21	DU-20
Benzo(a)anthracene	56-55-3		0.088 to 17	DU-21	DU-13		0.061 to 0.074	DU-21	DU-20
Benzo(a)pyrene	50-32-8		0.089 to 13	DU-21	DU-13		0.061 to 0.079	DU-21	DU-20
Benzo(b)fluoranthene	205-99-2		0.15 to 17	DU-21	DU-13		0.11 to 0.13	DU-20, DU-21	DU-21
Benzo(g,h,i)perylene	191-24-2		0.058 to 7.9	DU-21	DU-13		0.037 to 0.05	DU-21	DU-20
Benzo(k)fluoranthene	207-08-9		0.05 to 7.4	DU-21	DU-13		0.032 to 0.043	DU-20	DU-21
Chrysene	218-01-9		0.097 to 16	DU-21	DU-13		0.071 to 0.087	DU-21	DU-21
Dibenz(a,h)anthracene	53-70-3		0.016 to 2.4	DU-21	DU-13		0.011 to 0.015	DU-21	DU-20
Fluoranthene	206-44-0		0.16 to 38	DU-21	DU-13		0.11 to 0.15	DU-21	DU-20
Fluorene	86-73-7		0.0068 to 3.9	DU-21	DU-13		0.0046 to 0.011	DU-21	DU-20
Indeno(1,2,3-c,d)pyrene	193-39-5		0.07 to 9.2	DU-21	DU-13		0.042 to 0.053	DU-21	DU-20
Naphthalene	91-20-3		0.0063 to 1.1	DU-01	DU-13		0.007 to 0.0086	DU-20	DU-21
Phenanthrene	85-01-8		0.058 to 27	DU-21	DU-13		0.046 to 0.081	DU-21	DU-20
Pyrene	129-00-0		0.17 to 30	DU-21	DU-13		0.11 to 0.15	DU-21	DU-21
BTEX									
BTEX	Not applicable	Not analyzed				Not detected			
PCBs									
PCB-1260 (Aroclor 1260)	11096-82-5	Each of 2 DUs sampled (DU-23, DU-25)	0.011 to 0.034	DU-25	DU-23	Not sampled due to shallow depth to refusal in upland soil (less than 12 in. bgs)			
Explosives Residues									
1,3,5-Trinitrobenzene (TNB)	99-35-4	One of 7 DUs sampled (EXDU-1)	0.029	EXDU-1	EXDU-1	Not sampled.			
1,3-Dinitrobenzene (DNB)	99-65-0		0.038 to 0.051	EXDU-1	EXDU-1				
2,4,6-Trinitrotoluene (TNT)	118-96-7		0.21 to 0.37	EXDU-1	EXDU-1				
2,4-Dinitrotoluene (24DNT)	121-14-2		0.06 to 0.22	EXDU-1	EXDU-1				

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Table 6-6 DU-17 Through DU-19 Incremental Soil Sampling Analytical Results

Location			DU-17 (AOC #2 - Former Building 121 [Incinerator], AOC #16 - Area D - Dumping Area, and Previous Sampling Locations IX-121-B1 and II-EA-SD-02-02															
Sample ID			IINY-DU-17A-SSIS-20200331		IINY-DU-17B-SSIS-20200331		IINY-DU-17C-SSIS-20200331		%RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-17A-SBIS1-20200331		IINY-DU-17B-SBIS1-20200331		IINY-DU-17C-SBIS1-20200331		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)			0-6		0-6		0-6				6-36		6-36		6-36			
Matrix			Surface Soil		Surface Soil		Surface Soil				Subsurface Soil		Subsurface Soil		Subsurface Soil			
Sample Date			3/31/2020 8:15		3/31/2020 8:15		3/31/2020 8:15				3/31/2020 8:45		3/31/2020 8:45		3/31/2020 8:45			
Analyte	**CAS #**	**Unit**																
Target Analyte List Metals																		
Aluminum	7429-90-5	mg/kg	**5,400**		**5,300**		**7,000**		16	8,300	**6,100**		**5,900**		**6,100**		2	6,320
Antimony	7440-36-0	mg/kg	**9.9**		**7.3**		**6.5**		22.5	12.4	**4.8**		**4.5**		**4.4**		4.56	5.09
Arsenic	7440-38-2	mg/kg	**8.2**		**2.7**		**8.8**		51.2	15	**22**		**25**		**23**		6.55	27.2
Barium	7440-39-3	mg/kg	**150**		**120**		**130**		11.5	172	**460**		**330**		**280**		26.1	590
Beryllium	7440-41-7	mg/kg	**0.38**		**0.15**		**0.53**		54.2	0.835	**1.2**		**1.3**		**1.5**		11.5	1.72
Cadmium	7440-43-9	mg/kg	**5**		**20**		**16**		56.8	33.2	**3.9**		**3.4**		**3.2**		10.3	4.41
Calcium	7440-70-2	mg/kg	**74,000**		**43,000**		**58,000**		26.6	97300	**14,000**		**19,000**		**22,000**		22	28,500
Total Chromium, Total	7440-47-3	mg/kg	**19**		**6.9**		**25**		54.3	40.2	**13**		**13**		**12**		4.56	14.1
Cobalt	7440-48-4	mg/kg	**7.2**		**4.9**		**5.7**		19.7	8.87	**6.3**		**6.8**		**6.6**		3.83	7.2
Copper	7440-50-8	mg/kg	**210**		**83**		**280**		52.3	442	**180**		**130**		**130**		19.7	219
Iron	7439-89-6	mg/kg	**16,000**		**14,000**		**19,000**		15.4	22,700	**26,000**		**26,000**		**25,000**		2.25	27,100
Lead	7439-92-1	mg/kg	**2,900**		**1,500**		**1,200**		48.6	4,150	**2,700**		**1,200**		**820**		63.2	4,070
Magnesium	7439-95-4	mg/kg	**45,000**		**26,000**		**34,000**		27.3	59,000	**6,400**		**8,500**		**9,800**		20.8	12,600
Manganese	7439-96-5	mg/kg	**400**		**380**		**440**		7.51	484	**170**		**170**		**170**		0	170
Mercury	7439-97-6	mg/kg	**0.98**		**0.61**		**0.77**		24	1.25	**0.9**		**0.8**		**0.77**		8	0.995
Nickel	7440-02-0	mg/kg	**16**		**5.9**		**20**		52	32.3	**19**		**21**		**19**		5.87	22.6
Potassium	2023695	mg/kg	**1100**		**1100**		**1400**		14.4	1640	**610**		**550**		**560**		5.61	654
Selenium	7782-49-2	mg/kg	**0.52**		**0.2**	J/TR	**0.68**		52.4	1.08	**1.1**		**1.4**		**1.5**		15.6	1.86
Silver	7440-22-4	mg/kg	**0.59**		**0.56**		**0.72**		13.6	0.837	**0.3**		**0.25**		**0.24**		12.2	0.344
Sodium	7440-23-5	mg/kg	**400**	J/TR	**370**	J/TR	**490**		14.9	577	**510**		**480**		**510**		3.46	544
Thallium	7440-28-0	mg/kg	**0.12**		**0.1**		**0.15**		20.4	0.187	**0.6**		**0.72**		**0.8**		14.2	0.96
Vanadium	7440-62-2	mg/kg	**17**		**18**		**22**		13.9	25.7	**24**		**22**		**21**		6.84	26.2
Zinc	7440-66-6	mg/kg	**8,200**		**7,200**		**5,700**		17.9	10,200	**1,900**		**2,900**		**1,600**		31.9	3,850
Polycyclic Aromatic Hydrocarbons																		
1-Methylnaphthalene	90-12-0	mg/kg	**0.03**		**0.026**		**0.037**		18	0.045	**0.087**	J-/I	**0.098**	J-/I	**0.11**	J-/I	11.7	0.127
2-Methylnaphthalene	91-57-6	mg/kg	**0.044**		**0.039**		**0.056**		18.900	0.0683	**0.12**	J-/I	**0.14**	J-/I	**0.16**	J-/I	14.300	0.19
Acenaphthene	83-32-9	mg/kg	**0.035**		**0.028**		**0.044**		22.500	0.0559	**0.068**	J-/I	**0.058**	J-/I	**0.087**	J-/I	20.700	0.108
Acenaphthylene	208-96-8	mg/kg	**0.13**		**0.11**		**0.18**		25.800	0.231	**0.031**	J-/I	**0.035**	J-/I	**0.042**	J-/I	15.500	0.05
Anthracene	120-12-7	mg/kg	**0.17**		**0.15**		**0.24**		25.300	0.306	**0.21**		**0.081**	J-/I	**0.16**	J-/I	43.300	0.314
Benzo(a)anthracene	56-55-3	mg/kg	**0.58**		**0.48**	J-/I	**0.89**		32.900	1.19	**0.7**		**0.2**	J-/I	**0.47**	J-/I	54.800	1.09
Benzo(a)pyrene	50-32-8	mg/kg	**0.5**		**0.41**	J-/I	**0.75**		31.800	0.997	**0.45**		**0.11**	J-/I	**0.31**	J-/I	58.900	0.72
Benzo(b)fluoranthene	205-99-2	mg/kg	**0.88**		**0.71**	J-/I	**1.3**		31.500	1.73	**0.97**		**0.32**	J-/I	**0.67**	J-/I	49.800	1.47
Benzo(g,h,i)perylene	191-24-2	mg/kg	**0.32**		**0.29**		**0.45**		24.100	0.567	**0.34**		**0.13**	J-/I	**0.27**	J-/I	43.300	0.516
Benzo(k)fluoranthene	207-08-9	mg/kg	**0.28**		**0.24**		**0.38**		24.000	0.481	**0.23**	J-/I	**0.051**	J-/I	**0.17**	J-/I	60.600	0.38
Chrysene	218-01-9	mg/kg	**0.66**		**0.57**	J-/I	**1**		30.500	1.31	**1**		**0.48**	J-/I	**0.8**	J-/I	34.500	1.42
Dibenz(a,h)anthracene	53-70-3	mg/kg	**0.12**		**0.093**		**0.15**		23.600	0.193	**0.15**	J-/I	**0.068**	J-/I	**0.13**	J-/I	36.900	0.224
Fluoranthene	206-44-0	mg/kg	**1.1**		**0.94**	J-/I	**1.6**		28.400	2.08	**1.5**		**0.44**	J-/I	**1**	J-/I	54.100	2.31
Fluorene	86-73-7	mg/kg	**0.043**		**0.035**		**0.06**		27.800	0.0781	**0.076**	J-/I	**0.064**	J-/I	**0.11**	J-/I	28.600	0.143
Indeno(1,2,3-c,d)pyrene	193-39-5	mg/kg	**0.38**		**0.3**	J-/I	**0.52**		27.800	0.68	**0.29**		**0.085**	J-/I	**0.25**	J-/I	52.200	0.482
Naphthalene	91-20-3	mg/kg	**0.073**		**0.069**		**0.094**		17.100	0.112	**0.2**	J-/I	**0.24**	J-/I	**0.28**	J-/I	16.700	0.341
Phenanthrene	85-01-8	mg/kg	**0.49**		**0.4**	J-/I	**0.74**		32.400	0.987	**1.1**		**0.48**	J-/I	**0.88**	J-/I	38.300	1.61
Pyrene	129-00-0	mg/kg	**1.1**		**0.92**	J-/I	**1.6**		29.200	2.09	**1.2**		**0.4**	J-/I	**0.87**	J-/I	48.800	1.84
Total LMW PAHs	N/A	mg/kg	1.015		0.857		1.451		27.800	1.88	1.892		1.196		1.829		23.500	2.61
Total HMW PAHs	N/A	mg/kg	5.92		4.953		8.64		29.400	11.3	6.83		2.284		4.94		48.700	10.4
Polychlorinated Biphenyls																		
PCB, Total	1336-36-3	mg/kg	**0.14**		**0.13**		**0.14**		4.22	0.151	0.016	UJ (LOD)/I	0.015	UJ (LOD)/I	0.015	UJ (LOD)/I	ND	ND
PCB-1016 (Aroclor 1016)	12674-11-2	mg/kg	0.03	U (LOD)	0.027	U (LOD)	0.027	U (LOD)	ND	ND	0.031	UJ (LOD)/I	0.029	UJ (LOD)/I	0.028	UJ (LOD)/I	ND	ND
PCB-1221 (Aroclor 1221)	11104-28-2	mg/kg	0.078	U (LOD)	0.071	U (LOD)	0.071	U (LOD)	ND	ND	0.082	UJ (LOD)/I	0.075	UJ (LOD)/I	0.073	UJ (LOD)/I	ND	ND
PCB-1232 (Aroclor 1232)	11141-16-5	mg/kg	0.03	U (LOD)	0.027	U (LOD)	0.027	U (LOD)	ND	ND	0.031	UJ (LOD)/I	0.029	UJ (LOD)/I	0.028	UJ (LOD)/I	ND	ND
PCB-1242 (Aroclor 1242)	53469-21-9	mg/kg	0.047	U (LOD)	0.043	U (LOD)	0.043	U (LOD)	ND	ND	0.049	UJ (LOD)/I	0.045	UJ (LOD)/I	0.044	UJ (LOD)/I	ND	ND
PCB-1248 (Aroclor 1248)	12672-29-6	mg/kg	**0.095**		**0.084**		**0.087**		6.41	0.103	0.015	UJ (LOD)/I	0.014	UJ (LOD)/I	0.014	UJ (LOD)/I	ND	ND
PCB-1254 (Aroclor 1254)	11097-69-1	mg/kg	0.032	U (LOD)	0.03	U (LOD)	0.03	U (LOD)	ND	ND	0.034	UJ (LOD)/I	0.031	UJ (LOD)/I	0.03	UJ (LOD)/I	ND	ND
PCB-1260 (Aroclor 1260)	11096-82-5	mg/kg	**0.044**	J/TR	**0.041**	J/TR	**0.048**	J/TR	7.92	0.0532	0.0068	UJ (LOD)/I/V2	0.0063	UJ (LOD)/I/V2	0.0031	J-/I/TR/V2/P1	37.2	0.0105
PCB-1262 (Aroclor 1262)	37324-23-5	mg/kg	0.016	U (LOD)	0.014	U (LOD)	0.014	U (LOD)	ND	ND	0.016	UJ (LOD)/I	0.015	UJ (LOD)/I	0.015	UJ (LOD)/I	ND	ND
PCB-1268 (Aroclor 1268)	11100-14-4	mg/kg	0.0065	UJ (LOD)/V2	0.0059	UJ (LOD)/V2	0.0059	UJ (LOD)/V2	ND	ND	0.0068	UJ (LOD)/I	0.0063	UJ (LOD)/I	0.0061	UJ (LOD)/I	ND	ND
Explosives Residues																		
1,3,5-Trinitrobenzene (TNB)	99-35-4	mg/kg	0.038	U (LOD)	0.037	UJ (LOD)/I	0.037	U (LOD)	ND	ND	0.038	U (LOD)	0.038	U (LOD)	0.038	U (LOD)	ND	ND
1,3-Dinitrobenzene (DNB)	99-65-0	mg/kg	0.038	UJ (LOD)-/C	0.037	UJ (LOD)-/I/C	0.037	UJ (LOD)-/C	ND	ND	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	ND	ND
2,4,6-Trinitrotoluene (TNT)	118-96-7	mg/kg	0.096	UJ (LOD)-/C	0.093	UJ (LOQ)-/I/C	0.092	UJ (LOQ)-/C	ND	ND	0.095	UJ (LOQ)-/C	0.095	UJ (LOQ)-/C	0.096	UJ (LOQ)-/C	ND	ND
2,4-Dinitrotoluene (24DNT)	121-14-2	mg/kg	0.038	UJ (LOD)-/C	0.037	UJ (LOD)-/I/C	0.037	UJ (LOD)-/C	ND	ND	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	ND	ND
2,6-Dinitrotoluene (26DNT)	606-20-2	mg/kg	0.038	UJ (LOD)-/C	0.037	UJ (LOD)-/I/C	0.037	UJ (LOD)-/C	ND	ND	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	ND	ND
2-Amino-4,6-dinitrotoluene (2AMDNT)	35572-78-2	mg/kg	0.096	U (LOQ)	0.093	UJ (LOQ)/I	0.092	U (LOQ)	ND	ND	0.095	U (LOQ)	0.095	U (LOQ)	0.096	UJ (LOQ)/I	ND	ND
2-Nitrotoluene (2NT)	88-72-2	mg/kg	0.096	U (LOD)	0.093	UJ (LOD)/I	0.092	U (LOD)	ND	ND	0.095	U (LOD)	0.095	U (LOD)	0.096	U (LOD)	ND	ND
3,5-Dinitroaniline	618-87-1	mg/kg	0.019	U (LOD)	0.019	UJ (LOD)/I	0.018	U (LOD)	ND	ND	0.019	U (LOD)	0.019	U (LOD)	0.019	U (LOD)	ND	ND
3-Nitrotoluene (3NT)	99-08-1	mg/kg	0.19	UJ (LOQ)-/C	0.19	UJ (LOQ)-/I/C	0.18	UJ (LOQ)-/C	ND	ND	0.19	UJ (LOQ)-/C	0.19	UJ (LOQ)-/C	0.19	UJ (LOQ)-/C	ND	ND
4-Amino-2,6-dinitrotoluene (4AMDNT)	19406-51-0	mg/kg	0.096	U (LOQ)	0.093	UJ (LOQ)/I	0.092	U (LOQ)	ND	ND	0.095	U (LOQ)	0.095	U (LOQ)	0.096	U (LOQ)	ND	ND
4-Nitrotoluene (4NT)	99-99-0	mg/kg	0.096	UJ (LOD)-/C	0.093	UJ (LOD)-/I/C	0.092	UJ (LOD)-/C	ND	ND	0.095	UJ (LOD)-/C	0.095	UJ (LOD)-/C	0.096	UJ (LOD)-/C	ND	ND
Hexahydro-1,3,5-trinitro-1,3,5-triazine	121-82-4	mg/kg	0.096	U (LOD)	0.093	U (LOD)	0.092	U (LOD)	ND	ND	0.095	U (LOD)	0.095	U (LOD)	0.096	U (LOD)	ND	ND
Nitrobenzene (NB)	98-95-3	mg/kg	0.19	UJ (LOD)-/C	0.19	UJ (LOD)-/I/C	0.18	UJ (LOD)-/C	ND	ND	0.19	UJ (LOD)-/C	0.19	UJ (LOD)-/C	0.19	UJ (LOD)-/C	ND	ND
Nitroglycerin (NG)	55-63-0	mg/kg	0.67	U (LOD)	0.65	UJ (LOD)/I	0.64	U (LOD)	ND	ND	0.67	U (LOD)	0.67	U (LOD)	0.67	U (LOD)	ND	ND
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	mg/kg	0.067	U (LOD)	0.065	UJ (LOD)/I	0.064	U (LOD)	ND	ND	0.067	U (LOD)	0.067	U (LOD)	0.067	U (LOD)	ND	ND
Pentaerythritol tetranitrate (PETN)	78-11-5	mg/kg	0.96	U (LOD)	0.93	UJ (LOD)/I	0.92	U (LOD)	ND	ND	0.95	U (LOD)	0.95	U (LOD)	0.96	U (LOD)	ND	ND
Tetryl	479-45-8	mg/kg	0.096	UJ (LOD)-/C	0.093	UJ (LOD)-/I/C	0.092	UJ (LOD)-/C	ND	ND	0.095	UJ (LOD)-/C	0.095	UJ (LOD)-/C	0.096	UJ (LOD)-/C	ND	ND

NOTES:
mg/kg = milligrams per kilogram
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
PCB = Polychlorinated biphenyl
RSL = regional screening level
U = Analyte not detected Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate
- Bias low
+ Bias high

Validation Reason Codes:
A Serial dilution
C LCS Recovery
D MS RPD
H2 Prep Hold Time
I Surrogate recovery outside project limits
L Lab Blank
M MS Recovery
M2 Post Spike
P1 Column RPD
TR Trace Level Detect
V2 CCV

Detected results are bolded.

Table 6-6 DU-17 Through DU-19 Incremental Soil Sampling Analytical Results

Location			DU-18 (AOC #16 - Area D - Dumping Area and Previous Sampling Locations IX DMP-B22 and IXDMP-B1)															
Sample ID			IINY-DU-18A-SSIS-20200331		IINY-DU-18B-SSIS-20200331		IINY-DU-18C-SSIS-20200331		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-18A-SBIS1-20200331		IINY-DU-18B-SBIS1-20200331		IINY-DU-18B-SBIS1-20200331		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)			0-6		0-6		0-6				6-36		6-36		6-36			
Matrix			Surface Soil		Surface Soil		Surface Soil				Subsurface Soil		Subsurface Soil		Subsurface Soil			
Sample Date			3/31/2020 13:45		3/31/2020 13:45		3/31/2020 13:45				3/31/2020 14:20		3/31/2020 14:20		3/31/2020 14:20			
Analyte	**CAS #**	**Unit**																
Target Analyte List Metals																		
Aluminum	7429-90-5	mg/kg	**11,000**		**11,000**		**6,500**		27	16,000	**4,300**		**4,800**		**5,900**		16	7,060
Antimony	7440-36-0	mg/kg	**6.5**		**6.2**		**6.9**		5.38	7.42	**11**		**13**		**5.5**		39.5	19.6
Arsenic	7440-38-2	mg/kg	**7.8**		**15**		**15**		33	23.1	**17**		**19**		**16**		8.81	21.2
Barium	7440-39-3	mg/kg	**360**		**230**		**240**		26.1	459	**330**		**310**		**270**		10.1	380
Beryllium	7440-41-7	mg/kg	**0.56**		**0.55**		**0.66**		10.3	0.743	**0.64**		**0.69**		**0.63**		4.92	0.734
Cadmium	7440-43-9	mg/kg	**5.2**		**4.2**		**4.5**		11.1	5.92	**7.6**		**24**		**4.7**		86	38.3
Calcium	7440-70-2	mg/kg	**12,000**		**12,000**		**13,000**		4.68	13,800	**44,000**		**32,000**		**20,000**		37.5	62,200
Total Chromium, Total	7440-47-3	mg/kg	**14**		**33**		**240**		131	411	**33**		**32**		**29**		6.64	36.6
Cobalt	7440-48-4	mg/kg	**7.6**		**7**		**7.2**		4.2	8.04	**7.5**		**5**		**6.5**		19.9	9.5
Copper	7440-50-8	mg/kg	**40**		**1,700**		**1,000**		91.2	3,010	**5,500**		**5,600**		**5,100**		4.9	6,070
Iron	7439-89-6	mg/kg	**35,000**		**35,000**		**27,000**		14.3	44,000	**43000**		**36000**		**33000**		13.7	50,200
Lead	7439-92-1	mg/kg	**1,500**		**1,400**		**1,400**		4.03	1,580	**2,900**		**2,000**		**2,400**		18.5	3,570
Magnesium	7439-95-4	mg/kg	**7900**		**7800**		**7,900**		0.734	8,010	**24,000**		**17,000**		**11,000**		37.5	33,700
Manganese	7439-96-5	mg/kg	**540**		**550**		**450**		10.7	652	**480**		**450**		**510**		6.25	555
Mercury	7439-97-6	mg/kg	**4.3**		**2.3**		**1.5**		53	6.33	**0.71**		**2.1**		**0.71**		68	3.19
Nickel	7440-02-0	mg/kg	**16**		**29**		**30**		31.2	44.7	**79**		**64**		**52**		20.8	99
Potassium	2023695	mg/kg	**2,300**		**2,300**		**920**		43.3	3,850	**480**		**590**		**1100**		45.7	1560
Selenium	7782-49-2	mg/kg	**0.36**	J/TR	**0.74**		**0.58**		34.1	1.04	**0.79**		**0.95**		**0.86**		9.25	1.07
Silver	7440-22-4	mg/kg	**0.92**		**0.63**		**0.85**		18.9	1.18	**1.5**		**2.1**		**0.83**		43	3.08
Sodium	7440-23-5	mg/kg	**810**		**590**				17.2	1060	**420**	J/TR	**430**	J/TR	**430**	J/TR	1.35	441
Thallium	7440-28-0	mg/kg	**0.13**		**0.21**		**0.2**		24.2	0.29	**0.35**		**0.31**		**0.27**		12.9	0.411
Vanadium	7440-62-2	mg/kg	**29**		**24**		**29**	J/A	10.6	34.6	**17**		**18**		**18**		3.27	19.1
Zinc	7440-66-6	mg/kg	**83**		**1,800**		**1,600**		80.9	3,520	**5,600**		**5,000**		**3,100**		28.6	7,850
Polycyclic Aromatic Hydrocarbons																		
1-Methylnaphthalene	90-12-0	mg/kg	**0.04**		**0.04**	J-/I	**0.041**	J-/I	1.43	0.0418	**0.1**	J-/I	**0.08**	J-/I	**0.086**	J-/I	11.6	0.114
2-Methylnaphthalene	91-57-6	mg/kg	**0.07**		**0.06**	J-/I	**0.072**	J-/I	9.550	0.0835	**0.12**	J-/I	**0.095**	J-/I	**0.1**	J-/I	12.600	0.138
Acenaphthene	83-32-9	mg/kg	**0.046**		**0.055**	J-/I	**0.052**	J-/I	8.990	0.0625	**0.23**	J-/I	**0.18**	J-/I	**0.18**	J-/I	14.700	0.269
Acenaphthylene	208-96-8	mg/kg	**0.059**		**0.074**	J-/I	**0.12**	J-/I	37.700	0.164	**0.041**	J-/I	**0.063**	J-/I	**0.066**	J-/I	24.100	0.091
Anthracene	120-12-7	mg/kg	**0.13**		**0.17**	J-/I	**0.21**	J-/I	23.500	0.271	**0.12**	J-/I	**0.16**	J-/I	**0.23**	J-/I	32.800	0.31
Benzo(a)anthracene	56-55-3	mg/kg	**0.49**	J-/I	**0.63**	J-/I	**1**		37.300	1.37	**0.28**	J-/I	**0.44**	J-/I	**0.79**		51.800	1.16
Benzo(a)pyrene	50-32-8	mg/kg	**0.44**	J-/I	**0.58**	J-/I	**0.92**		38.200	1.27	**0.15**	J-/I	**0.28**	J-/I	**0.64**		71.200	0.995
Benzo(b)fluoranthene	205-99-2	mg/kg	**0.86**	J-/I	**1.1**	J-/I	**1.6**		31.800	2.14	**0.44**	J-/I	**0.77**	J-/I	**1.3**		51.900	1.93
Benzo(g,h,i)perylene	191-24-2	mg/kg	**0.3**		**0.41**	J-/I	**0.64**		38.600	0.887	**0.14**	J-/I	**0.24**	J-/I	**0.51**		64.500	0.778
Benzo(k)fluoranthene	207-08-9	mg/kg	**0.21**		**0.31**	J-/I	**0.45**		37.300	0.627	**0.075**	J-/I	**0.14**	J-/I	**0.28**		63.500	0.429
Chrysene	218-01-9	mg/kg	**0.86**	J-/I	**1.1**	J-/I	**1.5**		28.000	1.97	**0.65**	J-/I	**1.1**	J-/I	**1.7**		45.800	2.48
Dibenz(a,h)anthracene	53-70-3	mg/kg	**0.11**		**0.16**	J-/I	**0.19**	J-/I	26.400	0.255	**0.064**	J-/I	**0.1**	J-/I	**0.2**	J-/I	58.100	0.299
Fluoranthene	206-44-0	mg/kg	**0.97**	J-/I	**1.2**	J-/I	**1.7**		28.900	2.23	**0.72**	J-/I	**0.93**	J-/I	**1.4**		34.200	1.89
Fluorene	86-73-7	mg/kg	**0.061**		**0.071**	J-/I	**0.068**	J-/I	7.700	0.0796	**0.15**	J-/I	**0.14**	J-/I	**0.16**	J-/I	6.670	0.175
Indeno(1,2,3-c,d)pyrene	193-39-5	mg/kg	**0.31**		**0.45**	J-/I	**0.71**		41.400	1	**0.1**	J-/I	**0.22**	J-/I	**0.45**		69.300	0.704
Naphthalene	91-20-3	mg/kg	**0.24**		**0.2**	J-/I	**0.24**	J-/I	10.200	0.285	**0.71**	J-/I	**0.46**	J-/I	**0.51**		23.600	0.893
Phenanthrene	85-01-8	mg/kg	**0.62**	J-/I	**0.78**	J-/I	**0.9**		18.300	1.12	**0.66**	J-/I	**0.86**	J-/I	**1.4**		39.300	1.94
Pyrene	129-00-0	mg/kg	**0.87**	J-/I	**1.1**	J-/I	**1.7**		35.000	2.3	**0.62**	J-/I	**0.89**	J-/I	**1.3**		36.600	1.8
Total LMW PAHs	N/A	mg/kg	1.266		1.45		1.703		14.900	2.03	2.131		2.038		2.732		16.400	3.25
Total HMW PAHs	N/A	mg/kg	5.42		7.04		10.41		33.400	14	3.239		5.11		8.57		48.000	12.4
Polychlorinated Biphenyls																		
PCB, Total	1336-36-3	mg/kg	**0.29**		**0.17**		**0.4**	J-/I	40.1	0.576	**0.15**		**0.1**		**0.057**	J	45.5	0.219
PCB-1016 (Aroclor 1016)	12674-11-2	mg/kg	0.029	U (LOD)	0.028	U (LOD)	0.029	UJ (LOD)/I	ND	ND	0.03	U (LOD)	0.028	U (LOD)	0.029	U (LOD)	ND	ND
PCB-1221 (Aroclor 1221)	11104-28-2	mg/kg	0.075	U (LOD)	0.074	U (LOD)	0.076	UJ (LOD)/I	ND	ND	0.078	U (LOD)	0.072	U (LOD)	0.075	U (LOD)	ND	ND
PCB-1232 (Aroclor 1232)	11141-16-5	mg/kg	0.029	U (LOD)	0.028	U (LOD)	0.029	UJ (LOD)/I	ND	ND	0.03	U (LOD)	0.028	U (LOD)	0.029	U (LOD)	ND	ND
PCB-1242 (Aroclor 1242)	53469-21-9	mg/kg	0.045	U (LOD)	0.044	U (LOD)	0.046	UJ (LOD)/I	ND	ND	0.047	U (LOD)	0.043	U (LOD)	0.045	U (LOD)	ND	ND
PCB-1248 (Aroclor 1248)	12672-29-6	mg/kg	**0.13**		**0.099**		**0.14**	J-/I	17.4	0.177	0.015	U (LOD)	0.013	U (LOD)	0.014	U (LOD)	ND	ND
PCB-1254 (Aroclor 1254)	11097-69-1	mg/kg	0.031	U (LOD)	0.031	U (LOD)	0.032	UJ (LOD)/I	ND	ND	0.032	U (LOD)	0.03	U (LOD)	0.031	U (LOD)	ND	ND
PCB-1260 (Aroclor 1260)	11096-82-5	mg/kg	**0.16**		**0.074**		**0.25**	J-/I	54.6	0.383	0.0065	U (LOD)	0.006	U (LOD)	0.0062	U (LOD)	ND	ND
PCB-1262 (Aroclor 1262)	37324-23-5	mg/kg	0.015	U (LOD)	0.015	U (LOD)	0.015	UJ (LOD)/I	ND	ND	**0.15**	J/V2	**0.1**	J/V2	**0.057**	J/V2	45.5	0.219
PCB-1268 (Aroclor 1268)	11100-14-4	mg/kg	0.0063	UJ (LOD)/V2	0.0061	UJ (LOD)/V2	0.0063	UJ (LOD)/I/V2	ND	ND	0.0065	U (LOD)	0.006	U (LOD)	0.0062	U (LOD)	ND	ND
Explosives Residues																		
1,3,5-Trinitrobenzene (TNB)	99-35-4	mg/kg	0.037	U (LOD)	0.039	U (LOD)	0.038	U (LOD)	ND	ND	0.039	UJ (LOD)/I	0.039	UJ (LOD)/I	0.038	UJ (LOD)/I	ND	ND
1,3-Dinitrobenzene (DNB)	99-65-0	mg/kg	0.037	UJ (LOD)-/C	0.039	UJ (LOD)-/C	0.038	UJ (LOD)-/C	ND	ND	0.039	UJ (LOD)-/I/C	0.039	UJ (LOD)-/I/C	0.038	UJ (LOD)-/I/C	ND	ND
2,4,6-Trinitrotoluene (TNT)	118-96-7	mg/kg	0.094	UJ (LOQ)-/C	0.098	UJ (LOQ)-/C	0.096	UJ (LOQ)-/C	ND	ND	0.096	UJ (LOQ)-/I/C	0.096	UJ (LOQ)-/I/C	0.094	UJ (LOQ)-/I/C	ND	ND
2,4-Dinitrotoluene (24DNT)	121-14-2	mg/kg	0.037	UJ (LOD)-/C	0.039	UJ (LOD)-/C	0.038	UJ (LOD)-/C	ND	ND	0.039	UJ (LOD)-/I/C	0.039	UJ (LOD)-/I/C	0.038	UJ (LOD)-/I/C	ND	ND
2,6-Dinitrotoluene (26DNT)	606-20-2	mg/kg	0.037	UJ (LOD)-/C	0.039	UJ (LOD)-/C	0.038	UJ (LOD)-/C	ND	ND	0.039	UJ (LOD)-/I/C	0.039	UJ (LOD)-/I/C	0.038	UJ (LOD)-/I/C	ND	ND
2-Amino-4,6-dinitrotoluene (2AMDNT)	35572-78-2	mg/kg	0.094	U (LOQ)	0.098	U (LOQ)	0.096	U (LOQ)	ND	ND	0.096	UJ (LOQ)/I	0.096	UJ (LOQ)/I	0.094	UJ (LOQ)/I	ND	ND
2-Nitrotoluene (2NT)	88-72-2	mg/kg	0.094	U (LOD)	0.098	U (LOD)	0.096	U (LOD)	ND	ND	0.096	UJ (LOD)/I	0.096	UJ (LOD)/I	0.094	UJ (LOD)/I	ND	ND
3,5-Dinitroaniline	618-87-1	mg/kg	0.019	U (LOD)	0.02	U (LOD)	0.019	U (LOD)	ND	ND	0.019	UJ (LOD)/I	0.019	UJ (LOD)/I	0.019	UJ (LOD)/I	ND	ND
3-Nitrotoluene (3NT)	99-08-1	mg/kg	0.19	UJ (LOQ)-/C	0.2	UJ (LOQ)-/C	0.19	UJ (LOQ)-/C	ND	ND	0.19	UJ (LOQ)-/I/C	0.19	UJ (LOQ)-/I/C	0.19	UJ (LOQ)-/I/C	ND	ND
4-Amino-2,6-dinitrotoluene (4AMDNT)	19406-51-0	mg/kg	0.094	U (LOQ)	0.098	U (LOQ)	0.096	U (LOQ)	ND	ND	0.096	UJ (LOQ)/I	0.096	UJ (LOQ)/I	0.094	UJ (LOQ)/I	ND	ND
4-Nitrotoluene (4NT)	99-99-0	mg/kg	0.094	UJ (LOD)-/C	0.098	UJ (LOD)-/C	0.096	UJ (LOD)-/C	ND	ND	0.096	UJ (LOD)-/I/C	0.096	UJ (LOD)-/I/C	0.094	UJ (LOD)-/I/C	ND	ND
Hexahydro-1,3,5-trinitro-1,3,5-triazine	121-82-4	mg/kg	0.094	UJ (LOD)/I	0.098	U (LOD)	0.096	UJ (LOD)/I	ND	ND	0.096	UJ (LOD)/I	0.096	UJ (LOD)/I	0.094	UJ (LOD)/I	ND	ND
Nitrobenzene (NB)	98-95-3	mg/kg	0.19	UJ (LOD)-/C	0.2	UJ (LOD)-/C	0.19	UJ (LOD)-/C	ND	ND	0.19	UJ (LOD)-/I/C	0.19	UJ (LOD)-/I/C	0.19	UJ (LOD)-/I/C	ND	ND
Nitroglycerin (NG)	55-63-0	mg/kg	0.65	U (LOD)	0.68	U (LOD)	0.67	U (LOD)	ND	ND	0.68	UJ (LOD)/I	0.67	UJ (LOD)/I	0.66	UJ (LOD)/I	ND	ND
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	mg/kg	0.065	U (LOD)	0.068	U (LOD)	0.067	U (LOD)	ND	ND	0.068	UJ (LOD)/I	0.067	UJ (LOD)/I	0.066	UJ (LOD)/I	ND	ND
Pentaerythritol tetranitrate (PETN)	78-11-5	mg/kg	0.94	U (LOD)	0.98	U (LOD)	0.96	U (LOD)	ND	ND	0.96	UJ (LOD)/I	0.96	UJ (LOD)/I	0.94	UJ (LOD)/I	ND	ND
Tetryl	479-45-8	mg/kg	0.094	UJ (LOD)-/I/C	0.098	UJ (LOD)-/C	0.096	UJ (LOD)-/C	ND	ND	0.096	UJ (LOD)-/I/C	0.096	UJ (LOD)-/I/C	0.094	UJ (LOD)-/I/C	ND	ND

NOTES:
mg/kg = milligrams per kilogram
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the qu
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
PCB = Polychlorinated biphenyl
RSL = regional screening level
U = Analyte not detected Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate
- Bias low
+ Bias high

Validation Reason Codes:
A Serial dilution
C LCS Recovery
D MS RPD
H2 Prep Hold Time
I Surrogate recovery outside project limits
L Lab Blank
M MS Recovery
M2 Post Spike
P1 Column RPD
TR Trace Level Detect
V2 CCV

Table 6-6 DU-17 Through DU-19 Incremental Soil Sampling Analytical Results

Location			DU-19 (AOC #16 - Area D - Dumping Area and Previous Sampling Location II-EA-SS-02-16															
Sample ID			IINY-DU-19A-SSIS-20200331		IINY-DU-19B-SSIS-20200331		IINY-DU-19C-SSIS-20200331		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-19A-SBIS1-20200331		IINY-DU-19B-SBIS1-20200331		IINY-DU-19C-SBIS1-20200331		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)			0-6		0-6		0-6				6-36		6-36		6-36			
Matrix			Surface Soil		Surface Soil		Surface Soil				Subsurface Soil		Subsurface Soil		Subsurface Soil			
Sample Date			3/31/2020 10:45		3/31/2020 10:45		3/31/2020 10:45				3/31/2020 11:00		3/31/2020 11:00		3/31/2020 11:00			
Analyte	**CAS #**	**Unit**																
Target Analyte List Metals																		
Aluminum	7429-90-5	mg/kg	**16,000**		**25,000**		**20,000**		22	31,700	**25,000**		**20,000**		**21,000**		12	28,700
Antimony	7440-36-0	mg/kg	**0.5**	J-/M	**0.28**	J-/M	**0.5**	J-/M	29.8	0.746	**0.12**	J/TR	**0.11**	J/TR	**0.11**	J/TR	5.09	0.128
Arsenic	7440-38-2	mg/kg	**9.6**	J+/M/D	**6.8**	J+/M/D	**12**	J+/M/D	27.5	16	**2.8**		**2.9**		**2.6**		5.52	3.15
Barium	7440-39-3	mg/kg	**81**	J/D/M2	**63**	J/D	**83**	J/D	14.6	103	**34**	J/M2	**37**		**35**		4.32	39.2
Beryllium	7440-41-7	mg/kg	**0.42**	J+/M/D	**0.35**	J+/M/D	**0.45**	J+/M/D	12.6	0.536	**0.19**		**0.19**		**0.17**		6.3	0.212
Cadmium	7440-43-9	mg/kg	**0.33**		**0.25**		**0.3**		13.8	0.395	**0.097**	J/TR	**0.093**	J/TR	**0.087**	J/TR	5.45	0.105
Calcium	7440-70-2	mg/kg	**10,000**	J/A	**15,000**		**12,000**		20	18,700	**20,000**		**17,000**		**17,000**		10	22,400
Total Chromium, Total	7440-47-3	mg/kg	**10**	J+/M	**10**	J+/M	**11**	J+/M	5.59	11.8	**7.8**		**7.7**		**7.8**		0.743	7.91
Cobalt	7440-48-4	mg/kg	**14**		**19**		**15**		16.5	22.7	**18**		**16**		**17**		5.88	19.5
Copper	7440-50-8	mg/kg	**130**		**180**		**140**		17.6	217	**210**		**210**		**210**		0	210
Iron	7439-89-6	mg/kg	**23,000**	J/A	**36,000**		**29,000**		22	45,700	**36,000**		**33,000**		**35,000**		4	38,500
Lead	7439-92-1	mg/kg	**61**		**38**		**67**		27.7	93.9	**14**		**12**		**11**		12.4	16.2
Magnesium	7439-95-4	mg/kg	**5,700**	J+/M	**8,300**	J+/M/A	**6,700**	J+/M	19	10,200	**7,600**		**7,200**		**7,000**		4	8,040
Manganese	7439-96-5	mg/kg	**410**	J/D/M2	**410**	J/D	**470**	J/D	8.06	517	**270**	J/M2	**280**		**280**		2.09	291
Mercury	7439-97-6	mg/kg	**0.46**	J-/M	**0.11**	J-/M	**0.43**	J-/M	58	0.822	**0.12**		**0.23**		**0.27**		38	0.402
Nickel	7440-02-0	mg/kg	**16**	J-/M/D	**17**	J-/M/D	**17**	J-/M/D	3.46	18.1	**14**		**14**		**14**		0	14
Potassium	2023695	mg/kg	**1,200**		**1,500**		**1,600**		15	1,960	**1,200**		**1,100**		**1,100**		5	1,280
Selenium	7782-49-2	mg/kg	**0.42**	J/D/TR	**0.35**	J/D/TR	**0.44**	J/D/TR	11.7	0.522	**0.23**	J/TR	**0.23**	J/TR	**0.23**	J/TR	0	0.23
Silver	7440-22-4	mg/kg	**0.12**		**0.12**		**0.13**		4.68	0.138	**0.11**		**0.097**	J/TR	**0.1**		6.65	0.119
Sodium	7440-23-5	mg/kg	**1,700**		**3,100**		**2,100**		31	4,110	**3,400**		**2,400**		**2,400**		21	4,190
Thallium	7440-28-0	mg/kg	**0.12**	J+/M/D	**0.12**	J+/M/D	**0.14**	J+/M/D	9.12	0.156	**0.07**	J/TR	**0.076**	J/TR	**0.071**	J/TR	4.44	0.0804
Vanadium	7440-62-2	mg/kg	**46**		**52**		**44**		8.8	57.8	**59**		**55**		**52**		6.35	64.2
Zinc	7440-66-6	mg/kg	**120**	J/D	**90**	J/D	**110**	J/D	14.3	145	**60**		**61**		**62**		1.64	63.5
Polycyclic Aromatic Hydrocarbons																		
1-Methylnaphthalene	90-12-0	mg/kg	**0.023**		**0.012**		**0.017**		31.8	0.0312	**0.0011**	J-/TR	**0.0012**	J-/TR	**0.0006**	J-/TR	30.5	0.00173
2-Methylnaphthalene	91-57-6	mg/kg	**0.035**	J-/D	**0.018**	J-/D	**0.028**	J-/D	31.600	0.0485	**0.0017**	J-/TR	**0.0019**	J-/TR	**0.0009**	J-/TR	33.900	0.0028
Acenaphthene	83-32-9	mg/kg	**0.06**		**0.026**		**0.027**		51.400	0.0864	**0.0024**	J-/TR	**0.0015**	J-/TR	**0.0009**	J-/TR	48.400	0.00353
Acenaphthylene	208-96-8	mg/kg	**0.27**	J-/D	**0.13**	J-/D	**0.21**	J-/D	34.500	0.38	**0.0066**	J-/TR	**0.0069**	J-/TR	**0.0034**	J-/TR	34.400	0.0105
Anthracene	120-12-7	mg/kg	**0.43**		**0.19**		**0.24**		44.200	0.605	**0.0067**	J-/TR	**0.0064**	J-/TR	**0.0032**	J-/TR	35.700	0.0103
Benzo(a)anthracene	56-55-3	mg/kg	**2.5**		**1.1**		**1.1**		51.600	3.6	**0.024**		**0.029**		**0.013**		37.200	0.0426
Benzo(a)pyrene	50-32-8	mg/kg	**1.9**		**0.9**		**0.98**		44.100	2.66	**0.029**		**0.031**		**0.015**		34.900	0.0469
Benzo(b)fluoranthene	205-99-2	mg/kg	**3.4**		**1.6**		**1.8**		43.500	4.75	**0.045**		**0.047**		**0.023**		34.700	0.0718
Benzo(g,h,i)perylene	191-24-2	mg/kg	**1.1**		**0.55**		**0.64**		38.600	1.51	**0.025**		**0.028**		**0.015**		30.000	0.0398
Benzo(k)fluoranthene	207-08-9	mg/kg	**1.2**		**0.59**		**0.59**		44.400	1.68	**0.013**		**0.015**		**0.0072**	J-/TR	34.500	0.0219
Chrysene	218-01-9	mg/kg	**2.3**		**0.98**		**1.1**		50.000	3.3	**0.027**		**0.033**		**0.014**		39.400	0.0491
Dibenz(a,h)anthracene	53-70-3	mg/kg	**0.41**		**0.26**		**0.27**		26.800	0.524	**0.0061**	J-/TR	**0.0067**	J-/TR	**0.0039**	J-/TR	26.500	0.00928
Fluoranthene	206-44-0	mg/kg	**4**		**1.6**		**1.7**		55.800	5.85	**0.046**		**0.053**		**0.023**		38.600	0.0802
Fluorene	86-73-7	mg/kg	**0.077**	J-/M	**0.028**	J-/M	**0.039**	J-/M	53.600	0.113	**0.0037**	J-/TR	**0.0028**	J-/TR	**0.0011**	J-/TR	52.100	0.00586
Indeno(1,2,3-c,d)pyrene	193-39-5	mg/kg	**1.5**		**0.77**		**0.82**		39.600	2.06	**0.027**		**0.029**		**0.014**		34.900	0.0438
Naphthalene	91-20-3	mg/kg	**0.083**	J-/D	**0.046**	J-/D	**0.068**	J-/D	28.300	0.113	**0.0019**	J-/TR	**0.0022**	J-/TR	**0.0019**	U (LOD)	8.660	0.00244
Phenanthrene	85-01-8	mg/kg	**1.5**		**0.52**		**0.58**		63.400	2.25	**0.022**		**0.023**		**0.0091**	J-/TR	43.000	0.0375
Pyrene	129-00-0	mg/kg	**3.2**		**1.3**		**1.4**		54.400	4.66	**0.044**		**0.052**		**0.023**		37.800	0.0774
Total LMW PAHs	N/A	mg/kg	2.478		0.97		1.209		52.200	3.59	0.0461		0.0459		0.0211		38.100	0.0738
Total HMW PAHs	N/A	mg/kg	21.51		9.65		10.4		47.900	30.6	0.2861		0.3237		0.1511		35.800	0.482
Polychlorinated Biphenyls																		
PCB, Total	1336-36-3	mg/kg	**0.011**	J/TR	**0.0071**	J/TR	0.015	UJ (LOD)/I	35.8	0.021	**0.05**	J/TR	**0.049**	J/TR	**0.054**	J/TR	5.19	0.0577
PCB-1016 (Aroclor 1016)	12674-11-2	mg/kg	0.029	U (LOD)	0.028	U (LOD)	0.029	UJ (LOD)/I	ND	ND	0.03	U (LOD)	0.029	U (LOD)	0.03	U (LOD)	ND	ND
PCB-1221 (Aroclor 1221)	11104-28-2	mg/kg	0.076	U (LOD)	0.072	U (LOD)	0.075	UJ (LOD)/I	ND	ND	0.077	U (LOD)	0.076	U (LOD)	0.077	U (LOD)	ND	ND
PCB-1232 (Aroclor 1232)	11141-16-5	mg/kg	0.029	U (LOD)	0.028	U (LOD)	0.029	UJ (LOD)/I	ND	ND	0.03	U (LOD)	0.029	U (LOD)	0.03	U (LOD)	ND	ND
PCB-1242 (Aroclor 1242)	53469-21-9	mg/kg	0.046	U (LOD)	0.043	U (LOD)	0.045	UJ (LOD)/I	ND	ND	0.046	U (LOD)	0.046	U (LOD)	0.046	U (LOD)	ND	ND
PCB-1248 (Aroclor 1248)	12672-29-6	mg/kg	0.014	U (LOD)	0.013	U (LOD)	0.014	UJ (LOD)/I	ND	ND	0.015	U (LOD)	0.014	U (LOD)	0.015	U (LOD)	ND	ND
PCB-1254 (Aroclor 1254)	11097-69-1	mg/kg	0.032	U (LOD)	0.03	U (LOD)	0.031	UJ (LOD)/I	ND	ND	0.032	U (LOD)	0.032	U (LOD)	0.032	U (LOD)	ND	ND
PCB-1260 (Aroclor 1260)	11096-82-5	mg/kg	**0.011**	J-/M/TR/P1/V2	**0.0071**	J-/M/TR/P1/V2	**0.0022**	J-/M/I/TR/P1/V2	65.2	0.0179	**0.05**	J/TR/V2	**0.049**	J/TR/V2/P1	**0.054**	J/TR/V2	5.19	0.0577
PCB-1262 (Aroclor 1262)	37324-23-5	mg/kg	0.015	U (LOD)	0.014	U (LOD)	0.015	UJ (LOD)/I	ND	ND	0.015	U (LOD)	0.015	U (LOD)	0.015	U (LOD)	ND	ND
PCB-1268 (Aroclor 1268)	11100-14-4	mg/kg	0.0063	U (LOD)	0.006	U (LOD)	0.0063	UJ (LOD)/I	ND	ND	0.0065	U (LOD)	0.0064	U (LOD)	0.0065	U (LOD)	ND	ND
Explosives Residues																		
1,3,5-Trinitrobenzene (TNB)	99-35-4	mg/kg	0.039	U (LOD)	0.04	U (LOD)	0.039	U (LOD)	ND	ND	0.038	U (LOD)	0.038	U (LOD)	0.04	U (LOD)	ND	ND
1,3-Dinitrobenzene (DNB)	99-65-0	mg/kg	0.039	UJ (LOD)-/C	0.04	UJ (LOD)-/C	0.039	UJ (LOD)-/C	ND	ND	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	0.04	UJ (LOD)-/C	ND	ND
2,4,6-Trinitrotoluene (TNT)	118-96-7	mg/kg	0.099	UJ (LOQ)-/C	0.1	UJ (LOQ)-/C	0.098	UJ (LOQ)-/C	ND	ND	0.096	UJ (LOQ)-/C	0.096	UJ (LOQ)-/C	0.099	UJ (LOQ)-/C	ND	ND
2,4-Dinitrotoluene (24DNT)	121-14-2	mg/kg	0.039	UJ (LOD)-/C	0.04	UJ (LOD)-/C	0.039	UJ (LOD)-/C	ND	ND	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	0.04	UJ (LOD)-/C	ND	ND
2,6-Dinitrotoluene (26DNT)	606-20-2	mg/kg	0.039	UJ (LOD)-/C	0.04	UJ (LOD)-/C	0.039	UJ (LOD)-/C	ND	ND	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	0.04	UJ (LOD)-/C	ND	ND
2-Amino-4,6-dinitrotoluene (2AMDNT)	35572-78-2	mg/kg	0.099	U (LOQ)	0.1	U (LOQ)	0.098	U (LOQ)	ND	ND	0.096	U (LOQ)	0.096	U (LOQ)	0.099	U (LOQ)	ND	ND
2-Nitrotoluene (2NT)	88-72-2	mg/kg	0.099	U (LOD)	0.1	U (LOD)	0.098	U (LOD)	ND	ND	0.096	U (LOD)	0.096	U (LOD)	0.099	U (LOD)	ND	ND
3,5-Dinitroaniline	618-87-1	mg/kg	0.02	UJ (LOD)/M	0.02	UJ (LOD)/M	0.02	UJ (LOD)/M	ND	ND	0.019	U (LOD)	0.019	U (LOD)	0.02	U (LOD)	ND	ND
3-Nitrotoluene (3NT)	99-08-1	mg/kg	0.2	UJ (LOQ)-/C	0.2	UJ (LOQ)-/C	0.2	UJ (LOQ)-/C	ND	ND	0.19	UJ (LOQ)-/C	0.19	UJ (LOQ)-/C	0.2	UJ (LOQ)-/C	ND	ND
4-Amino-2,6-dinitrotoluene (4AMDNT)	19406-51-0	mg/kg	0.099	U (LOQ)	0.1	U (LOQ)	0.098	U (LOQ)	ND	ND	0.096	U (LOQ)	0.096	U (LOQ)	0.099	U (LOQ)	ND	ND
4-Nitrotoluene (4NT)	99-99-0	mg/kg	0.099	UJ (LOD)-/C	0.1	UJ (LOD)-/C	0.098	UJ (LOD)-/C	ND	ND	0.096	UJ (LOD)-/C	0.096	UJ (LOD)-/C	0.099	UJ (LOD)-/C	ND	ND
Hexahydro-1,3,5-trinitro-1,3,5-triazine	121-82-4	mg/kg	0.099	U (LOD)	0.1	U (LOD)	0.098	U (LOD)	ND	ND	0.096	U (LOD)	0.096	U (LOD)	0.099	U (LOD)	ND	ND
Nitrobenzene (NB)	98-95-3	mg/kg	0.2	UJ (LOD)-/C	0.2	UJ (LOD)-/C	0.2	UJ (LOD)-/C	ND	ND	0.19	UJ (LOD)-/C	0.19	UJ (LOD)-/C	0.2	UJ (LOD)-/C	ND	ND
Nitroglycerin (NG)	55-63-0	mg/kg	0.69	U (LOD)	0.7	U (LOD)	0.69	U (LOD)	ND	ND	0.67	U (LOD)	0.67	U (LOD)	0.69	U (LOD)	ND	ND
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	mg/kg	0.069	U (LOD)	0.07	U (LOD)	0.069	U (LOD)	ND	ND	0.067	U (LOD)	0.067	U (LOD)	0.069	U (LOD)	ND	ND
Pentaerythritol tetranitrate (PETN)	78-11-5	mg/kg	0.99	U (LOD)	1	U (LOD)	0.98	U (LOD)	ND	ND	0.96	U (LOD)	0.96	U (LOD)	0.99	U (LOD)	ND	ND
Tetryl	479-45-8	mg/kg	0.099	UJ (LOD)-/C	0.1	UJ (LOD)-/C	0.098	UJ (LOD)-/C	ND	ND	0.096	UJ (LOD)-/C	0.096	UJ (LOD)-/C	0.099	UJ (LOD)-/C	ND	ND

NOTES:
mg/kg = milligrams per kilogram
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the qua
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
PCB = Polychlorinated biphenyl
RSL = regional screening level
U = Analyte not detected Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate
- Bias low
+ Bias high

Validation Reason Codes:

A	Serial dilution
C	LCS Recovery
D	MS RPD
H2	Prep Hold Time
I	Surrogate recovery outside project limits
L	Lab Blank
M	MS Recovery
M2	Post Spike
P1	Column RPD
TR	Trace Level Detect
V2	CCV

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Table 6-7 AOC #16 – Area D (former Dumping Area) Soil Contaminant Detections Summary

		AOC #16 – Area D (former Dumping Area) Surface Soil				AOC #16 – Area D (former Dumping Area) Subsurface Soil			
Metals Analyte	**CAS #**	**Onsite DU With Detection**	**Concentration Range (mg/kg)**	**DU with Minimum Concentration**	**DU with Maximum Concentration**	**Onsite DU With Detection**	**Concentration Range (mg/kg)**	**DU with Minimum Concentration**	**DU with Maximum Concentration**
TAL Metals									
Mercury	7439-97-6	Each of 3 DUs sampled (DU-17, DU-18, DU-19)	0.11 to 4.3	DU-19	DU-18	Each of 3 DUs sampled (DU-17, DU-18, DU-19)	0.12 to 2.1	DU-19	DU-18
Silver	7440-22-4		0.12 to 0.92	DU-19	DU-18		0.097 to 2.1	DU-19	DU-18
Aluminum	7429-90-5		5,300 to 25,000	DU-17	DU-19		4,300 to 25,000	DU-18	DU-19
Antimony	7440-36-0		0.28 to 9.9	DU-19	DU-17		0.11 to 13	DU-19	DU-18
Arsenic	7440-38-2		2.7 to 15	DU-17	DU-18		2.6 to 25	DU-19	DU-17
Barium	7440-39-3		63 to 360	DU-19	DU-18		34 to 460	DU-19	DU-17
Beryllium	7440-41-7		0.15 to 0.66	DU-17	DU-18		0.17 to 1.5	DU-19	DU-17
Cadmium	7440-43-9		0.25 to 20	DU-19	DU-17		0.087 to 24	DU-19	DU-18
Calcium	7440-70-2		10,000 to 74,000	DU-19	DU-17		14,000 to 44,000	DU-17	DU-18
Chromium, Total	7440-47-3		6.9 to 240	DU-17	DU-18		7.7 to 33	DU-19	DU-18
Cobalt	7440-48-4		4.9 to 19	DU-17	DU-19		5 to 18	DU-18	DU-19
Copper	7440-50-8		40 to 1700	DU-18	DU-18		130 to 5,600	DU-17	DU-18
Iron	7439-89-6		14,000 to 36,000	DU-17	DU-19		25,000 to 43,000	DU-17	DU-18
Lead	7439-92-1		38 to 2,900	DU-19	DU-17		11 to 2,900	DU-19	DU-18
Magnesium	7439-95-4		5,700 to 45,000	DU-19	DU-17		6,400 to 24,000	DU-17	DU-18
Manganese	7439-96-5		380 to 550	DU-17	DU-18		170 to 510	DU-17	DU-18
Nickel	7440-02-0		5.9 to 30	DU-17	DU-18		14 to 79	DU-19	DU-18
Potassium	2023695		920 to 2,300	DU-18	DU-18		480 to 1,200	DU-18	DU-19
Selenium	7782-49-2		0.2 to 0.74	DU-17	DU-18		0.23 to 1.5	DU-19	DU-17
Sodium	7440-23-5		370 to 3100	DU-17	DU-19		420 to 3,400	DU-18	DU-19
Thallium	7440-28-0		0.1 to 0.21	DU-17	DU-18		0.07 to 0.8	DU-19	DU-17
Vanadium	7440-62-2		17 to 52	DU-17	DU-19		17 to 59	DU-18	DU-19
Zinc	7440-66-6		83 to 8,200	DU-18	DU-17		60 to 5,600	DU-19	DU-18
PAHs									
1-Methylnaphthalene	90-12-0	Each of 3 DUs sampled (DU-17, DU-18, DU-19)	0.012 to 0.041	DU-19	DU-18	Each of 3 DUs sampled (DU-17, DU-18, DU-19)	0.00064 to 0.11	DU-19	DU-17
2-Methylnaphthalene	91-57-6		0.018 to 0.072	DU-19	DU-18		0.00093 to 0.16	DU-19	DU-17
Acenaphthene	83-32-9		0.026 to 0.06	DU-19	DU-19		0.00087 to 0.23	DU-19	DU-18
Acenaphthylene	208-96-8		0.059 to 0.27	DU-18	DU-19		0.0034 to 0.066	DU-19	DU-18
Anthracene	120-12-7		0.13 to 0.43	DU-18	DU-19		0.0032 to 0.23	DU-19	DU-18
Benzo(a)anthracene	56-55-3		0.48 to 2.5	DU-17	DU-19		0.013 to 0.79	DU-19	DU-18
Benzo(a)pyrene	50-32-8		0.41 to 1.9	DU-17	DU-19		0.015 to 0.64	DU-19	DU-18
Benzo(b)fluoranthene	205-99-2		0.71 to 3.4	DU-17	DU-19		0.023 to 1.3	DU-19	DU-18
Benzo(g,h,i)perylene	191-24-2		0.29 to 1.1	DU-17	DU-19		0.015 to 0.51	DU-19	DU-18
Benzo(k)fluoranthene	207-08-9		0.21 to 1.2	DU-18	DU-19		0.0072 to 0.28	DU-19	DU-18
Chrysene	218-01-9		0.57 to 2.3	DU-17	DU-19		0.014 to 1.7	DU-19	DU-18
Dibenz(a,h)anthracene	53-70-3		0.093 to 0.41	DU-17	DU-19		0.0039 to 0.2	DU-19	DU-18
Fluoranthene	206-44-0		0.94 to 4	DU-17	DU-19		0.023 to 1.5	DU-19	DU-17
Fluorene	86-73-7		0.028 to 0.077	DU-19	DU-19		0.0011 to 0.16	DU-19	DU-18
Indeno(1,2,3-c,d)pyrene	193-39-5		0.3 to 1.5	DU-17	DU-19		0.014 to 0.45	DU-19	DU-18
Naphthalene	91-20-3		0.046 to 0.24	DU-19	DU-18		0.0019 to 0.71	DU-19	DU-18
Phenanthrene	85-01-8		0.4 to 1.5	DU-17	DU-19		0.0091 to 1.4	DU-19	DU-18
Pyrene	129-00-0		0.87 to 3.2	DU-18	DU-19		0.023 to 1.3	DU-19	DU-18
PCBs									
PCB-1248 (Aroclor 1248)	12672-29-6	2 of 3 DUs sampled (DU-17, DU-18)	0.084 to 0.14	DU-17	DU-18	Not detected			
PCB-1260 (Aroclor 1260)	11096-82-5	Each of 3 DUs sampled (DU-17, DU-18, DU-19)	0.0022 to 0.25	DU-19	DU-18	2 of 3 DUs sampled (DU-17, DU-19)	0.0031 to 0.054	DU-17	DU-19
PCB-1262 (Aroclor 1262)	37324-23-5	Not detected				1 of 3 DUs sampled (DU-18)	0.057 to 0.15	DU-18	DU-18
Explosives Residues									
Explosives Residues	Not applicable					Not detected			

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Table 6-8 AOC #16 – Area D (former Dumping Area) Surface Water Analytical Results

Location			AOC #16 – Area D (former Dumping Area)																			
Sample ID			IINY-DUMP-SW-01-041922		IINY-DUMP-SW-02-041922		IINY-DUMP-SW-03-041922		IINY-DUMP-SW-04-041922		IINY-DUMP-SW-05-041922		IINY-DUMP-SW-06-041922		IINY-DUMP-SW-07-041922		IINY-DUMP-SW-08-041922		IINY-DUMP-SW-09-041922		IINY-DUMP-SW-10-041922	
Matrix			Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
Sample Date			4/19/2022 16:10		4/19/2022 15:00		4/19/2022 14:15		4/19/2022 15:50		4/19/2022 15:25		4/19/2022 14:55		4/19/2022 14:05		4/19/2022 13:30		4/19/2022 15:45		4/19/2022 15:20	
Analyte	CAS Number	Unit																				
Dissolved Target Analyte List Metals																						
Aluminum	7429-90-5	µg/L	**24.0**	J, TR	**33.0**	J, TR	70.0	U	**21.0**	J, TR	70.0	U	70.0	U	**30.0**	J, TR	70.0	U	**21.0**	J, TR	**18.0**	J, TR
Antimony	7440-36-0	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Arsenic	7440-38-2	µg/L	1.00	U	1.00	U	**0.400**	J, TR	1.00	U	1.00	U	1.00	U	1.00	U	**0.340**	J, TR	**0.370**	J, TR	**0.390**	J, TR
Barium	7440-39-3	µg/L	**13.0**		**10.0**		**12.0**		**14.0**		**14.0**		**11.0**		**12.0**		**9.00**		**14.0**		**15.0**	
Beryllium	7440-41-7	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U
Cadmium	7440-43-9	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U
Calcium	7440-70-2	µg/L	**22,000**		**14,000**		**15,000**		**22,000**		**18,000**		**16,000**		**17,000**		**13,000**		**22,000**		**18,000**	
Total Chromium	7440-47-3	µg/L	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U
Cobalt	7440-48-4	µg/L	0.350	U	0.350	U	0.350	U	0.350	U	**0.120**	J, TR	0.350	U	0.350	U	0.350	U	0.350	U	**0.140**	J, TR
Copper	7440-50-8	µg/L	**2.40**		**2.10**		**2.80**		**2.30**		**3.60**		**1.30**	J, TR	**1.50**	J, TR	**3.30**		**2.50**		**3.60**	
Iron	7439-89-6	µg/L	100	U, L	100	U, L	100	U, L	34.0	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L
Lead	7439-92-1	µg/L	0.700	U	**0.300**	J, TR	0.470	J, TR	0.700	U	**1.00**	J, TR	0.700	U	**0.250**	J, TR	0.700	U	0.700	U	**0.890**	J, TR
Magnesium	7439-95-4	µg/L	**3,800**		**6,500**		**6,400**		**3,700**		**5,300**		**6,500**		**7,000**		**6,300**		**3,700**		**5,300**	
Manganese	7439-96-5	µg/L	**8.80**		**7.30**		**5.30**		**7.30**		**17.0**		**7.80**		**7.30**		**4.60**		**8.00**		**18.0**	
Mercury	7439-97-6	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U
Nickel	7440-02-0	µg/L	**0.450**	J, TR	1.00	U	**0.410**	J, TR	**0.330**	J, TR	**0.540**	J, TR	**0.330**	J, TR	**0.390**	J, TR	1.00	U	**0.560**	J, TR	**0.410**	J, TR
Potassium	2023695	µg/L	**1,500**	J, TR	**3,000**		**2,600**	J, TR	**1,400**	J, TR	**1,900**	J, TR	**2,700**	J, TR	**2,700**	J, TR	**2,600**	J, TR	**1,400**	J, TR	**1,900**	J, TR
Selenium	7782-49-2	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Silver	7440-22-4	µg/L	0.100	U, L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
Sodium	7440-23-5	µg/L	**15,000**		**31,000**		**30,000**		**15,000**		**17,000**		**30,000**		**33,000**		**29,000**		**15,000**		**17,000**	
Thallium	7440-28-0	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Vanadium	7440-62-2	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U
Zinc	7440-66-6	µg/L	**2.00**	J, TR	**11.0**	J, TR	**11.0**	J, TR	8.00	U	**35.0**		**7.20**	J, TR	**5.70**	J, TR	**4.00**	J, TR	**3.10**	J, TR	**37.0**	

1. 95UCLs calculated using ProUCL. The recommended 95UCL is presented. For those analytes that were not detected in any of the 20 surface water samples collected, ProUCL recommends that UCLs should also be non-detect. For those analytes detected in only 1 of 20 samples (total chromium, selenium, thallium), the maximum detected concentration is presented.

NOTES:

CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
KM = Kaplan-Meier
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
RSL = regional screening level
U = Analyte not detected. Numerical value is LOD or LOQ, as indicated

Validation Reason Codes:

A Serial dilution
L Lab Blank
TR Trace Level Detect

Detected results are bolded.

Table 6-8 AOC #16 – Area D (former Dumping Area) Surface Water Analytical Results

Location			AOC #16 – Area D (former Dumping Area)																							
Sample ID			IINY-DUMP-SW-11-041922		IINY-DUMP-SW-12-041922		IINY-DUMP-SW-13-041922		IINY-DUMP-SW-14-041922		IINY-DUMP-SW-15-041922		IINY-DUMP-SW-16-041922		IINY-DUMP-SW-17-041922		IINY-DUMP-SW-18-041922		IINY-DUMP-SW-FD1-041922 (Duplicate of DUMP-SW-18)		IINY-DUMP-SW-19-041922		IINY-DUMP-SW-20-041922		ProUCL Recommended 95% Upper Confidence Limit[1]	UCL Calculation Type
Matrix			Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water			
Sample Date			4/19/2022 14:50		4/19/2022 14:00		4/19/2022 13:25		4/19/2022 15:40		4/19/2022 15:15		4/19/2022 14:45		4/19/2022 13:50		4/19/2022 13:20		4/19/2022 8:00		4/19/2022 13:45		4/19/2022 15:35			
Analyte	CAS Number	Unit																								
Dissolved Target Analyte List Metals																										
Aluminum	7429-90-5	µg/L	**30.0**	J, TR	**19.0**	J, TR	70.0	U	**19.0**	J, TR	70.0	U	70.0	U	70.0	U	70.0	U	70.0	U	70.0	U	**18.0**	J, TR	26.39	95% KM (t) UCL
Antimony	7440-36-0	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	**1.40**	J, TR	**1.30**	J, TR	1.093	95% KM (t) UCL
Arsenic	7440-38-2	µg/L	**0.340**	J, TR	1.00	U	**0.340**	J, TR	**0.410**	J, TR	**0.340**	J, TR	1.00	U	1.00	U	1.00	U	**0.360**	J, TR	**0.610**	J, TR	**0.470**	J, TR	0.447	95% KM (t) UCL
Barium	7440-39-3	µg/L	**13.0**		**13.0**		**12.0**		**15.0**		**13.0**		**13.0**		**14.0**		**13.0**		**12.0**		**12.0**		**12.0**		13.29	95% Student's-t UCL
Beryllium	7440-41-7	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	**0.320**	J, TR	**0.0880**	J, TR	0.088	Maximum
Cadmium	7440-43-9	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	N/A	No detections
Calcium	7440-70-2	µg/L	**18,000**		**17,000**		**16,000**		**22,000**		**17,000**		**18,000**		**17,000**		**17,000**	J, A	**17,000**		**17,000**		**12,000**		18,511	95% Student's-t UCL
Total Chromium	7440-47-3	µg/L	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	**0.500**	J, TR	0.5	Maximum
Cobalt	7440-48-4	µg/L	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	**0.200**	J, TR	**0.120**	J, TR	0.178	95% KM (t) UCL
Copper	7440-50-8	µg/L	**2.00**		**1.60**	J, TR	**2.10**		**2.70**		**4.00**		**1.80**	J, TR	**1.50**	J, TR	**2.90**		**1.90**	J, TR	**2.10**		**7.10**		3.16	95% Student's-t UCL
Iron	7439-89-6	µg/L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	N/A	No detections
Lead	7439-92-1	µg/L	**0.200**	J, TR	0.700	U	0.700	U	0.700	U	**0.700**	J, TR	0.700	U	0.700	U	**0.210**	J, TR	0.700	U	**0.270**	J, TR	**1.00**	J, TR	0.522	95% KM (t) UCL
Magnesium	7439-95-4	µg/L	**5,400**		**6,900**		**6,600**		**3,700**		**5,600**		**5,300**		**7,000**		**7,800**		**7,900**		**7,600**		**5,400**		6291	95% Student's-t UCL
Manganese	7439-96-5	µg/L	**4.50**		**4.50**		**2.10**	J, TR	**8.20**		**4.50**		**3.70**		**3.60**		**2.20**	J, TR	**2.00**	J, TR	**1.90**	J, TR	**7.90**		8.348	95% Student's-t UCL
Mercury	7439-97-6	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	N/A	No detections
Nickel	7440-02-0	µg/L	**0.440**	J, TR	**0.390**	J, TR	**0.330**	J, TR	**0.630**	J, TR	**0.510**	J, TR	1.00	U	1.00	U	**0.360**	J, TR	**0.510**	J, TR	**0.350**	J, TR	**0.420**	J, TR	0.467	95% KM (t) UCL
Potassium	2023695	µg/L	**2,000**	J, TR	**2,700**	J, TR	**2,500**	J, TR	**1,500**	J, TR	**2,200**	J, TR	**1,900**	J, TR	**2,700**	J, TR	**2,600**	J, TR	**2,600**	J, TR	**2,500**	J, TR	**2,500**	J, TR	2,437	95% Student's-t UCL
Selenium	7782-49-2	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	**0.370**	J, TR	1.00	U	0.37	Maximum
Silver	7440-22-4	µg/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U, L	0.100	U, L	N/A	No detections
Sodium	7440-23-5	µg/L	**20,000**		**33,000**		**30,000**		**15,000**		**21,000**		**20,000**		**35,000**		**37,000**		**38,000**		**36,000**		**23,000**		28,195	95% Student's-t UCL
Thallium	7440-28-0	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	**0.170**	J, TR	0.200	U	0.17	Maximum
Vanadium	7440-62-2	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	N/A	No detections
Zinc	7440-66-6	µg/L	**6.50**	J, TR	**4.60**	J, TR	**5.00**	J, TR	**3.50**	J, TR	**26.0**		**7.20**	J, TR	**3.50**	J, TR	**5.50**	J, TR	**3.30**	J, TR	**3.80**	J, TR	**44.0**		16.5	95% KM (t) UCL

Table 6-9 Iona Island Hudson River Shoreline Surface Water Analytical Results

Location			IHRS (Iona Island Hudson River Shoreline Adjacent to AOC #16 – Area D)																			
Sample ID			IHRS-SW-01-041922		IHRS-SW-02-041922		IHRS-SW-03-041922		IHRS-SW-04-041922		FD1-041922 (Duplicate of IHRS-		IHRS-SW-05-041922		IHRS-SW-06-041922		IHRS-SW-07-041922		IHRS-SW-08-041922		IHRS-SW-09-041922		IHRS-SW-10-041922	
Matrix			Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
Sample Date			4/19/2022 16:30		4/19/2022 16:32		4/19/2022 16:35		4/19/2022 16:38		4/19/2022 8:00		4/19/2022 16:42		4/19/2022 16:45		4/19/2022 16:48		4/19/2022 16:53		4/19/2022 16:56		4/19/2022 17:00	
Analyte	**CAS Number**	**Unit**																						
Dissolved Target Analyte List Metals																								
Aluminum	7429-90-5	µg/L	**19.0**	J, TR	70.0	U	70.0	U	70.0	U	**20.0**	J, TR	70.0	U	**26.0**	J, TR	70.0	U	70.0	U	70.0	U	70.0	U
Antimony	7440-36-0	µg/L	**0.950**	J, TR	1.00	U	1.00	U	1.00	U	**1.30**	J, TR	**0.480**	J, TR	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Arsenic	7440-38-2	µg/L	**0.400**	J, TR	**0.520**	J, TR	**0.540**	J, TR	**0.520**	J, TR	**0.590**	J, TR	**0.640**	J, TR	**0.610**	J, TR	**0.460**	J, TR	**0.490**	J, TR	**0.430**	J, TR	**0.450**	J, TR
Barium	7440-39-3	µg/L	**14.0**		**17.0**		**14.0**		**14.0**		**12.0**		**14.0**		**14.0**		**14.0**		**13.0**		**14.0**		**14.0**	
Beryllium	7440-41-7	µg/L	0.300	U	0.300	U, L	0.300	U	0.300	U	1.00	U, L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U
Cadmium	7440-43-9	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U
Calcium	7440-70-2	µg/L	**14,000**		**23,000**		**23,000**		**23,000**		**22,000**		**23,000**		**23,000**		**22,000**		**22,000**		**23,000**		**23,000**	
Total Chromium	7440-47-3	µg/L	1.80	U	**0.560**	J, TR	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U
Cobalt	7440-48-4	µg/L	0.350	U	0.350	U	0.350	U	0.350	U	**0.180**	J, TR	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U
Copper	7440-50-8	µg/L	**8.00**		**3.40**		**3.70**		**4.40**	J, D3	**2.30**	J, D3	**6.40**		**2.70**		**3.10**		**3.30**		**2.90**		**3.50**	
Iron	7439-89-6	µg/L	100	U, L	34.0	U, L	34.0	U, L	34.0	U, L	100	U, L	100	U, L	100	U, L	34.0	U, L	100	U, L	34.0	U, L	34.0	U, L
Lead	7439-92-1	µg/L	3.00	U, L	0.700	U	0.700	U	0.700	U	**0.240**	J, TR	**0.200**	J, TR	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U
Magnesium	7439-95-4	µg/L	**5,700**		**3,800**		**3,900**		**3,900**		**3,600**		**3,900**		**3,700**		**3,700**		**3,800**		**3,900**		**3,900**	
Manganese	7439-96-5	µg/L	**12.0**		**9.40**		**8.10**		**8.30**		**11.0**		**8.60**		**8.50**		**8.00**		**7.80**		**7.20**		**7.60**	
Mercury	7439-97-6	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U
Nickel	7440-02-0	µg/L	1.00	U	**0.470**	J, TR	**0.450**	J, TR	**0.370**	J, TR	**0.550**	J, TR	**0.480**	J, TR	**0.310**	J, TR	**0.520**	J, TR	**0.330**	J, TR	**0.530**	J, TR	**0.390**	J, TR
Potassium	2023695	µg/L	**2,500**	J, TR	**1,500**	J, TR	**1,500**	J, TR	**1,500**	J, TR	**1,500**	J, TR	**1,500**	J, TR	**1,500**	J, TR	**1,500**	J, TR	**1,500**	J, TR	**1,500**	J, TR	**1,600**	J, TR
Selenium	7782-49-2	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	**0.480**	J, TR	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Silver	7440-22-4	µg/L	0.100	U	**0.0460**	J, TR	0.100	U	0.100	U	**0.0710**	J, TR	**0.460**	J, TR	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
Sodium	7440-23-5	µg/L	**22,000**		**15,000**		**15,000**		**15,000**		**14,000**		**15,000**		**15,000**		**15,000**		**16,000**		**16,000**		**16,000**	
Thallium	7440-28-0	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	**0.150**	J, TR	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Vanadium	7440-62-2	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U
Zinc	7440-66-6	µg/L	**60.0**		**3.10**	J, TR	**2.70**	J, TR	**3.20**	J, TR	**2.00**	J, TR	**3.00**	J, TR	**2.30**	J, TR	**2.60**	J, TR	**3.80**	J, TR	8.00	U	8.00	U

1. 95UCLs calculated using ProUCL. Recommended UCLMs are presented. For those analytes that were not detected in any of the 20 surface water samples collected, ProUCL recommends that UCLs should also be non-detect. For those analytes detected in only 1 of 20 samples (total chromium, iron), the maximum detected concentration is presented.

NOTES:

CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
KM = Kaplan-Meier
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
RSL = regional screening level
U = Analyte not detected. Numerical value is LOD

Validation Reason Codes:

A Serial dilution
L Lab Blank
TR Trace Level Detect

Detected results are bolded.

Table 6-9 Iona Island Hudson River Shoreline Surface Water Analytical Results

Location			IHRS (Iona Island Hudson River Shoreline Adjacent to AOC #16 – Area D)																		ProUCL Recommended 95% Upper Confidence Limit[1]	UCL Calculation Type
Sample ID			IHRS-SW-11-041922		IHRS-SW-12-041922		IHRS-SW-13-041922		IHRS-SW-14-041922		IHRS-SW-15-041922		IHRS-SW-16-041922		IHRS-SW-17-041922		IHRS-SW-18-041922		IHRS-SW-19-041922		IHRS-SW-20-041922			
Matrix			Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water			
Sample Date			4/19/2022 17:03		4/19/2022 17:07		4/19/2022 17:10		4/19/2022 17:14		4/19/2022 17:19		4/19/2022 17:22		4/19/2022 17:25		4/19/2022 17:30		4/19/2022 17:35		4/19/2022 17:40			
Analyte	**CAS Number**	**Unit**																						
Dissolved Target Analyte List Metals																								
Aluminum	7429-90-5	µg/L	70.0	U	70.0	U	70.0	U	70.0	U	70.0	U	70.0	U	**22.0**	J, TR	**22.0**	J, TR	**20.0**	J, TR	**22.0**	J, TR	23.53	95% KM (t) UCL
Antimony	7440-36-0	µg/L	1.00	U	1.00	U	**0.510**	J, TR	1.00	U	1.00	U	1.00	U	1.00	U	**0.660**	J, TR	**0.510**	J, TR	1.00	U	0.774	95% KM (t) UCL
Arsenic	7440-38-2	µg/L	**0.430**	J, TR	**0.470**	J, TR	**0.520**	J, TR	**0.560**	J, TR	**0.540**	J, TR	**0.450**	J, TR	**0.440**	J, TR	**0.500**	J, TR	**0.420**	J, TR	**0.430**	J, TR	0.516	95% Student's-t UCL
Barium	7440-39-3	µg/L	**15.0**		**16.0**		**19.0**		**19.0**		**19.0**		**23.0**		**17.0**		**19.0**		**21.0**		**17.0**		17.45	95% Student's-t UCL
Beryllium	7440-41-7	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	N/A	No detections
Cadmium	7440-43-9	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	N/A	No detections
Calcium	7440-70-2	µg/L	**23,000**		**23,000**		**23,000**		**23,000**		**23,000**		**23,000**		**22,000**		**22,000**		**22,000**		**22,000**		23000	Maximum
Total Chromium	7440-47-3	µg/L	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	0.56	Maximum
Cobalt	7440-48-4	µg/L	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	N/A	No detections
Copper	7440-50-8	µg/L	**5.10**		**10.0**		**8.90**		**9.10**		**8.20**		**5.10**		**3.30**		**8.30**		**11.0**		**8.20**		6.995	95% Student's-t UCL
Iron	7439-89-6	µg/L	34.0	U, L	34.0	U, L	34.0	U, L	100	U, L	34.0	U, L	34.0	U, L	100	U, L	100	U, L	34.0	U, L	**110**		110	Maximum
Lead	7439-92-1	µg/L	0.700	U	**0.460**	J, TR	**0.320**	J, TR	**0.320**	J, TR	**0.280**	J, TR	0.700	U	0.700	U	**0.290**	J, TR	**0.370**	J, TR	**0.240**	J, TR	0.359	95% KM (t) UCL
Magnesium	7439-95-4	µg/L	**4,000**		**4,200**		**5,000**		**5,200**		**4,900**		**5,900**		**4,500**		**4,500**		**5,800**		**4,800**		4736	95% Student's-t UCL
Manganese	7439-96-5	µg/L	**8.30**		**10.0**		**11.0**		**12.0**		**11.0**		**16.0**		**10.0**		**7.30**		**8.30**		**6.90**		10.17	95% Student's-t UCL
Mercury	7439-97-6	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	N/A	No detections
Nickel	7440-02-0	µg/L	**0.370**	J, TR	**0.310**	J, TR	**0.440**	J, TR	**0.520**	J, TR	1.00	U	**0.540**	J, TR	**0.480**	J, TR	**0.320**	J, TR	**0.480**	J, TR	**0.470**	J, TR	0.465	95% KM (t) UCL
Potassium	2023695	µg/L	**1,500**	J, TR	**1,600**	J, TR	**1,900**	J, TR	**1,900**	J, TR	**1,900**	J, TR	**2,300**	J, TR	**1,800**	J, TR	**1,600**	J, TR	**2,200**	J, TR	**1,800**	J, TR	1848	95% Student's-t UCL
Selenium	7782-49-2	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	N/A	No detections
Silver	7440-22-4	µg/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.46	Maximum
Sodium	7440-23-5	µg/L	**17,000**		**19,000**		**26,000**		**28,000**		**26,000**		**34,000**		**22,000**		**21,000**		**32,000**		**23,000**		22745	95% Student's-t UCL
Thallium	7440-28-0	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	N/A	No detections
Vanadium	7440-62-2	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	N/A	No detections
Zinc	7440-66-6	µg/L	8.00	U	**3.80**	J, TR	**4.10**	J, TR	**3.60**	J, TR	**3.60**	J, TR	**7.70**	J, TR	**4.10**	J, TR	**5.00**	J, TR	**15.0**	J, TR	**6.40**	J, TR	12.24	95% KM (t) UCL

Table 6-10 Iona Marsh Surface Water Analytical Results

Location			RRDS (Iona Marsh shoreline at Outlet of Riprap Filled Drainage Swale)																				ProUCL Recommended 95% Upper Confidence Limit[3]	UCL Calculation Type
Sample ID			RRDS-SW-01-042022		RRDS-SW-02-042022		RRDS-SW-03-042022		RRDS-SW-04-042022		RRDS-SW-05-042022		RRDS-SW-06-042022		RRDS-SW-07-042022		RRDS-SW-08-042022		RRDS-SW-09-042022		RRDS-SW-10-042022		FD1-042022 (Duplicate of RRDS-			
Matrix			Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water			
Sample Date			4/20/2022 15:00		4/20/2022 15:05		4/20/2022 15:10		4/20/2022 15:15		4/20/2022 15:20		4/20/2022 15:25		4/20/2022 15:30		4/20/2022 15:35		4/20/2022 15:40		4/20/2022 15:45		4/20/2022 8:00			
Analyte	CAS Number	Unit																								
Dissolved Target Analyte List Metals																										
Aluminum	7429-90-5	µg/L	**19.0**	J, TR	**18.0**	J, TR	**23.0**	J, TR	**26.0**	J, TR	70.0	U	**18.0**	J, TR	**23.0**	J, TR	**19.0**	J, TR	70.0	U	**21.0**	J, TR	70.0	U	22.75	95% KM (t) UCL
Antimony	7440-36-0	µg/L	**0.720**	J, TR	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	0.72	Maximum
Arsenic	7440-38-2	µg/L	**1.20**	J, TR	**0.490**	J, TR	**0.450**	J, TR	**0.560**	J, TR	**0.540**	J, TR	**0.500**	J, TR	**0.450**	J, TR	**0.470**	J, TR	**0.430**	J, TR	**0.500**	J, TR	**0.480**	J, TR	0.692	95% Student's-t UCL
Barium	7440-39-3	µg/L	**15.0**		**13.0**		**13.0**		**13.0**		**14.0**		**13.0**		**14.0**		**15.0**		**16.0**		**15.0**		**15.0**		14.74	95% Student's-t UCL
Beryllium	7440-41-7	µg/L	0.300	U, L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	N/A	No detections
Cadmium	7440-43-9	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	N/A	No detections
Calcium	7440-70-2	µg/L	**23000**		**21,000**		**21,000**		**21,000**		**21,000**		**22,000**		**22,000**		**22,000**		**21,000**		**22,000**		**21,000**		22,005	95% Student's-t UCL
Total Chromium	7440-47-3	µg/L	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	N/A	No detections
Cobalt	7440-48-4	µg/L	**0.0970**	J, TR	0.350	U	**0.0940**	J, TR	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	**0.110**	J, TR	0.097	Maximum
Copper	7440-50-8	µg/L	**1.20**	J, TR	**1.20**	J, TR	**1.30**	J, TR	**1.20**	J, TR	**1.30**	J, TR	**1.40**	J, TR	**1.30**	J, TR	**1.20**	J, TR	**1.40**	J, TR	**1.30**	J, TR	**1.60**	J, TR	1.326	95% Student's-t UCL
Iron	7439-89-6	µg/L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	34.0	U, L	N/A	No detections
Lead	7439-92-1	µg/L	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	N/A	No detections
Magnesium	7439-95-4	µg/L	**8500**		**3,800**		**3,700**		**4,000**		**4,000**		**3,900**		**3,900**		**3,900**		**3,500**		**3,700**		**3,600**		5,152	95% Student's-t UCL
Manganese	7439-96-5	µg/L	**130**		**20.0**		**23.0**		**20.0**		**23.0**		**22.0**		**16.0**		**19.0**		**18.0**		**16.0**		**18.0**		50.98	95% Student's-t UCL
Mercury	7439-97-6	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	N/A	No detections
Nickel	7440-02-0	µg/L	**0.380**	J, TR	**0.370**	J, TR	**0.370**	J, TR	**0.490**	J, TR	**0.450**	J, TR	**0.560**	J, TR	**0.440**	J, TR	**0.410**	J, TR	**0.460**	J, TR	**0.510**	J, TR	**0.340**	J, TR	0.481	95% Student's-t UCL
Potassium	2023695	µg/L	**3,100**		**1,400**	J, TR	**1,300**	J, TR	**1,400**	J, TR	**1,500**	J, TR	**1,400**	J, TR	**1,400**	J, TR	**1,500**	J, TR	**1,400**	J, TR	**1,400**	J, TR	**1,300**	J, TR	1,891	95% Student's-t UCL
Selenium	7782-49-2	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	N/A	No detections
Silver	7440-22-4	µg/L	0.100	U, L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	N/A	No detections
Sodium	7440-23-5	µg/L	**51,000**		**16,000**		**16,000**		**18,000**		**17,000**		**17,000**		**17,000**		**17,000**		**16,000**		**17,000**		**16,000**		26,484	95% Student's-t UCL
Thallium	7440-28-0	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	N/A	No detections
Vanadium	7440-62-2	µg/L	**1.20**	J, TR	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	N/A	No detections
Zinc	7440-66-6	µg/L	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U	N/A	No detections

1. 95UCLs calculated using ProUCL. Suggested UCLMs are presented. For those analytes that were not detected in any of the 20 surface water samples collected, ProUCL recommends that UCLs should also be non-detect.
For those analytes detected in only 1 of 10 samples (antimony and vanadium in RRDS samples and thallium and zinc in TWS samples), the maximum detected concentration is presented.

NOTES:
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
KM = Kaplan-Meier
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
RSL = regional screening level
U = Analyte not detected. Numerical value is LOD

Validation Reason Codes:
A Serial dilution
L Lab Blank
TR Trace Level Detect

Detected results are bolded.

Table 6-10 Iona Marsh Surface Water Analytical Results

			TWS (Iona Marsh shoreline at Outlet of Tidal Wetland Swale)																			
Sample ID			**TWS-SW-01-042022**		**TWS-SW-02-042022**		**TWS-SW-03-042022**		**TWS-SW-04-042022**		**TWS-SW-05-042022**		**TWS-SW-06-042022**		**TWS-SW-07-042022**		**TWS-SW-08-042022**		**TWS-SW-09-042022**		**TWS-SW-10-042022**		**ProUCL Recommended 95% Upper Confidence Limit[1]**	**UCL Calculation Type**
Matrix			**Surface Water**		**Surface Water**		**Surface Water**		**Surface Water**		**Surface Water**		**Surface Water**		**Surface Water**		**Surface Water**		**Surface Water**		**Surface Water**			
Sample Date			**4/20/2022 13:40**		**4/20/2022 13:45**		**4/20/2022 13:50**		**4/20/2022 13:55**		**4/20/2022 14:00**		**4/20/2022 14:05**		**4/20/2022 14:10**		**4/20/2022 14:15**		**4/20/2022 14:20**		**4/20/2022 14:25**			
Analyte	**CAS Number**	**Unit**																						
Dissolved Target Analyte List Metals																								
Aluminum	7429-90-5	µg/L	**18.0**	J, TR	**19.0**	J, TR	70.0	U	70.0	U	70.0	U	**27.0**	J, TR	70.0	U	70.0	U	70.0	U	**33.0**	J, TR	30.75	95% KM (t) UCL
Antimony	7440-36-0	µg/L	**0.530**	J, TR	**0.430**	J, TR	**0.580**	J, TR	1.00	U	**0.420**	J, TR	1.00	U	**1.20**	J, TR	**0.540**	J, TR	**0.420**	J, TR	1.00	U	0.7	95% KM (t) UCL
Arsenic	7440-38-2	µg/L	**1.40**	J, TR	**1.10**	J, TR	**0.910**	J, TR	**1.10**	J, TR	**1.00**	J, TR	**0.830**	J, TR	**0.870**	J, TR	**0.950**	J, TR	**0.820**	J, TR	**0.720**	J, TR	1.082	95% Student's-t UCL
Barium	7440-39-3	µg/L	**15.0**		**13.0**		**14.0**		**14.0**		**14.0**		13.0		**14.0**		**13.0**		**14.0**		**13.0**		14.09	95% Student's-t UCL
Beryllium	7440-41-7	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	**0.130**	J, TR	**0.220**	J, TR	0.300	U	**0.100**	J, TR	0.300	U	0.216	95% KM (t) UCL
Cadmium	7440-43-9	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	N/A	No detections
Calcium	7440-70-2	µg/L	**23,000**		**23,000**		**23,000**		**23,000**		**22,000**		**22,000**		**22,000**		**23,000**		**22,000**		**22,000**		22806	95% Student's-t UCL
Total Chromium	7440-47-3	µg/L	1.80	U	1.80	U	1.80	U	**0.580**	J, TR	1.80	U	1.80	U	**0.690**	J, TR	1.80	U	1.80	U	1.80	U	0.69	Maximum
Cobalt	7440-48-4	µg/L	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	**0.0940**	J, TR	**0.120**	J, TR	**0.110**	J, TR	0.350	U	**0.120**	J, TR	0.12	Maximum
Copper	7440-50-8	µg/L	**1.00**	J, TR	**1.30**	J, TR	**1.30**	J, TR	**1.10**	J, TR	**1.10**	J, TR	**1.10**	J, TR	**1.40**	J, TR	**1.20**	J, TR	**1.50**	J, TR	**1.50**	J, TR	1.353	95% Student's-t UCL
Iron	7439-89-6	µg/L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	N/A	No detections
Lead	7439-92-1	µg/L	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	N/A	No detections
Magnesium	7439-95-4	µg/L	**8,100**		**6,800**		**7,200**		**6,700**		**6,800**		**5,900**		**5,800**		**6,200**		**6,500**		**6,400**		7028	95% Student's-t UCL
Manganese	7439-96-5	µg/L	**120**		**70.0**		**50.0**		**85.0**		**64.0**		**51.0**		**51.0**		**57.0**		**16.0**		**17.0**		75.77	95% Student's-t UCL
Mercury	7439-97-6	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	NA	No detections
Nickel	7440-02-0	µg/L	**0.370**	J, TR	**0.390**	J, TR	**0.370**	J, TR	**0.470**	J, TR	**0.630**	J, TR	**0.390**	J, TR	**0.570**	J, TR	**0.360**	J, TR	**0.350**	J, TR	**0.540**	J, TR	0.503	95% Student's-t UCL
Potassium	2023695	µg/L	**3,000**		**2,700**	J, TR	**2,800**	J, TR	**2,600**	J, TR	**2,600**	J, TR	**2,200**	J, TR	**2,200**	J, TR	**2,400**	J, TR	**2,500**	J, TR	**2,500**	J, TR	2695	95% Student's-t UCL
Selenium	7782-49-2	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	N/A	No detections
Silver	7440-22-4	µg/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U, L	0.100	U, L	0.100	U	0.100	U	0.100	U	N/A	No detections
Sodium	7440-23-5	µg/L	**50,000**		**41,000**		**44,000**		**40,000**		**41,000**		**34,000**		**33,000**		**36,000**		**39,000**		**38,000**		42482	95% Student's-t UCL
Thallium	7440-28-0	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	**0.110**	J, TR	0.200	U	0.200	U	0.200	U	0.11	Maximum
Vanadium	7440-62-2	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	N/A	No detections
Zinc	7440-66-6	µg/L	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U	**3.90**	J, TR	8.00	U	8.00	U	8.00	U	3.9	Maximum

Table 6-11 Surface Water Contaminant Detections Summary

Metals Analyte	CAS #	Source area at AOC #16 - Area D (former Dumping Area) (DUMP-SW-01 to DUMP-SW-20)				Iona Island Hudson River Shoreline (IHRS-SW-01 through IHRS-SW-20)			
		Samples With Detection	Concentration Range (mg/kg)	Sample with Minimum Concentration	Sample with Maximum Concentration	Samples With Detection	Concentration Range (mg/kg)	Sample with Minimum Concentration	Sample with Maximum Concentration
Aluminum	7429-90-5	10 samples (SW-1, SW-2, SW-4, SW-7, SW-9, SW-10, SW-11, SW-12, SW-14, SW-20)	18 to 33	DW-10, SW-20	SW-2	7 samples (SW-1, SW-4, SW-6, SW-17 to SW-20)	19 to 26	SW-1	SW-6
Antimony	7440-36-0	2 samples (SW-19, SW-20)	1.3 to 1.4	SW-20	SW-19	6 samples (SW-1, SW-4 duplicate only, SW-5, SW-13, SW-18, SW-19)	0.48 to 1.3	SW-5	SW-4 (duplicate only)
Arsenic	7440-38-2	11 samples (SW-3, SW-8, SW-9, SW-10, SW-11, SW-13, SW-14, SW-15, SW-18, SW-19, SW-20)	0.34 to 0.61	SW-8, SW-11, SW-13, SW-15	SW-19	each of 20 samples	0.4 to 0.64	SW-1	SW-5
Barium	7440-39-3	Each of 20 samples	9 to 15	SW-8	SW-10, SW-14	each of 20 samples	12 to 26	SW-4	SW-16
Beryllium	7440-41-7	2 samples (SW-19, SW-20)	0.088 to 0.32	SW-20	SW-19	0 samples	Not detected		
Calcium	7440-70-2	Each of 20 samples	12,000 to 22,000	SW-20	SW-1, SW-4, SW-9. SW-14	each of 20 samples	14,000 to 22,000	SW-1	SW-4, SW-17 to SW-20
Chromium (Total	7440-47-3	1 sample (SW-20)	0.5 to 0.5	SW-20	SW-20	1 sample (SW-2)	0.56 to 0.56	SW-2	SW-2
Cobalt	7440-48-4	4 samples (SW-5, SW-10, SW-19, S-20)	0.12 to 0.2	SW-5, SW-20	SW-19	1 sample (SW-4 duplicate only)	0.18 to 0.18	SW-4 (duplicate only)	SW-4 (duplicate only)
Copper	7440-50-8	Each of 20 samples	1.3 to 7.1	SW-6	SW-20	each of 20 samples	2.3 to 11	SW-4	SW-19
Iron	7439-89-6	0 samples	Not detected			1 sample (SW-20)	110 to 110	SW-20	SW-20
Lead	7439-92-1	20 samples (SW-2, SW-3, SW-5, SW-7, SW-10, SW-11, SW-15, SW-18,SW-19, SW-20)	0.2 to 1	SW-11	SW-5, SW-20	9 samples (SW-4, SW-5, SW-12, SW-13, SW-14, SW-15, SW-18, SW-19, SW-20)	0.2 to 0.46	SW-5	SW-12
Magnesium	7439-95-4	Each of 20 samples	3,700 to 7,900	SW-4	SW-18	each of 20 samples	3,600 to 5,900	SW-4	SW-16
Manganese	7439-96-5	Each of 20 samples	1.9 to 18	SW-19	SW-10	each of 20 samples	6.9 to 16	SW-20	SW-16
Nickel	7440-02-0	16 samples (SW-1 to SW-7, SW-9, SW 11 to SW-15, SW-18 to SW-20)	0.33 to 0.63	SW-4, SW-6, SW-13	SW-14	18 samples (SW-2 to SW-15, SW-16 to SW-20)	0.31 to 0.55	SW-6, SW-12	SW-4 (duplicate)
Potassium	2023695	Each of 20 samples	1,400 to 3,000	SW-4, SW-9	SW-2	each of 20 samples	1,500 to 2,500	SW-2 to SW-9, SW-11	SW-1
Selenium	7782-49-2	1 sample (SW-19)	0.37 to 0.37	SW-19	SW-19	1 sample (SW-4 field duplicate only)	0.48 to 0.48	SW-4 (duplicate only)	SW-4 (duplicate only)
Silver	7440-22-4	0 samples	Not detected			3 samples (SW-2, SW-5, SW-4 field duplicate only)	0.046 to 0.46	SW-2	SW-5
Sodium	7440-23-5	Each of 20 samples	15,000 to 38,000	SW-1, SW-4, SW-9, SW-14	SW-18	each of 20 samples	14,000 to 34,000	SW-4	SW-16
Thallium	7440-28-0	1 sample (SW-19)	0.17 to 0.17	SW-19	SW-19	1 sample (SW-4 field duplicate only)	0.15 to 0.15	SW-4 (duplicate only)	SW-4 (duplicate only)
Zinc	7440-66-6	19 samples (SW-1 to SW-3, SW-5 to SW-20)	2 to 44	SW-1	SW-20	17 samples (SW-1 to SW-8, SW-12 to SW-20)	2 to 60	SW-4	SW-1
		Riprap Filled Drainage Swale (RRDS-SW-01 through RRDS-SW-10)				Tidal Wetland Swale (TWS-SW-01 through TWS-SW-10)			
Metals Analyte	CAS #	Samples With Detection	Concentration Range (mg/kg)	Sample with Minimum Concentration	Sample with Maximum Concentration	Samples With Detection	Concentration Range (mg/kg)	Sample with Minimum Concentration	Sample with Maximum Concentration
Aluminum	7429-90-5	8 samples (SW-1 to SW-4, SW-6 to SW-8, SW-10)	18 to 26	SW-2, SW-6	SW-4	4 samples (SW-1, SW-2, SW-6, SW-10)	18 to 33	SW-1	SW-10
Antimony	7440-36-0	1 sample (SW-1)	0.72 to 0.72	SW-1	SW-1	7 samples (SW-1, SW-2, SW-3, SW-5, SW-7, SW-8, SW-9)	0.42 to 1.2	SW-5, SW-9	SW-7
Arsenic	7440-38-2	each of 10 samples	0.43 to 1.2	SW-9	SW-1	each of 10 samples	0.72 to 1.4	SW-10	SW-1
Barium	7440-39-3	each of 10 samples	13 to 16	SW-2, SW-3, SW-4, SW-6	SW-9	each of 10 samples	13 to 15	SW-2, SW-6, SW-8, SW-10	SW-1
Beryllium	7440-41-7	0 samples	Not detected			3 samples (SW-6, SW-7, SW-9)	0.1 to 0.22	SW-9	SW-7
Calcium	7440-70-2	each of 10 samples	21,000 to 23,000	SW-2, to SW-5, SW-9, SW-10	SW-1	each of 10 samples	22,000 to 23,000	SW05, SW-6, SW-7, SW-9, SW-10	SW-1, SW-2, SW-3, SW-4, SW-8
Chromium (Total	7440-47-3	0 samples	Not detected			2 samples (SW-4, SW-7)	0.58 to 0.69	SW-4	SW-7
Cobalt	7440-48-4	3 samples (SW-1, SW-3, SW-10)	0.094 to 0.11	SW-3	SW-10	4 samples (SW-6, SW-7, SW-8, SW-10)	0.094 to 0.12	SW-6, SW-12	SW-7, SW-10
Copper	7440-50-8	each of 10 samples	1.2 to 1.6	SW-1, SW-2	SW-10	each of 10 samples	1 to 1.5	SW-1	SW-9, SW-10
Magnesium	7439-95-4	each of 10 samples	3,500 to 8,500	SW-9	SW-1	each of 10 samples	5,800 to 8,100	SW-7	SW-1
Manganese	7439-96-5	each of 10 samples	16 to 130	SW-7, SW-10	SW-1	each of 10 samples	16 to 120	SW-9	SW-1
Nickel	7440-02-0	each of 10 samples	0.34 to 0.56	SW-10	SW-6	each of 10 samples	0.35 to 0.63	SW-9	SW-5
Potassium	2023695	each of 10 samples	1,300 to 3,100	SW-3, SW-10	SW-1	each of 10 samples	2,200 to 3,000	SW-6, SW-7	SW-1
Sodium	7440-23-5	each of 10 samples	16,000 to 51,000	SW-2, SW-3, SW-9, SW-10	SW-1	each of 10 samples	33,000 to 50,000	SW-7	SW-1
Thallium	7440-28-0	0 samples	Not detected			1 sample (SW-7)	0.11 to 0.11	SW-7	SW-7
Vanadium	7440-62-2	1 sample	1.2 to 1.2	SW-1	SW-1	0 samples	Not detected		
Zinc	7440-66-6	0 samples	Not detected			1 sample (SW-7)	3.9 to 3.9	SW-7	SW-7

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Table 6-12 Onsite ISM Sediment Analytical Results

Location			Iona Island Hudson River Shoreline Adjacent to AOC #16 – Area D (former Dumping Area)									95% UCL Calculations per ITRC Calculator (2020)			
Sample ID			IINY-IHRS-DU-01A-SEDIS-041922		IINY-IHRS-DU-01B-SEDIS-041922		IINY-IHRS-DU-01C-SEDIS-041922								
Depth (in.)			0-6		0-6		0-6								
Matrix			Sediment		Sediment		Sediment								
Sample Date			4/19/2022 10:45		4/19/2022 10:45		4/19/2022 10:45								
Analyte	CAS Number	Unit							Mean	Arithmetic Standard Deviation	% Relative Standard Deviation	Student's-t	Chebychev	Adjusted CV of Increments	Recommended 95% UCL
Target Analyte List Metals															
Aluminum	7429-90-5	mg/kg	**6,900**	J, A	**5,700**		**6,300**		6,300	600	9.52	7,310	7,810	0.766	7,310
Antimony	7440-36-0	mg/kg	**110**	J, A	**89.0**		**110**		103	12.1	11.8	123	134	0.956	123
Arsenic	7440-38-2	mg/kg	**35.0**	J, M	**34.0**		**32.0**		33.7	1.53	4.54	36.2	37.5	0.361	36.2
Barium	7440-39-3	mg/kg	**370**	J, D	**510**		**470**		450	72.1	16	572	631	1.33	572
Beryllium	7440-41-7	mg/kg	**0.910**		**0.920**		**0.760**		0.863	0.0896	10.4	1.01	1.09	0.838	1.01
Cadmium	7440-43-9	mg/kg	**9.60**		**9.30**		**8.90**		9.27	0.351	3.79	9.86	10.2	0.302	9.86
Total Chromium, Total	7440-47-3	mg/kg	**120**	J, D	**150**		**130**		133	15.3	11.5	159	172	0.929	159
Cobalt	7440-48-4	mg/kg	**14.0**		**14.0**		**12.0**		13.3	1.15	8.66	15.3	16.2	0.695	15.3
Copper	7440-50-8	mg/kg	**4,600**	J, D	**7,600**		**6,500**		6,230	1,520	24.3	8,790	10,100	2.18	10,100
Iron	7439-89-6	mg/kg	**180,000**	J, A	**140,000**		**150,000**		157,000	20,800	13.3	192,000	209,000	1.09	192,000
Lead	7439-92-1	mg/kg	**7,700**	J, D/M2	**14,000**		**8,000**		9,900	3,550	35.9	15,900	18,800	3.71	18,800
Manganese	7439-96-5	mg/kg	**1,200**		**1,200**		**1,200**		1,200	0	0	1,200	1,200	0	1,200
Mercury	7439-97-6	mg/kg	**0.0810**		**0.0730**		**0.0620**		0.072	0.00954	13.2	0.0881	0.096	1.08	0.0881
Nickel	7440-02-0	mg/kg	**69.0**		**110**		**77.0**		85.3	21.7	25.5	122	140	2.31	140
Selenium	7782-49-2	mg/kg	0.590	UJ, M/D	0.530	U	0.770	U	0.63	0.125	19.8	0.841	0.944	1.7	0.944
Silver	7440-22-4	mg/kg	**1.00**	J, M	**2.00**		**1.40**		1.47	0.503	34.3	2.32	2.73	3.47	2.73
Thallium	7440-28-0	mg/kg	**0.0750**	J, TR	**0.0560**	J, TR	**0.0690**	J, TR	0.0667	0.00971	14.6	0.083	0.0911	1.2	0.083
Vanadium	7440-62-2	mg/kg	**37.0**	J, M	**32.0**		**30.0**		33	3.61	10.9	39.1	42.1	0.884	39.1
Zinc	7440-66-6	mg/kg	**3,800**		**3,800**		**3,600**		3,730	115	3.09	3,930	4,020	0.246	3,930

NOTES:

95% UCL = 95% upper confidence limit for arithmetic mean
mg/kg = milligrams per kilogram
mV = millivolts
CAS = Chemical Abstracts Service
CV = Coefficient of variation
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
RSL = regional screening level
- Bias low
+ Bias high

Validation Reason Codes:

A	Serial dilution
D	MS RPD
M	MS Recovery
M2	Post Spike
TR	Trace Level Detect

Detected results are bolded.

Table 6-12 Onsite ISM Sediment Analytical Results

Location			Iona Marsh at Outlet of Riprap Filled Drainage Swale													
Sample ID			IINY-RRDS-DU-01A-SEDIS-041922		IINY-RRDS-DU-01B-SEDIS-041922		IINY-RRDS-DU-01C-SEDIS-041922					95% UCL Calculations per ITRC Calculator (2020)			
Depth (in.)			0-6		0-6		0-6								
Matrix			Sediment		Sediment		Sediment								
Sample Date			4/19/2022 11:30		4/19/2022 11:30		4/19/2022 11:30								
Analyte	CAS Number	Unit							Mean	Arithmetic Standard Deviation	% Relative Standard Deviation	Student's-t	Chebychev	Adjusted CV of Increments	Recommended 95% UCL
Target Analyte List Metals															
Aluminum	7429-90-5	mg/kg	**20,000**		**19,000**		**15,000**		18,000	2,650	14.7	22,500	24,700	1.21	22,500
Antimony	7440-36-0	mg/kg	**0.770**		**0.730**		**0.730**		0.743	0.0231	3.11	0.782	0.801	0.247	0.782
Arsenic	7440-38-2	mg/kg	**9.7**		**9.60**		**9.40**		9.57	0.153	1.6	9.82	9.95	0.127	9.82
Barium	7440-39-3	mg/kg	**110**		**100**		**110**		107	5.77	5.41	116	121	0.432	116
Beryllium	7440-41-7	mg/kg	**0.990**		**0.900**		**0.890**		0.927	0.0551	5.94	1.02	1.07	0.474	1.02
Cadmium	7440-43-9	mg/kg	**0.960**		**0.940**		**0.910**		0.937	0.0252	2.69	0.979	1	0.214	0.979
Total Chromium, Total	7440-47-3	mg/kg	**43.0**		**40.0**		**40.0**		41	1.73	4.22	43.9	45.4	0.337	43.9
Cobalt	7440-48-4	mg/kg	**15.0**		**15.0**		**14.0**		14.7	0.577	3.94	15.6	16.1	0.314	15.6
Copper	7440-50-8	mg/kg	**58.0**	J, TR	**53.0**	J, TR	**51.0**	J, TR	54	3.61	6.68	60.1	63.1	0.533	60.1
Iron	7439-89-6	mg/kg	**37,000**		**35,000**		**35,000**		35,700	1,150	3.24	37,600	38,600	0.258	37,600
Lead	7439-92-1	mg/kg	**67.0**		**60.0**		**56.0**		61	5.57	9.13	70.4	75	0.733	70.4
Manganese	7439-96-5	mg/kg	**2,700**		**2,600**		**2,800**		2,700	100	3.7	2,870	2,950	0.295	2,870
Mercury	7439-97-6	mg/kg	**0.190**		**0.190**		**0.180**		0.187	0.00577	3.09	0.196	0.201	0.246	0.196
Nickel	7440-02-0	mg/kg	**34.0**		**34.0**		**34.0**		34	0	0	34	34	0	34
Selenium	7782-49-2	mg/kg	**0.780**	J, TR	**0.760**	J, TR	**0.750**	J, TR	0.763	0.0153	2	0.789	0.802	0.16	0.789
Silver	7440-22-4	mg/kg	**0.330**		**0.310**		**0.310**		0.317	0.0115	3.65	0.336	0.346	0.29	0.336
Thallium	7440-28-0	mg/kg	**0.200**		**0.180**		**0.190**		0.19	0.01	5.26	0.207	0.215	0.42	0.207
Vanadium	7440-62-2	mg/kg	**31.0**		**29.0**		**29.0**		29.7	1.15	3.89	31.6	32.6	0.31	31.6
Zinc	7440-66-6	mg/kg	**190**	J, TR	**190**	J, TR	**200**		193	5.77	2.99	203	208	0.238	203

Table 6-12 Onsite ISM Sediment Analytical Results

Location			Iona Marsh at Outlet of Tidal Wetland Swale												
Sample ID			IINY-TWS-DU-01A-SEDIS-041922		IINY-TWS-DU-01B-SEDIS-041922		IINY-TWS-DU-01C-SEDIS-041922					95% UCL Calculations per ITRC Calculator (2020)			
Depth (in.)			0-6		0-6		0-6								
Matrix			Sediment		Sediment		Sediment								
Sample Date			4/19/2022 12:10		4/19/2022 12:10		4/19/2022 12:10								
Analyte	CAS Number	Unit							Mean	Arithmetic Standard Deviation	% Relative Standard Deviation	Student's-t	Chebychev	Adjusted CV of Increments	Recommended 95% UCL
Target Analyte List Metals															
Aluminum	7429-90-5	mg/kg	**16,000**		**16,000**		**15,000**		15,700	577	3.69	16,600	17,100	0.294	16,600
Antimony	7440-36-0	mg/kg	**1.00**		**0.730**		**0.790**		0.84	0.142	16.9	1.08	1.2	1.41	1.08
Arsenic	7440-38-2	mg/kg	**8.40**		**8.00**		**9.30**		8.57	0.666	7.77	9.69	10.2	0.622	9.69
Barium	7440-39-3	mg/kg	**95.0**		**95.0**		**92.0**		94	1.73	1.84	96.9	98.4	0.147	96.9
Beryllium	7440-41-7	mg/kg	**0.960**		**0.950**		**0.870**		0.927	0.0493	5.32	1.01	1.05	0.424	1.01
Cadmium	7440-43-9	mg/kg	**1.20**		**0.840**		**2.20**		1.41	0.705	49.9	2.6	3.19	6.41	3.19
Total Chromium, Total	7440-47-3	mg/kg	**43.0**		**43.0**		**41.0**		42.3	1.15	2.73	44.3	45.2	0.217	44.3
Cobalt	7440-48-4	mg/kg	**14.0**		**13.0**		**13.0**		13.3	0.577	4.33	14.3	14.8	0.345	14.3
Copper	7440-50-8	mg/kg	**59.0**	J, TR	**55.0**	J, TR	**72.0**	J, TR	62	8.89	14.3	77	84.4	1.18	77
Iron	7439-89-6	mg/kg	**29,000**		**29,000**		**36,000**		31,300	4,040	12.9	38,100	41,500	1.05	38,100
Lead	7439-92-1	mg/kg	**79.0**		**65.0**		**97.0**		80.3	16	20	107	121	1.71	121
Manganese	7439-96-5	mg/kg	**1,100**		**1,000**		**1,200**		1,100	100	9.09	1,270	1,350	0.73	1,270
Mercury	7439-97-6	mg/kg	**0.190**		**0.210**		**0.180**		0.193	0.0153	7.9	0.219	0.232	0.633	0.219
Nickel	7440-02-0	mg/kg	**33.0**		**31.0**		**35.0**		33	2	6.06	36.4	38	0.484	36.4
Selenium	7782-49-2	mg/kg	**0.740**	J, TR	**0.610**	J, TR	**0.630**	J, TR	0.66	0.07	10.6	0.778	0.836	0.857	0.778
Silver	7440-22-4	mg/kg	**0.330**		**0.360**		**0.280**		0.323	0.0404	12.5	0.391	0.425	1.02	0.391
Thallium	7440-28-0	mg/kg	**0.180**	J, TR	**0.180**	J, TR	**0.180**	J, TR	0.18	3.4E-17	1.89E-14	0.18	0.18	1.51E-15	0.18
Vanadium	7440-62-2	mg/kg	**35.0**		**35.0**		**33.0**		34.3	1.15	3.36	36.3	37.2	0.268	36.3
Zinc	7440-66-6	mg/kg	**360**		**230**	J, TR	**990**		527	406	77.2	1,210	1,550	15.7	1,550

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Table 6-13 Sediment Metals Detections Summary

Metals Analyte	CAS #	Iona Island Hudson River Shoreline Adjacent to AOC #16 – Area D (former Dumping Area)		Iona Marsh at Outlet of Riprap Filled Drainage Swale (RRDS-DU-01)		Iona Marsh at Outlet of Tidal Wetland Swale (TWS-DU-01)	
		Samples With Detection	Concentration Range (mg/kg)	Samples With Detection	Concentration Range (mg/kg)	Samples With Detection	Concentration Range (mg/kg)
Aluminum	7429-90-5	3	5,700 to 6,900	3	15,000 to 20,000	3	15,000 to 16,000
Antimony	7440-36-0	3	89 to 110	3	0.73 to 0.77	3	0.73 to 1
Arsenic	7440-38-2	3	32 to 35	3	9.4 to 9.7	3	8 to 9.3
Barium	7440-39-3	3	370 to 510	3	100 to 110	3	92 to 95
Beryllium	7440-41-7	3	0.76 to 0.92	3	0.89 to 0.99	3	0.87 to 0.96
Cadmium	7440-43-9	3	8.9 to 9.6	3	0.91 to 0.96	3	0.84 to 2.2
Chromium, Total	7440-47-3	3	130 to 150	3	40 to 43	3	41 to 43
Cobalt	7440-48-4	3	12 to 14	3	14 to 15	3	13 to 14
Copper	7440-50-8	3	4,600 to 7,600	3	51 to 58	3	55 to 72
Iron	7439-89-6	3	140,000 to 180,000	3	35,00 to 37,000	3	29,000 to 36,000
Lead	7439-92-1	3	7,700 to 14,000	3	56 to 67	3	65 to 97
Manganese	7439-96-5	3	1,200	3	2,700 to 2,800	3	1,000 to 1,200
Mercury	7439-97-6	3	0.062 to 0.081	3	0.18 to 0.19	3	0.18 to 0.21
Nickel	7440-02-0	3	69 to 110	3	34	3	31 to 35
Selenium	7782-49-2	0	Not Detected	3	0.75 to 0.78	3	0.61 to 0.74
Silver	7440-22-4	3	1 to 2	3	0.31 to 0.33	3	0.28 to 0.36
Thallium	7440-28-0	3	0.056 to 0.075	3	0.18 to 0.2	3	0.18
Vanadium	7440-62-2	3	30 to 37	3	29 to 31	3	33 to 35
Zinc	7440-66-6	3	3,600 to 3,800	3	190 to 200	3	230 to 990

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Table 6-14 Background Incremental Soil Analytical Results

			Location		BADU-1		BADU-2		BADU-3		BADU-4		BADU-5		BADU-6		BADU-7		BADU-8		95% Upper Confidence Limit Chebychev Test
			Sample ID		IINY-BADU-1		IINY-BADU-2		IINY-BADU-3		IINY-BADU-4		IINY-BADU-5		IINY-BADU-6		IINY-BADU-7		IINY-BADU-8		
			Depth (in)		0-6		0-6		0-6		0-6		0-6		0-6		0-6		0-6		
			Matrix		Surface Soil		Surface Soil		Surface Soil		Surface Soil		Surface Soil		Surface Soil		Surface Soil		Surface Soil		
			Sample Date / Time		4/1/2020 11:45		4/1/2020 12:15		4/1/2020 12:45		4/1/2020 13:20		4/1/2020 9:55		4/1/2020 9:20		4/1/2020 9:00		4/1/2020 9:25		
Analyte	CAS #	Unit																			
Target Analyte List Metals																					
Aluminum	7429-90-5	mg/kg	**14,000**		**15,000**		**11,000**		**7,300**		**10,000**		**11,000**		**15,000**		**14,000**		16,400		
Antimony	7440-36-0	mg/kg	**1.2**		**1.2**		**1.1**		**0.94**		**0.53**		**1.2**		**0.89**		**0.83**		1.35		
Arsenic	7440-38-2	mg/kg	**4.3**		**4**		**3.5**		**2.1**		**6.3**		**7.5**		**7.1**		**7.8**		8.59		
Barium	7440-39-3	mg/kg	**28**		**21**		**17**		**13**		**47**		**47**		**47**		**47**		56.7		
Beryllium	7440-41-7	mg/kg	**0.31**		**0.23**		**0.11**		**0.057**	J/TR	**0.92**		**0.7**		**0.62**		**0.57**		0.914		
Cadmium	7440-43-9	mg/kg	**0.22**		**0.14**		**0.13**		**0.11**		**0.23**		**0.29**		**0.16**		**0.12**		0.274		
Calcium	7440-70-2	mg/kg	**2,100**		**900**		**1,300**		**980**		**2,000**		**1,100**		**750**		**650**		2,070		
Total Chromium, Total	7440-47-3	mg/kg	**7.4**		**6.4**		**6.9**		**3.6**		**22**	J+/M	**20**		**20**		**31**		29.9		
Cobalt	7440-48-4	mg/kg	**2.1**		**1.7**		**1.1**		**0.59**		**6.4**		**5.3**		**5.5**		**7.3**		7.83		
Copper	7440-50-8	mg/kg	**11**	J/TR	**8.5**	J/TR	**7**	J/TR	**4.9**	J/TR	**25**		**21**	J/TR	**16**	J/TR	**26**		27.7		
Iron	7439-89-6	mg/kg	**12,000**		**13,000**		**13,000**		**8,600**		**14,000**		**15,000**		**17,000**		**21,000**		19,800		
Lead	7439-92-1	mg/kg	**53**		**57**		**50**		**33**		**49**		**94**		**58**		**46**		82.1		
Magnesium	7439-95-4	mg/kg	**1,400**		**1,300**		**1,000**		**600**		**2,100**	J/M2/A	**1,900**		**2,300**		**3,100**		2,940		
Manganese	7439-96-5	mg/kg	**330**		**200**		**75**		**37**		**340**		**200**		**230**		**280**		381		
Mercury	7439-97-6	mg/kg	**0.290**		**0.310**		**0.260**		**0.200**		**0.120**		**0.320**		**0.200**		**0.120**		0.351		
Nickel	7440-02-0	mg/kg	**5.7**		**4.8**		**4**		**2.7**		**22**		**23**		**19**		**23**		27.6		
Potassium	2023695	mg/kg	**840**		**710**		**840**		**700**		**620**		**720**		**670**		**720**		846		
Selenium	7782-49-2	mg/kg	**0.91**		**0.92**		**0.9**		**0.65**		**1.1**		**1.2**		**1.1**		**0.9**		1.22		
Silver	7440-22-4	mg/kg	**0.33**		**0.28**		**0.4**		**0.28**		**0.14**		**0.33**		**0.25**		**0.17**		0.405		
Sodium	7440-23-5	mg/kg	**52**	J/TR	**38**	J/TR	**34**	J/TR	**36**	J/TR	**63**	J-/M/TR	**44**	J/TR	**36**	J/TR	**47**	J/TR	59.1		
Thallium	7440-28-0	mg/kg	**0.1**		**0.099**		**0.082**	J/TR	**0.043**	J/TR	**0.2**		**0.18**		**0.17**		**0.16**		0.215		
Vanadium	7440-62-2	mg/kg	**23**		**21**		**22**		**13**		**37**	J+/M/M2	**40**		**47**		**56**		55.3		
Zinc	7440-66-6	mg/kg	**35**		**28**		**21**	J/TR	**30**		**60**		**72**		**45**		**48**		69.1		
Polycyclic Aromatic Hydrocarbons																					
1-Methylnaphthalene	90-12-0	mg/kg	**0.028**	J-/H2/TR	**0.015**	J-/H2/I/TR	**0.012**	J-/H2/I/TR	**0.0099**	J-/H2/I/TR	**0.018**	J-/H2/I/TR	**0.015**	J-/H2/I/TR	**0.0053**	J-/H2/I/TR	**0.0039**	J-/H2/I/TR	0.0252		
2-Methylnaphthalene	91-57-6	mg/kg	**0.022**	J-/H2/TR	**0.015**	J-/H2/I/TR	**0.013**	J-/H2/I/TR	**0.011**	J-/H2/I/TR	**0.017**	J-/H2/I/TR	**0.012**	J-/H2/I/TR	**0.0052**	J-/H2/I/TR	**0.0039**	J-/H2/I/TR	0.0215		
Acenaphthene	83-32-9	mg/kg	**0.097**	J-/H2	**0.034**	J-/H2/I/TR	**0.024**	J-/H2/I/TR	**0.021**	J-/H2/I/TR	**0.049**	J-/H2/M/I	**0.072**	J-/H2/I	**0.0081**	J-/H2/I/TR	**0.0048**	J-/H2/I/TR	0.0883		
Acenaphthylene	208-96-8	mg/kg	**0.05**	J-/H2/TR	**0.034**	J-/H2/I/TR	**0.028**	J-/H2/I/TR	**0.025**	J-/H2/I/TR	**0.081**	J-/H2/I	**0.028**	J-/H2/I/TR	**0.013**	J-/H2/I	**0.009**	J-/H2/I/TR	0.0688		
Anthracene	120-12-7	mg/kg	**0.12**	J-/H2	**0.049**	J-/H2/I	**0.039**	J-/H2/I	**0.028**	J-/H2/I/TR	**0.12**	J-/H2/M/I	**0.094**	J-/H2/I	**0.015**	J-/H2/I	**0.0084**	J-/H2/I/TR	0.13		
Benzo(a)anthracene	56-55-3	mg/kg	**0.68**	J-/H2	**0.21**	J-/H2/I	**0.17**	J-/H2/I	**0.1**	J-/H2/I	**0.51**	J-/H2/I	**0.68**	J-/H2/I	**0.067**	J-/H2/I	**0.043**	J-/H2/I	0.727		
Benzo(a)pyrene	50-32-8	mg/kg	**0.79**	J-/H2	**0.22**	J-/H2/I	**0.19**	J-/H2/I	**0.12**	J-/H2/I	**0.52**	J-/H2/I	**0.69**	J-/H2/I	**0.063**	J-/H2/I	**0.045**	J-/H2/I	0.783		
Benzo(b)fluoranthene	205-99-2	mg/kg	**1.3**	J-/H2	**0.38**	J-/H2/I	**0.31**	J-/H2/I	**0.19**	J-/H2/I	**0.73**	J-/H2/I	**1.1**	J-/H2/I	**0.11**	J-/H2/I	**0.072**	J-/H2/I	1.24		
Benzo(g,h,i)perylene	191-24-2	mg/kg	**0.68**	J-/H2	**0.18**	J-/H2/I	**0.15**	J-/H2/I	**0.091**	J-/H2/I	**0.39**	J-/H2/I	**0.52**	J-/H2/I	**0.049**	J-/H2/I	**0.035**	J-/H2/I	0.632		
Benzo(k)fluoranthene	207-08-9	mg/kg	**0.46**	J-/H2	**0.14**	J-/H2/I	**0.11**	J-/H2/I	**0.074**	J-/H2/I	**0.27**	J-/H2/I	**0.41**	J-/H2/I	**0.039**	J-/H2/I	**0.028**	J-/H2/I	0.451		
Chrysene	218-01-9	mg/kg	**1**	J-/H2	**0.31**	J-/H2/I	**0.25**	J-/H2/I	**0.16**	J-/H2/I	**0.62**	J-/H2/I	**0.9**	J-/H2/I	**0.093**	J-/H2/I	**0.061**	J-/H2/I	0.992		
Dibenz(a,h)anthracene	53-70-3	mg/kg	**0.15**	J-/H2	**0.042**	J-/H2/I	**0.036**	J-/H2/I	0.027	R (LOD)/H2/I	**0.092**	J-/H2/I	**0.13**	J-/H2/I	**0.013**	J-/H2/I	0	UJ (LOD)/H2/I	0.161		
Fluoranthene	206-44-0	mg/kg	**2.2**	J-/H2	**0.7**	J-/H2/I	**0.54**	J-/H2/I	**0.31**	J-/H2/I	**1.3**	J-/H2/I	**1.9**	J-/H2	**0.19**	J-/H2/I	**0.12**	J-/H2/I	2.14		
Fluorene	86-73-7	mg/kg	**0.1**	J-/H2	**0.087**	J-/H2/I	**0.056**	J-/H2/I	**0.06**	J-/H2/I	**0.065**	J-/H2/M/I	**0.061**	J-/H2/I	**0.01**	J-/H2/I	**0.0058**	J-/H2/I/TR	0.107		
Indeno(1,2,3-c,d)pyrene	193-39-5	mg/kg	**0.74**	J-/H2	**0.2**	J-/H2/I	**0.17**	J-/H2/I	**0.1**	J-/H2/I	**0.42**	J-/H2/I	**0.58**	J-/H2/I	**0.053**	J-/H2/I	**0.037**	J-/H2/I	0.692		
Naphthalene	91-20-3	mg/kg	**0.031**	J-/H2/TR	**0.023**	J-/H2/I/TR	**0.017**	J-/H2/I/TR	**0.017**	J-/H2/I/TR	**0.022**	J-/H2/I/TR	**0.017**	J-/H2/I/TR	**0.0074**	J-/H2/I/TR	**0.0063**	J-/H2/I/TR	0.0301		
Phenanthrene	85-01-8	mg/kg	**1.1**	J-/H2	**0.36**	J-/H2/I	**0.28**	J-/H2/I	**0.17**	J-/H2/I/TR	**0.58**	J-/H2/I	**0.86**	J-/H2/I	**0.09**	J-/H2/I	**0.061**	J-/H2/I	1.02		
Pyrene	129-00-0	mg/kg	**1.9**	J-/H2	**0.6**	J-/H2/I	**0.46**	J-/H2/I	**0.27**	J-/H2/I/TR	**1.1**	J-/H2/I	**1.5**	J-/H2	**0.16**	J-/H2/I	**0.11**	J-/H2/I	1.79		
Total LMW PAHs	N/A	mg/kg	1.548		0.617		0.469		0.3419		0.952		1.159		0.154		0.1031		1.46		
Total HMW PAHs	N/A	mg/kg	9.9		2.982		2.386		1.415		5.952		8.41		0.837		0.551		9.59		

NOTES:
mg/kg = milligrams per kilogram
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
NS = No standard
PCB = Polychlorinated biphenyl
R = The data are unusable. The sample results are rejected due to serious deficiencies in meeting the QC criteria
RSL = regional screening level
U = Analyte not detected. Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate
- Bias low
+ Bias high

Validation Reason Codes:

A	Serial dilution
C	LCS Recovery
D	MS RPD
H2	Prep Hold Time
I	Surrogate recovery outside project limits
L	Lab Blank
M	MS Recovery
M2	Post Spike
P1	Column RPD
TR	Trace Level Detect
V2	CCV

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Table 6-15 Background Surface Water Analytical Results

Location			Con Hook Hudson River Shoreline (CHHRS)																			
Sample ID			IINY-CHHRS-SW-01-042122		IINY-CHHRS-SW-02-042122		(Duplicate of CHHRS-SW-02)		IINY-CHHRS-SW-03-042122		IINY-CHHRS-SW-04-042122		IINY-CHHRS-SW-05-042122		IINY-CHHRS-SW-06-042122		IINY-CHHRS-SW-07-042122		IINY-CHHRS-SW-08-042122		IINY-CHHRS-SW-09-042122		IINY-CHHRS-SW-10-042122	
Matrix			Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
Sample Date			4/21/2022 9:55		4/21/2022 10:05		4/21/2022 8:00		4/21/2022 10:15		4/21/2022 10:25		4/21/2022 10:50		4/21/2022 11:00		4/21/2022 11:15		4/21/2022 11:40		4/21/2022 12:00		4/21/2022 12:10	
Analyte	**CAS Number**	**Unit**																						
Dissolved Target Analyte List Metals																								
Aluminum	7429-90-5	µg/L	**20.0**	J, TR	**18.0**	J, TR	**23.0**	J, TR	**20.0**	J, TR	**18.0**	J, TR	**19.0**	J, TR	**21.0**	J, TR	**19.0**	J, TR	**22.0**	J, TR	**21.0**	J, TR	**36.0**	J, TR
Antimony	7440-36-0	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Arsenic	7440-38-2	µg/L	**0.380**	J, TR	**0.340**	J, TR	**0.400**	J, TR	**0.350**	J, TR	**0.370**	J, TR	1.00	U	**0.330**	J, TR	**0.360**	J, TR	**0.440**	J, TR	**0.340**	J, TR	**0.460**	J, TR
Barium	7440-39-3	µg/L	**12.0**		**12.0**		**12.0**		**12.0**		12.0		**13.0**		**13.0**		**12.0**		**13.0**		**12.0**		**13.0**	
Beryllium	7440-41-7	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U
Cadmium	7440-43-9	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U
Calcium	7440-70-2	µg/L	**21,000**		**22,000**		**21,000**		**22,000**		**22,000**		**22,000**		**22,000**		**22,000**		**22,000**		**22,000**		**22,000**	
Total Chromium	7440-47-3	µg/L	1.80	U	1.80	U	**0.550**	J, TR	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U
Cobalt	7440-48-4	µg/L	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U
Copper	7440-50-8	µg/L	**1.00**	J, TR	**1.10**	J, TR	**1.20**	J, TR	**0.950**	J, TR	**1.00**	J, TR	**1.10**	J, TR	**1.00**	J, TR	**1.10**	J, TR	**1.30**	J, TR	**3.40**		**1.20**	J, TR
Iron	7439-89-6	µg/L	100	U, L	**35.0**	J, TR	100	U, L	**42.0**	J, TR	**31.0**	J, TR	**34.0**	J, TR	**37.0**	J, TR	**32.0**	J, TR	**90.0**	J, TR	**54.0**	J, TR	**84.0**	J, TR
Lead	7439-92-1	µg/L	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U
Magnesium	7439-95-4	µg/L	**3,800**		**3,700**		**3,400**		**3,800**		**3,700**		**3,800**		**3,800**		**3,800**		**3,800**		**3,700**		**3,800**	
Manganese	7439-96-5	µg/L	**37.0**		**23.0**		**23.0**		**7.00**		**9.20**		**4.70**		**4.50**		**4.60**		**4.90**		**6.30**		**79.0**	
Mercury	7439-97-6	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U
Nickel	7440-02-0	µg/L	1.00	U	**0.320**	J, TR	**0.380**	J, TR	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	**0.400**	J, TR	1.00	U	**0.330**	J, TR
Potassium	2023695	µg/L	**1,300**	J, TR	**1,200**	J, TR	**1,200**	J, TR	**1,300**	J, TR	**1,100**	J, TR	**1,200**	J, TR	**1,400**	J, TR	**1,200**	J, TR	**1,200**	J, TR	**1,200**	J, TR	**1,200**	J, TR
Selenium	7782-49-2	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Silver	7440-22-4	µg/L	0.100	U	0.100	U	0.100	U, L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
Sodium	7440-23-5	µg/L	**18,000**		**15,000**		**15,000**		**16,000**		**15,000**		**15,000**		**16,000**		**16,000**		**15,000**		**15,000**		**15,000**	
Thallium	7440-28-0	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Vanadium	7440-62-2	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U
Zinc	7440-66-6	µg/L	8.00	U	8.00	UJ, D	**3.00**	J, TR	8.00	U	8.00	U	8.00	U	8.00	U	**90.0**		8.00	U	3.00	J, TR	8.00	U
Location			Con Hook Marsh Shoreline																			
Sample ID			IINY-CHMS-SW-01-042122		IINY-CHMS-SW-02-042122		IINY-CHMS-SW-03-042122		IINY-CHMS-SW-04-042122		IINY-CHMS-SW-05-042122		IINY-CHMS-SW-06-042122		IINY-CHMS-SW-07-042122		IINY-CHMS-SW-08-042122		IINY-CHMS-SW-09-042122		IINY-CHMS-SW-10-042122		IINY-CHMS-SW-11-042122	
Matrix			Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
Sample Date			4/21/2022 17:30		4/21/2022 17:25		4/21/2022 17:15		4/21/2022 17:10		4/21/2022 17:05		4/21/2022 16:40		4/21/2022 16:35		4/21/2022 16:32		4/21/2022 16:31		4/21/2022 16:30		4/21/2022 16:20	
Analyte	**CAS Number**	**Unit**																						
Dissolved Target Analyte List Metals																								
Aluminum	7429-90-5	µg/L	**22.0**	J, TR	70.0	U	**20.0**	J, TR	**23.0**	J, TR	**44.0**	J, TR	**31.0**	J, TR	**25.0**	J, TR	**39.0**	J, TR	**39.0**	J, TR	**20.0**	J, TR	**51.0**	J, TR
Antimony	7440-36-0	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Arsenic	7440-38-2	µg/L	**0.380**	J, TR	1.00	U	**0.420**	J, TR	**0.480**	J, TR	**0.420**	J, TR	**0.900**	J, TR	**1.50**	J, TR	**2.70**	J, TR	**0.690**	J, TR	**0.590**	J, TR	**0.620**	J, TR
Barium	7440-39-3	µg/L	**14.0**		**13.0**		**13.0**		**13.0**		**13.0**		**17.0**		**17.0**		**17.0**		**16.0**		**15.0**		**16.0**	
Beryllium	7440-41-7	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U
Cadmium	7440-43-9	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U
Calcium	7440-70-2	µg/L	**20,000**		**22,000**		**22,000**		**21,000**		**20,000**		**23,000**		**24,000**		**23,000**		**24,000**		**25,000**		**23,000**	
Total Chromium	7440-47-3	µg/L	**0.510**	J, TR	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	**0.500**	J, TR	1.80	U	**0.560**	J, TR	**0.540**	J, TR	**0.640**	J, TR
Cobalt	7440-48-4	µg/L	**0.110**	J, TR	0.350	U	0.350	U	0.350	U	0.350	U	**0.120**	J, TR	**0.150**	J, TR	**0.140**	J, TR	**0.150**	J, TR	**0.120**	J, TR	**0.180**	J, TR
Copper	7440-50-8	µg/L	**0.710**	J, TR	**1.30**	J, TR	**1.30**	J, TR	**1.30**	J, TR	**1.30**	J, TR	**0.650**	J, TR	**0.680**	J, TR	**0.630**	J, TR	**0.700**	J, TR	**0.820**	J, TR	**0.690**	J, TR
Iron	7439-89-6	µg/L	100	U, L	100	U, L	100	U, L	100	U, L	**110**	+J, L	**140**	+J, L	**400**		**250**		**160**	+J, L	**160**	+J, L	**200**	+J, L
Lead	7439-92-1	µg/L	0.700	U	0.700	U	0.700	U	0.700	U	**0.220**	J, TR	0.700	U	**0.230**	J, TR	**0.390**	J, TR	0.700	U	0.700	U	0.700	U
Magnesium	7439-95-4	µg/L	**6,500**		**4,100**		**3,900**		**4,200**		4,100		**11,000**		**11,000**		**12,000**		**11,000**		**11,000**		**10,000**	
Manganese	7439-96-5	µg/L	**41.0**		**8.20**		**12.0**		**10.0**		**16.0**		**310**		**330**		**540**		**270**		**210**		**290**	
Mercury	7439-97-6	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U
Nickel	7440-02-0	µg/L	**0.510**	J, TR	1.00	U	**0.410**	J, TR	**0.410**	J, TR	**0.330**	J, TR	**0.510**	J, TR	**0.460**	J, TR	**0.400**	J, TR	**0.460**	J, TR	**0.420**	J, TR	**0.560**	J, TR
Potassium	2023695	µg/L	**1,800**	J, TR	**1,300**	J, TR	**1,200**	J, TR	**1,300**	J, TR	**1,400**	J, TR	**2,900**	J, TR	**3,000**		**3,200**		**2,900**	J, TR	**3,000**		**2,700**	J, TR
Selenium	7782-49-2	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Silver	7440-22-4	µg/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
Sodium	7440-23-5	µg/L	**41,000**		**19,000**		**17,000**		**20,000**		**19,000**		**97,000**		**95,000**		**100,000**		**95,000**		**91,000**		**86,000**	
Thallium	7440-28-0	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Vanadium	7440-62-2	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U
Zinc	7440-66-6	µg/L	**2.50**	J, TR	**3.50**	J, TR	**3.70**	J, TR	**3.40**	J, TR	**4.20**	J, TR	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U	**2.90**	J, TR

1. 95UCLs calculated using ProUCL. Suggested UCLMs are presented. For those analytes that were not detected in any of the 20 surface water samples collected, ProUCL recommends that UCLs should also be non-detect. For those analytes detected in only 1 of 20 samples (cobalt, lead), the maximum detected concentration is presented.

NOTES:
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
KM = Kaplan-Meier
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
NC = not calculated
ND = not detected
NS = No standard
RSL = regional screening level
U = Analyte not detected. Numerical value is LOD

Validation Reason Codes:
A Serial dilution
L Lab Blank
TR Trace Level Detect

Detected results are bolded.

Table 6-15 Background Surface Water Analytical Results

Location			Con Hook Hudson River Shoreline (CHHRS)																				ProUCL Recommended 95% Upper Confidence Limit[1]	UCL Calculation Type
Sample ID			IINY-CHHRS-SW-11-042122		IINY-CHHRS-SW-12-042122		IINY-CHHRS-SW-13-042122		IINY-CHHRS-SW-14-042122		IINY-CHHRS-SW-15-042122		IINY-CHHRS-SW-16-042122		IINY-CHHRS-SW-17-042122		IINY-CHHRS-SW-18-042122		IINY-CHHRS-SW-19-042122		IINY-CHHRS-SW-20-042122			
Matrix			Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water			
Sample Date			4/21/2022 12:35		4/21/2022 13:00		4/21/2022 13:15		4/21/2022 13:25		4/21/2022 13:35		4/21/2022 13:45		4/21/2022 14:00		4/21/2022 14:10		4/21/2022 14:20		4/21/2022 14:30			
Analyte	CAS Number	Unit																						
Dissolved Target Analyte List Metals																								
Aluminum	7429-90-5	µg/L	**21.0**	J, TR	**20.0**	J, TR	**21.0**	J, TR	**20.0**	J, TR	**20.0**	J, TR	**18.0**	J, TR	**18.0**	J, TR	**19.0**	J, TR	**20.0**	J, TR	**19.0**	J, TR	21.98	95% Student's-t UCL
Antimony	7440-36-0	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	N/A	No detections
Arsenic	7440-38-2	µg/L	**0.350**	J, TR	**0.400**	J, TR	1.00	U	1.00	U	**0.350**	J, TR	**0.370**	J, TR	**0.400**	J, TR	1.00	U	**0.330**	J, TR	**0.450**	J, TR	0.395	95% KM (t) UCL
Barium	7440-39-3	µg/L	**12.0**		**12.0**		**12.0**		**12.0**		**13.0**		**13.0**		**13.0**		**12.0**		**12.0**		**12.0**		12.54	95% Student's-t UCL
Beryllium	7440-41-7	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	N/A	No detections
Cadmium	7440-43-9	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	N/A	No detections
Calcium	7440-70-2	µg/L	**23,000**		**23,000**		**23,000**		**23,000**		**22,000**		**22,000**		**22,000**		**22,000**		**22,000**		**23,000**		22,402	95% Student's-t UCL
Total Chromium	7440-47-3	µg/L	1.80	U	1.80	U	1.80	U, L	1.80	U	1.80	U	1.80	U	1.80	U, L	1.80	U	1.80	U	1.80	U	N/A	No detections
Cobalt	7440-48-4	µg/L	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	**0.0930**	J, TR	0.350	U	0.350	U	0.350	U	0.093	Maximum
Copper	7440-50-8	µg/L	**1.20**	J, TR	**1.10**	J, TR	**1.00**	J, TR	**1.10**	J, TR	**2.70**		**1.10**	J, TR	**2.50**		**1.00**	J, TR	**1.20**	J, TR	**1.20**	J, TR	1.622	95% Student's-t UCL
Iron	7439-89-6	µg/L	**46.0**	J, TR	**28.0**	J, TR	**150**		**310**		**38.0**	J, TR	**43.0**	J, TR	**50.0**	J, TR	**39.0**	J, TR	**71.0**	J, TR	**51.0**	J, TR	90.55	95% KM (t) UCL
Lead	7439-92-1	µg/L	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	**0.610**	J, TR	0.700	U	0.700	U	0.700	U	0.61	Maximum
Magnesium	7439-95-4	µg/L	**3,900**		**4,000**		**3,900**		**3,900**		**3,800**		**3,800**		**3,900**		**3,800**		**3,800**		**3,900**		3,850	95% Student's-t UCL
Manganese	7439-96-5	µg/L	**5.00**		**5.10**		**5.20**		**6.90**		**8.70**		**7.90**		**7.50**		**8.00**		**8.60**		**10.0**		19.38	95% Student's-t UCL
Mercury	7439-97-6	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	N/A	No detections
Nickel	7440-02-0	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	**1.00**	J, TR	1.00	U	1.00	U	**0.310**	J, TR	0.443	95% KM (t) UCL
Potassium	2023695	µg/L	**1,200**	J, TR	**1,300**	J, TR	**1,200**	J, TR	**1,200**	J, TR	**1,200**	J, TR	**1,200**	J, TR	**1,200**	J, TR	**1,200**	J, TR	**1,200**	J, TR	**1,200**	J, TR	1,244	95% Student's-t UCL
Selenium	7782-49-2	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	N/A	No detections
Silver	7440-22-4	µg/L	0.100	U	0.100	U, L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	N/A	No detections
Sodium	7440-23-5	µg/L	**16,000**		**16,000**		**16,000**		**16,000**		**16,000**		**16,000**		**16,000**		**15,000**		**15,000**		**16,000**		15,983	95% Student's-t UCL
Thallium	7440-28-0	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	N/A	No detections
Vanadium	7440-62-2	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	N/A	No detections
Zinc	7440-66-6	µg/L	8.00	U	8.00	U, L	8.00	U, L	8.00	U	8.00	U	8.00	U, L	8.00	U	8.00	U, L	8.00	U	8.00	U	17.72	95% KM (t) UCL
Location																								
Sample ID			**IINY-CHMS-SW-12-042122**		**IINY-CHMS-SW-13-042122**		**IINY-CHMS-SW-14-042122**		**IINY-CHMS-SW-15-042122**		**IINY-CHMS-SW-16-042122**		**IINY-CHMS-SW-17-042122**		**(Duplicte of CHMS-SW-17)**		**IINY-CHMS-SW-18-042122**		**IINY-CHMS-SW-19-042122**		**IINY-CHMS-SW-20-042122**		**ProUCL Recommended 95% Upper Confidence Limit[1]**	**UCL Calculation Type**
Matrix			**Surface Water**		**Surface Water**		**Surface Water**		**Surface Water**		**Surface Water**		**Surface Water**		**Surface Water**		**Surface Water**		**Surface Water**		**Surface Water**			
Sample Date			**4/21/2022 16:15**		**4/21/2022 16:10**		**4/21/2022 16:00**		**4/21/2022 15:55**		**4/21/2022 15:40**		**4/21/2022 15:25**		**4/21/2022 8:00**		**4/21/2022 15:35**		**4/21/2022 15:15**		**4/21/2022 15:10**			
Analyte	**CAS Number**	**Unit**																						
Dissolved Target Analyte List Metals																								
Aluminum	7429-90-5	µg/L	**24.0**	J, TR	**26.0**	J, TR	**260**		**320**		**110**		**20.0**	J, TR	70.0	U	**25.0**	J, TR	70.0	U	**21.0**	J, TR	90.76	95% KM (t) UCL
Antimony	7440-36-0	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	N/A	No detections
Arsenic	7440-38-2	µg/L	**0.480**	J, TR	**0.530**	J, TR	**0.730**	J, TR	**0.760**	J, TR	**0.740**	J, TR	**0.420**	J, TR	**0.400**	J, TR	**0.460**	J, TR	**0.400**	J, TR	**0.440**	J, TR	0.854	95% KM H-UCL
Barium	7440-39-3	µg/L	**17.0**		**18.0**		**7.00**		**4.80**		**7.90**		**11.0**		**10.0**		**10.0**		**10.0**		**12.0**		14.53	95% Student's-t UCL
Beryllium	7440-41-7	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	N/A	No detections
Cadmium	7440-43-9	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	N/A	No detections
Calcium	7440-70-2	µg/L	**26,000**		**27,000**		**8,900**		**7,600**		**12,000**		**20,000**		**20,000**		**20,000**		**20,000**		**18,000**		22,349	95% Student's-t UCL
Total Chromium	7440-47-3	µg/L	**0.610**	J, TR	**0.550**	J, TR	**0.540**	J, TR	**0.600**	J, TR	**0.540**	J, TR	1.80	U	1.80	U	**0.520**	J, TR	1.80	U	**0.550**	J, TR	0.576	95% KM (t) UCL
Cobalt	7440-48-4	µg/L	**0.130**	J, TR	**0.130**	J, TR	**0.120**	J, TR	0.350	U	**0.130**	J, TR	0.350	U	0.350	U	0.350	U	0.350	U	**0.100**	J, TR	0.142	95% KM (t) UCL
Copper	7440-50-8	µg/L	**0.730**	J, TR	**0.790**	J, TR	**0.790**	J, TR	**0.770**	J, TR	**0.610**	J, TR	**1.00**	J, TR	**0.970**	J, TR	**1.00**	J, TR	**0.960**	J, TR	**1.20**	J, TR	0.994	95% Student's-t UCL
Iron	7439-89-6	µg/L	**150**	+J, L	**160**	+J, L	**310**		**320**		**230**		100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	204.5	95% Student's-t UCL
Lead	7439-92-1	µg/L	0.700	U	0.700	U	**0.300**	J, TR	**0.290**	J, TR	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.339	95% KM (t) UCL
Magnesium	7439-95-4	µg/L	**12,000**		**13,000**		**3,400**		**2,900**		**4,400**		**3,700**		**3,700**		**3,800**		**3,700**		**3,800**		8,349	95% Student's-t UCL
Manganese	7439-96-5	µg/L	**180**		**200**		**89.0**		**120**		**180**		**17.0**	-J, M	**16.0**		**14.0**		**19.0**		**18.0**		200.9	95% Student's-t UCL
Mercury	7439-97-6	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	N/A	No detections
Nickel	7440-02-0	µg/L	**0.390**	J, TR	**0.330**	J, TR	**0.440**	J, TR	**0.420**	J, TR	**0.420**	J, TR	**0.380**	J, TR	**0.450**	J, TR	1.00	U	1.00	U	**0.570**	J, TR	0.465	95% KM (t) UCL
Potassium	2023695	µg/L	**3,100**		**3,300**		**1,500**	J, TR	**1,400**	J, TR	**2,100**	J, TR	**1,200**	J, TR	**1,300**	J, TR	**1,300**	J, TR	**1,200**	J, TR	**1,300**	J, TR	2,378	95% Student's-t UCL
Selenium	7782-49-2	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	N/A	No detections
Silver	7440-22-4	µg/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U, L	0.100	U	0.100	U	N/A	No detections
Sodium	7440-23-5	µg/L	**100,000**		**110,000**		**25,000**		**22,000**		**37,000**		**17,000**		**17,000**		**17,000**		**17,000**		**20,000**		66,952	95% Student's-t UCL
Thallium	7440-28-0	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	N/A	No detections
Vanadium	7440-62-2	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	N/A	No detections
Zinc	7440-66-6	µg/L	8.00	U	8.00	U	**2.40**	J, TR	8.00	U	**2.50**	J, TR	**3.70**	-J, M/TR	8.00	U	8.00	U	8.00	U	2.00	J, TR	3.472	95% Student's-t UCL

Table 6-16 Background ISM Sediment Analytical Results

Location			Con Hook Hudson River Shoreline																													
Sample ID			IINY-CHHRS-SU-01-SEDIS-042122		IINY-CHHRS-SU-02-SEDIS-042122		IINY-CHHRS-SU-03-SEDIS-042122		IINY-CHHRS-SU-04-SEDIS-042122		IINY-CHHRS-SU-05-SEDIS-042122		IINY-CHHRS-SU-06-SEDIS-042122		IINY-CHHRS-SU-07-SEDIS-042122		IINY-CHHRS-SU-08-SEDIS-042122					95% UCL Calculations per ITRC Calculator (2020)			
Depth (in.)			0-6		0-6		0-6		0-6		0-6		0-6		0-6		0-6															
Matrix			Sediment		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment															
Sample Date			4/21/2022 13:00		4/21/2022 12:40		4/21/2022 12:20		4/21/2022 11:40		4/21/2022 11:25		4/21/2022 10:40		4/21/2022 10:15		4/21/2022 10:05															
Analyte	CAS Number	Unit																	Mean		Arithmetic Standard Deviation	% Relative Standard Deviation	Student's-t		Chebychev		Adjusted CV of Increments		Recommended 95% UCL	
Target Analyte List Metals																																
Aluminum	7429-90-5	mg/kg	**15,000**		**15,000**		**15,000**		**15,000**		**18,000**		**8,200**		**13,000**	J, A	**8,800**		13,500		3,370	25	15,800		18,700		2		18,700			
Antimony	7440-36-0	mg/kg	**0.500**		**0.470**		**0.460**		**0.510**		**0.510**		**0.610**		**0.270**	J, TR	**0.510**		0.48		0.0961	20	0.544		0.628		1.54		0.628			
Arsenic	7440-38-2	mg/kg	**7.00**		**6.70**		**6.80**		**7.60**		**7.90**		**3.70**		**4.10**	J, D	**3.70**		5.94		1.79	30.2	7.14		8.7		2.52		8.7			
Barium	7440-39-3	mg/kg	**89.0**		**92.0**		**110**		**120**		**120**		**45.0**		**56.0**	J+, M	**53.0**		85.6		30.7	35.9	106		133		3.21		133			
Beryllium	7440-41-7	mg/kg	**0.970**		**1.00**		**0.870**		**0.870**		**0.920**		**0.360**		**1.60**	J, D	**0.520**		0.889		0.367	41.3	1.13		1.45		3.98		1.45			
Cadmium	7440-43-9	mg/kg	**1.10**		**1.10**		**1.00**		**0.850**		**0.920**		**0.170**		**0.330**	J, D	**0.220**		0.711		0.401	56.4	0.98		1.33		6.95		1.33			
Total Chromium, Total	7440-47-3	mg/kg	**41.0**		**42.0**		**41.0**		**43.0**		**43.0**		**15.0**		**20.0**		**18.0**		32.9		12.7	38.6	41.4		52.4		3.58		52.4			
Cobalt	7440-48-4	mg/kg	**13.0**		**13.0**		**14.0**		**14.0**		**14.0**		**4.10**		**6.60**		**5.60**		10.5		4.3	40.8	13.4		17.2		3.91		17.2			
Copper	7440-50-8	mg/kg	**42**		**44.0**		**43.0**		**40.0**		**39.0**		**20.0**		**33.0**	J-, M	**25.0**		35.8		8.94	25	41.7		49.5		1.99		49.5			
Iron	7439-89-6	mg/kg	**27,000**		**26,000**		**27,000**		**27,000**		**32,000**		**17,000**		**19,000**	J, A	**15,000**		23,800		5,970	25	27,700		33,000		2		33,000			
Lead	7439-92-1	mg/kg	**44.0**		**44.0**		**40.0**		**39.0**		**39.0**		**71.0**		**56.0**		**60.0**		49.1		11.9	24.1	57.1		67.4		1.91		67.4			
Manganese	7439-96-5	mg/kg	**840**		**890**		**1,200**		**1,800**		**1,800**		**550**		**630**		**430**		1,020		537	53	1,380		1,850		6		1,850			
Mercury	7439-97-6	mg/kg	**0.260**		**0.270**		**0.260**		**0.250**		**0.290**		**0.0350**		**0.0880**		**0.0670**		0		0	56	0		0		7		0.354			
Nickel	7440-02-0	mg/kg	**29.0**		**30.0**		**31.0**		**30.0**		**29.0**		**8.40**		**14.0**		**12.0**		22.9		9.63	42	29.4		37.8		4.09		37.8			
Selenium	7782-49-2	mg/kg	**0.610**	J, TR	**0.540**	J, TR	**0.500**	J, TR	**0.520**	J, TR	**0.530**	J, TR	**0.220**	J, TR	**0.350**	J, D/TR	**0.220**	J, TR	0.436		0.152	34.8	0.538		0.671		3.08		0.671			
Silver	7440-22-4	mg/kg	**0.350**		**0.370**		**0.350**		**0.310**		**0.320**		**0.0620**	J, TR	**0.140**	J, TR	**0.120**	J, TR	0.253		0.124	49	0.336		0.443		5.32		0.443			
Thallium	7440-28-0	mg/kg	**0.180**		**0.190**		**0.170**	J, TR	**0.160**	J, TR	**0.170**	J, TR	**0.0920**	J, TR	**0.130**	J, D/TR	**0.0990**	J, TR	0.149		0.0373	25.1	0.174		0.206		2		0.206			
Vanadium	7440-62-2	mg/kg	**25.0**		**26.0**		**25.0**		**26.0**		**28.0**		**11.0**		**19.0**	J+, M	**14.0**		21.8		6.32	29.1	26		31.5		2.4		31.5			
Zinc	7440-66-6	mg/kg	**140**		**140**		**140**		**140**		**140**		**45.0**		**67.0**	J-, M	**58.0**		109		43.5	40	138		176		3.79		176			

NOTES:

95% UCL = 95% upper confidence limit for arithmetic mean
mg/kg = milligrams per kilogram
mV = millivolts
CAS = Chemical Abstracts Service
CV = Coefficient of variation
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
RSL = regional screening level
- Bias low
+ Bias high

Detected results are bolded.

Validation Reason Codes:

A	Serial dilution
D	MS RPD
M	MS Recovery
M2	Post Spike
TR	Trace Level Detect

Table 6-16 Background ISM Sediment Analytical Results

| Location | | | Con Hook Marsh Shoreline | | |

Table 6-17 Background Concentration Summary

Background Soil Bear Mountain State Park (BADU-1 to BADU-8)					
Metals Analyte	**CAS #**	**Concentration Range (mg/kg)**	**PAH Analyte**	**CAS #**	**Concentration Range (mg/kg)**
Aluminum	7429-90-5	7,300 to 15,000	1-	90-12-0	0.0039 to 0.028
Antimony	7440-36-0	0.53 to 1.2	2-	91-57-6	0.0039 to 0.022
Arsenic	7440-38-2	2.1 to 7.8	Acenaphthene	83-32-9	0.0048 to 0.097
Barium	7440-39-3	13 to 47	Acenaphthylene	208-96-8	0.009 to 0.081
Beryllium	7440-41-7	0.057 to 0.92	Anthracene	120-12-7	0.0084 to 0.12
Cadmium	7440-43-9	0.11 to 0.29	Benzo(a)anthracene	56-55-3	0.043 to 0.68
Calcium	7440-70-2	650 to 2100	Benzo(a)pyrene	50-32-8	0.045 to 0.79
Total Chromium, Tot	7440-47-3	3.6 to 31	Benzo(b)fluoranthene	205-99-2	0.072 to 1.3
Cobalt	7440-48-4	0.59 to 7.3	Benzo(g,h,i)perylene	191-24-2	0.035 to 0.68
Copper	7440-50-8	4.9 to 26	Benzo(k)fluoranthene	207-08-9	0.028 to 0.46
Iron	7439-89-6	8,600 to 21,000	Chrysene	218-01-9	0.061 to 1
Lead	7439-92-1	33 to 94	Dibenz(a,h)anthracene	53-70-3	0.013 to 0.15
Magnesium	7439-95-4	600 to 3100	Fluoranthene	206-44-0	0.12 to 2.2
Manganese	7439-96-5	37 to 340	Fluorene	86-73-7	0.0058 to 0.1
Mercury	7439-97-6	0.12 to 0.32	Indeno(1,2,3-	193-39-5	0.037 to 0.74
Nickel	7440-02-0	2.7 to 23	Naphthalene	91-20-3	0.0063 to 0.031
Potassium	2023695	620 to 840	Phenanthrene	85-01-8	0.061 to 1.1
Selenium	7782-49-2	0.65 to 1.2	Pyrene	129-00-0	0.11 to 1.9
Silver	7440-22-4	0.14 to 0.4			
Sodium	7440-23-5	34 to 63			
Thallium	7440-28-0	0.043 to 0.2			
Vanadium	7440-62-2	13 to 56			
Zinc	7440-66-6	21 to 72			

Table 6-17 Background Concentration Summary

Background Surface Water Con Hook Concentrations			
Metals Analyte	**CAS #**	**Hudson River Shoreline Concentration Range (µg/L)**	**Marsh Shoreline Concentration Range (µg/L)**
Aluminum	7429-90-5	18 to 36	20 to 320
Antimony	7440-36-0	Not detected	Not detected
Arsenic	7440-38-2	0.33 to 0.46	0.38 to 2.7
Barium	7440-39-3	12 to 13	4.8 to 18
Beryllium	7440-41-7	Not detected	Not detected
Cadmium	7440-43-9	Not detected	Not detected
Calcium	7440-70-2	21,000 to 23,000	7,600 to 27,000
Total Chromium, Tot	7440-47-3	0.55 to 0.55	0.5 to 0.64
Cobalt	7440-48-4	0.093 to 0.093	0.1 to 0.18
Copper	7440-50-8	0.95 to 3.4	0.61 to 1.3
Iron	7439-89-6	28 to 310	110 to 400
Lead	7439-92-1	0.61 to 0.61	0.22 to 0.39
Magnesium	7439-95-4	3,400 to 4,000	2,900 to 13,000
Manganese	7439-96-5	4.5 to 79	8.2 to 540
Mercury	7439-97-6	Not detected	Not detected
Nickel	7440-02-0	0.31 to 1	0.33 to 0.57
Potassium	2023695	11,00 to 1,400	1,200 to 3,300
Selenium	7782-49-2	Not detected	Not detected
Silver	7440-22-4	Not detected	Not detected
Sodium	7440-23-5	15,000 to 18,000	17,000 to 110,000
Thallium	7440-28-0	Not detected	Not detected
Vanadium	7440-62-2	Not detected	Not detected
Zinc	7440-66-6	3 to 90	2 to 8

Table 6-17 Background Concentration Summary

Background Sediment Con Hook Concentrations			
Metals Analyte	**CAS #**	**Hudson River Shoreline Concentration Range (mg/kg)**	**Marsh Shoreline Concentration Range (mg/kg)**
Aluminum	7429-90-5	8,200 to 18,000	13,000 to 17,000
Antimony	7440-36-0	0.27 to 0.61	0.66 to 1.2
Arsenic	7440-38-2	3.7 to 7.9	4 to 7.5
Barium	7440-39-3	45 to 120	40 to 91
Beryllium	7440-41-7	0.36 to 1.6	0.72 to 1.7
Cadmium	7440-43-9	0.17 to 1.1	0.57 to 0.93
Chromium	7440-47-3	15 to 43	15 to 39
Cobalt	7440-48-4	4.1 to 14	5.3 to 12
Copper	7440-50-8	20 to 44	19 to 39
Iron	7439-89-6	15,000 to 32,000	14,000 to 2,3000
Lead	7439-92-1	39 to 71	46 to 65
Manganese	7439-96-5	430 to 1800	310 to 750
Mercury	7439-97-6	0.035 to 0.29	0.15 to 0.31
Nickel	7440-02-0	8.4 to 31	15 to 29
Selenium	7782-49-2	0.22 to 0.61	0.64 to 0.97
Silver	7440-22-4	0.062 to 0.37	0.23 to 0.46
Thallium	7440-28-0	0.092 to 0.19	0.12 to 0.21
Vanadium	7440-62-2	11 to 28	17 to 31
Zinc	7440-66-6	45 to 140	79 to 150

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Table 6-18 Soil Background Comparison Results

		Metals Concentration in Surface Soil Exceeds Background?																	Metals Concentration in Subsurface Soil Exceeds Background?		
Metals Analyte	**CAS #**	**DU-01**	**DU-02**	**DU-03**	**DU-04**	**DU-05**	**DU-06**	**DU-07**	**DU-09**	**DU-10**	**DU-11**	**DU-12**	**DU-13**	**DU-14**	**DU-15**	**DU-16**	**DU-17**	**DU-18**	**DU-19**	**DU-17**	**DU-18**	**DU-19**
Aluminum	7429-90-5	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	**YES**	No	No	**YES**
Antimony	7440-36-0	No	No	No	**YES**	No	No	No	No	No	No	No	**YES**	No	No	No	**YES**	**YES**	No	**YES**	**YES**	No
Arsenic	7440-38-2	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	No	No	**YES**	**YES**	**YES**	**YES**	No	No	No	**YES**	**YES**	**YES**	**YES**	No
Barium	7440-39-3	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	No
Beryllium	7440-41-7	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	**YES**	No	No
Cadmium	7440-43-9	**YES**	No	No	**YES**	No	**YES**	**YES**	No	No	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	No
Calcium	7440-70-2	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Chromium, Total	7440-47-3	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	**YES**	No	No	**YES**	No
Cobalt	7440-48-4	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	No	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	No	**YES**	**YES**	No	No	**YES**
Copper	7440-50-8	No	**YES**	**YES**	**YES**	No	**YES**	**YES**	**YES**	No	**YES**	**YES**	**YES**	No	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Iron	7439-89-6	No	**YES**	**YES**	**YES**	**YES**	No	**YES**	No	No	No	No	**YES**	No	**YES**	**YES**	No	**YES**	**YES**	**YES**	**YES**	**YES**
Lead	7439-92-1	No	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	No	No	**YES**	**YES**	**YES**	**YES**	**YES**	No	**YES**	**YES**	No	**YES**	**YES**	No
Magnesium	7439-95-4	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Manganese	7439-96-5	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	No	**YES**	No
Mercury	7439-97-6	No	No	No	No	No	Not sampled	Not sampled	No	Not sampled	No	No	No	No	No	No	No	**YES**	**YES**	**YES**	**YES**	No
Nickel	7440-02-0	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	**YES**	No
Potassium	2023695	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	No	No	**YES**
Selenium	7782-49-2	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	**YES**	No	No
Silver	7440-22-4	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	**YES**	**YES**	No	No	**YES**	No
Sodium	7440-23-5	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Thallium	7440-28-0	No	No	No	No	No	No	**YES**	No	No	**YES**	No	No	No	No	No	No	No	No	**YES**	**YES**	No
Vanadium	7440-62-2	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	**YES**
Zinc	7440-66-6	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	No	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**

		PAH Concentration in Surface Soil Exceeds Background?																PAH Concentration in Subsurface Soil Exceeds Background?				
Analyte	**CAS #**	**DU-01**	**DU-02**	**DU-03**	**DU-04**	**DU-05**	**DU-09**	**DU-11**	**DU-12**	**DU-13**	**DU-16**	**DU-17**	**DU-18**	**DU-19**	**DU-20**	**DU-21**	**DU-22**	**DU-17**	**DU-18**	**DU-19**	**DU-20**	**DU-21**
1-Methylnaphthalene	90-12-0	No	**YES**	No	**YES**	No	No	**YES**	**YES**	**YES**	No	**YES**	**YES**	No	No	No	**YES**	**YES**	**YES**	No	No	No
2-Methylnaphthalene	91-57-6	No	**YES**	No	**YES**	No	No	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	No	No	No	**YES**	**YES**	**YES**	No	No	No
Acenaphthene	83-32-9	No	**YES**	No	No	No	No	No	**YES**	**YES**	**YES**	No	No	No	No	No	**YES**	No	**YES**	No	No	No
Acenaphthylene	208-96-8	No	**YES**	No	**YES**	No	No	**YES**	No	**YES**	No	**YES**	**YES**	**YES**	No	No	**YES**	No	No	No	No	No
Anthracene	120-12-7	No	**YES**	No	**YES**	No	No	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	No	No	**YES**	**YES**	**YES**	No	No	No
Benzo(a)anthracene	56-55-3	No	**YES**	No	**YES**	No	No	**YES**	**YES**	**YES**	No	No	No	**YES**	No	No	**YES**	No	No	No	No	No
Benzo(a)pyrene	50-32-8	No	**YES**	No	**YES**	No	No	**YES**	**YES**	**YES**	No	No	**YES**	**YES**	No	No	**YES**	No	No	No	No	No
Benzo(b)fluoranthene	205-99-2	No	**YES**	No	**YES**	No	No	**YES**	**YES**	**YES**	No	No	**YES**	**YES**	No	No	**YES**	No	No	No	No	No
Benzo(g,h,i)perylene	191-24-2	No	**YES**	No	**YES**	No	No	**YES**	**YES**	**YES**	No	No	No	**YES**	No	No	**YES**	No	No	No	No	No
Benzo(k)fluoranthene	207-08-9	No	**YES**	No	**YES**	No	No	**YES**	**YES**	**YES**	No	No	No	**YES**	No	No	**YES**	No	No	No	No	No
Chrysene	218-01-9	No	**YES**	No	**YES**	No	No	**YES**	**YES**	**YES**	No	No	**YES**	**YES**	No	No	**YES**	No	**YES**	No	No	No
Dibenz(a,h)anthracene	53-70-3	No	**YES**	No	**YES**	No	No	**YES**	**YES**	**YES**	No	No	**YES**	**YES**	No	No	**YES**	No	No	No	No	No
Fluoranthene	206-44-0	No	**YES**	No	**YES**	No	No	No	**YES**	**YES**	No	No	No	**YES**	No	No	**YES**	No	No	No	No	No
Fluorene	86-73-7	No	**YES**	No	No	No	No	No	**YES**	**YES**	No	No	No	No	No	No	**YES**	No	**YES**	No	No	No
Indeno(1,2,3-c,d)pyrene	193-39-5	No	**YES**	No	**YES**	No	No	**YES**	**YES**	**YES**	No	No	No	**YES**	No	No	**YES**	No	No	No	No	No
Naphthalene	91-20-3	No	**YES**	No	**YES**	No	No	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	No	No	**YES**	**YES**	**YES**	No	No	No
Phenanthrene	85-01-8	No	**YES**	No	**YES**	No	No	No	**YES**	**YES**	No	No	No	No	No	No	**YES**	No	**YES**	No	No	No
Pyrene	129-00-0	No	**YES**	No	**YES**	No	No	No	**YES**	**YES**	No	No	No	No	No	No	**YES**	No	No	No	No	No

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Table 6-19 Surface Water Background Comparison Results

Metals Analyte	CAS #	Metals Concentration in Surface Water Exceeds Background?				
		Comparison to Con Hook Hudson River Shoreline (CHHRS-SW-01 to CHHRS-SW-20)		Comparison to Con Hook Marsh Shoreline (CHMS-SW-01 to CHMS-SW-20)		
		AOC #16 – Area D (Former Dumping Area) (DUMP-SW-01 to DUMP-SW-20)	Hudson River Shoreline Adjacent to AOC #16 – Area D (Former Dumping Area) (IHRS-SW-01 to IHRS-SW-20)	AOC #16 – Area D (Former Dumping Area) (DUMP-SW-01 to DUMP-SW-20)	Iona Marsh At Outlet of Riprap Filled Drainage Swale (RRDS-SW-01 to RRDS-SW-20)	Iona Marsh At Outlet of Tidal Wetland Swale (TWS-SW-01 to TWS-SW-20)
Aluminum	7429-90-5	No	No	No	No	No
Antimony	7440-36-0	No	No	No	No	No
Arsenic	7440-38-2	No	**YES**	No	No	No
Barium	7440-39-3	No	**YES**	No	No	No
Beryllium	7440-41-7	No	Not detected	No	Not detected	No
Cadmium	7440-43-9	Not detected	Not detected	Not detected	Not detected	Not detected
Calcium	7440-70-2	No	No	No	No	No
Chromium	7440-47-3	No	No	No	Not detected	**YES**
Cobalt	7440-48-4	No	No	No	No	No
Copper	7440-50-8	**YES**	**YES**	**YES**	**YES**	**YES**
Iron	7439-89-6	Not detected	No	Not detected	Not detected	Not detected
Lead	7439-92-1	No	No	No	Not detected	Not detected
Magnesium	7439-95-4	**YES**	**YES**	No	No	No
Manganese	7439-96-5	No	No	No	No	No
Mercury	7439-97-6	Not detected	Not detected	Not detected	Not detected	Not detected
Nickel	7440-02-0	No	No	No	No	No
Potassium	2023695	**YES**	**YES**	No	No	No
Selenium	7782-49-2	No	No	No	Not detected	Not detected
Silver	7440-22-4	Not detected	No	Not detected	Not detected	Not detected
Sodium	7440-23-5	**YES**	**YES**	No	No	No
Thallium	7440-28-0	No	No	No	Not detected	No
Vanadium	7440-62-2	Not detected	Not detected	Not detected	No	Not detected
Zinc	7440-66-6	No	No	**YES**	Not detected	No

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Table 6-20 Sediment Background Comparison Results

Metals Analyte	CAS #	Metals Concentration in Sediment Exceeds Background?		
			Iona Marsh Shoreline	
		Hudson River Shoreline Adjacent to AOC #16 – Area D (IHRS-DU-01)	Outlet of Riprap Filled Drainage Swale (RRDS-DU-01)	Outlet of Tidal Wetland Swale (TWS-DU-01)
Aluminum	7429-90-5	No	No	No
Antimony	7440-36-0	**YES**	No	No
Arsenic	7440-38-2	**YES**	**YES**	**YES**
Barium	7440-39-3	**YES**	**YES**	**YES**
Beryllium	7440-41-7	No	No	No
Cadmium	7440-43-9	**YES**	**YES**	**YES**
Chromium, Total	7440-47-3	**YES**	**YES**	**YES**
Cobalt	7440-48-4	No	**YES**	**YES**
Copper	7440-50-8	**YES**	**YES**	**YES**
Iron	7439-89-6	**YES**	**YES**	**YES**
Lead	7439-92-1	**YES**	**YES**	**YES**
Manganese	7439-96-5	No	**YES**	**YES**
Mercury	7439-97-6	No	No	No
Nickel	7440-02-0	**YES**	**YES**	**YES**
Selenium	7782-49-2	No	No	No
Silver	7440-22-4	**YES**	No	No
Thallium	7440-28-0	No	No	No
Vanadium	7440-62-2	**YES**	No	**YES**
Zinc	7440-66-6	**YES**	**YES**	**YES**

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Table 6-21 Site Contaminants in Upland Surface Soil

Analyte	CAS #	Contaminant Concentration Range (mg/kg)	Minimum Contaminant Concentration Location	Maximum Contaminant Concentration Location	DU Concentration Range (mg/kg)																												
					DU-01	DU-02	DU-03	DU-04	DU-05	DU-06	DU-07	DU-09	DU-10	DU-11	DU-12	DU-13	DU-14	DU-15	DU-16	DU-20	DU-21	DU-22	DU-23	DU-25	EXDU-1	EXDU-2	EXDU-3	EXDU-4	EXDU-5	EXDU-6	EXDU-7
TAL Metals																																	
Antimony	7440-36-0	1.2 to 2.5	DU-13	DU-13	< Background	< Background	< Background	**1.5 to 2.1**	< Background	< Background	< Background	< Background	< Background	< Background	< Background	**1.2 to 2.5**	< Background	< Background	< Background														
Arsenic	7440-38-2	8 to 43	DU-6	DU-11	**8.9 to 12**	**13 to 14**	**12 to 15**	**23 to 41**	**11 to 12**	**8 to 11**	**17 to 18**	< Background	< Background	**37 to 43**	**13 to 14**	**9.7 to 11**	**16 to 18**	< Background	< Background														
Barium	7440-39-3	55 to 110	DU-6	DU-7	**65 to 71**	**68 to 79**	**75 to 85**	**74 to 100**	**65 to 78**	**55 to 72**	**93 to 110**	**59 to 65**	**56 to 58**	**76 to 79**	**79 to 84**	**86 to 96**	**76 to 81**	**58 to 62**	**56 to 61**														
Cadmium	7440-43-9	0.19 to 1.1	DU-6	DU-4	**0.24 to 0.35**	< Background	< Background	< Background	0.2 to 0.23	**0.19 to 0.31**	**0.48 to 0.62**	0.22 to 0.26	< Background	**0.36 to 0.37**	**0.33 to 0.38**	**0.74 to 0.77**	**0.27 to 0.28**	**0.38 to 0.58**	**0.25 to 0.33**														
Calcium	7440-70-2	2,900 to 28,000	DU-5	DU-11	**3,700 to 5,100**	**7,800 to 13,000**	**3,100 to 8,200**	**7,200 to 12,000**	**2,900 to 3,800**	**14,000 to 15,000**	**15,000 to 17,000**	**5,800 to 8,700**	**14,000 to 17,000**	**25,000 to 28,000**	**10,000 to 13,000**	**8,500 to 9,200**	**6,800 to 9,500**	**7,100 to 9,900**	**7,200 to 8,000**														
Cobalt	7440-48-4	6.3 to 8.6	DU-6	DU-13	**6.8 to 7.5**	**7.4 to 7.7**	**7.3 to 8**	**6.8 to 7.8**	**7.7 to 7.9**	**6.3 to 7.9**	< Background	**7.3 to 7.6**	**7.5 to 8**	**6.7 to 7**	**7.5 to 7.9**	**8.2 to 8.6**	**6.8 to 7.3**	**6.7 to 6.8**	**8 to 8.5**														
Copper	7440-50-8	25 to 600	DU-3	DU-13	< Background	**26 to 28**	**25 to 28**	**49 to 61**	< Background	**30 to 42**	**43 to 60**	**27 to 30**	< Background	**30 to 37**	**47 to 51**	**220 to 600**	< Background	**30 to 33**	**33 to 39**														
Iron	7439-89-6	18,000 to 22,000	Multiple	DU-16	< Background	**18,000 to 19,000**	**18,000 to 19,000**	**19,000 to 20,000**	**19,000 to 20,000**	< Background	**18,000 to 19,000**	< Background	< Background	< Background	< Background	**18,000 to 19,000**	< Background	**18,000 to 19,000**	**20,000 to 22,000**	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled
Lead	7439-92-1	72 to 2,000	DU-6	DU-7	< Background	**78 to 110**	**120 to 150**	**250 to 360**	**76 to 100**	**72 to 130**	**570 to 2,000**	< Background	< Background	**110 to 130**	**82 to 89**	**150 to 190**	**96 to 120**	**120 to 130**	< Background														
Magnesium	7439-95-4	3,800 to 19,000	DU-13	DU-11	**3,800 to 4,700**	**7,300 to 10,000**	**4,400 to 7,200**	**5,100 to 8,100**	**4,600 to 5,500**	**10,000 to 11,000**	**10,000 to 12,000**	**5,100 to 6,800**	**9,900 to 11,000**	**17,000 to 19,000**	**7,100 to 8,600**	**5,400 to 5,700**	**5,500 to 7,100**	**5,900 to 7,700**	**6,100 to 6,500**														
Manganese	7439-96-5	410 to 1,100	DU-15	DU-13	**470 to 480**	**620 to 660**	**580 to 670**	**430 to 510**	**690 to 800**	**520 to 870**	**460 to 630**	**470 to 510**	**520 to 570**	**600 to 600**	**790 to 940**	**830 to 1,100**	**670 to 720**	**410 to 480**	**430 to 450**														
Potassium	2023695	910 to 1,700	DU-11	DU-16	**1,200 to 1,200**	**1,200 to 1,400**	**1,200 to 1,400**	**1,200 to 1,300**	**1,200 to 1,300**	**1,200 to 1,200**	**1,000 to 1,100**	**1,200 to 1,300**	**1,200 to 1,400**	**910 to 1,000**	**1,100 to 1,100**	**1,400 to 1,400**	**980 to 1,000**	**1,200 to 1,200**	**1,400 to 1,700**														
Sodium	7440-23-5	56 to 440	DU-11	DU-16	**95 to 110**	**71 to 75**	**68 to 110**	**170 to 230**	**57 to 64**	**79 to 89**	**85 to 95**	**160 to 170**	**83 to 88**	**56 to 64**	**67 to 73**	**120 to 130**	**70 to 73**	**75 to 81**	**330 to 440**														
Thallium	7440-28-0	0.19 to 0.22	DU-7, DU-11	DU-11	< Background	< Background	< Background	< Background	< Background	< Background	**0.19 to 0.21**	< Background	< Background	**0.19 to 0.22**	< Background	< Background	< Background	< Background	< Background														
Zinc	7440-66-6	56 to 280	DU-6	DU-4	**67 to 92**	**72 to 80**	**98 to 130**	**150 to 280**	**74 to 79**	**56 to 79**	**200 to 210**	**67 to 70**	< Background	**87 to 110**	**93 to 100**	**140 to 170**	**74 to 78**	**120 to 250**	**66 to 71**														
PAHs																																	
1-Methylnaphthalene	90-12-0	0.021 to 0.45	DU-2	DU-13	< Background	**0.036 to 0.075**	< Background	**0.021 to 0.061**	< Background			< Background		**0.023 to 0.028**	**0.044 to 0.073**	**0.26 to 0.45**			< Background	< Background	< Background	**0.04 to 0.041**											
2-Methylnaphthalene	91-57-6	0.0082 to 0.5	DU-16	DU-13	< Background	**0.031 to 0.055**	< Background	**0.039 to 0.069**	< Background			< Background		**0.036 to 0.044**	**0.053 to 0.098**	**0.31 to 0.5**			**0.0082 to 0.041**	< Background	< Background	**0.057 to 0.064**											
Acenaphthene	83-32-9	0.036 to 4.7	DU-16	DU-13	< Background	**0.12 to 0.26**	< Background	< Background	< Background			< Background		< Background	**0.36 to 0.54**	**2.6 to 4.7**			**0.036 to 0.15**	< Background	< Background	**0.077 to 0.11**											
Acenaphthylene	208-96-8	0.09 to 1.3	DU-2	DU-13	< Background	**0.09 to 0.14**	< Background	**0.15 to 0.25**	< Background			< Background		**0.16 to 0.23**	< Background	**0.21 to 1.3**			< Background	< Background	< Background	**0.15 to 0.26**											
Anthracene	120-12-7	0.063 to 8	DU-16	DU-13	< Background	**0.34 to 0.73**	< Background	**0.18 to 0.39**	< Background			< Background		**0.097 to 0.15**	**0.59 to 0.86**	**2.9 to 8**			**0.063 to 0.18**	< Background	< Background	**0.27 to 0.44**											
Benzo(a)anthracene	56-55-3	0.89 to 17	DU-4	DU-13	< Background	**1.4 to 3.3**	< Background	**0.89 to 1.3**	< Background			< Background		**0.52 to 0.97**	**1.5 to 2.2**	**9.4 to 17**			< Background	< Background	< Background	**1.2 to 2**											
Benzo(a)pyrene	50-32-8	0.75 to 13	DU-11	DU-13	< Background	**1.2 to 2.7**	< Background	**1.1 to 1.1**	< Background			< Background		**0.75 to 1.2**	**1.2 to 1.8**	**7.1 to 13**			< Background	< Background	< Background	**1.1 to 1.9**											
Benzo(b)fluoranthene	205-99-2	1.1 to 17	DU-11	DU-13	< Background	**1.7 to 3.9**	< Background	**2.1 to 2.9**	< Background			< Background		**1.1 to 1.6**	**1.6 to 2.8**	**9.7 to 17**			< Background	< Background	< Background	**1.8 to 3.1**											
Benzo(g,h,i)perylene	191-24-2	0.64 to 7.9	DU-22	DU-13	< Background	**0.68 to 1.5**	< Background	**0.86 to 0.91**	< Background			< Background		**0.78 to 1.2**	**0.69 to 1.4**	**4.2 to 7.9**			< Background	< Background	< Background	**0.64 to 1**											
Benzo(k)fluoranthene	207-08-9	0.36 to 7.4	DU-11	DU-13	< Background	**0.48 to 1.2**	< Background	**0.66 to 0.92**	< Background			< Background		**0.36 to 0.57**	**0.62 to 1.1**	**3.8 to 7.4**			< Background	< Background	< Background	**0.56 to 1.1**											
Chrysene	218-01-9	0.75 to 16	DU-11	DU-13	< Background	**1.3 to 3.1**	< Background	**1 to 2.6**	< Background			< Background		**0.75 to 1.3**	**1.5 to 2.4**	**9.3 to 16**			< Background	< Background	< Background	**1.2 to 2.2**											
Dibenz(a,h)anthracene	53-70-3	0.16 to 2.4	DU-11	DU-13	< Background	**0.24 to 0.45**	< Background	**0.26 to 0.3**	< Background			< Background		**0.16 to 0.23**	**0.2 to 0.38**	**1.2 to 2.4**			< Background	< Background	< Background	**0.2 to 0.38**											
Fluoranthene	206-44-0	1.3 to 38	DU-4	DU-13	< Background	**2.6 to 5.6**	< Background	**1.3 to 7.9**	< Background			< Background		< Background	**3.1 to 4.3**	**21 to 38**			< Background	< Background	< Background	**1.9 to 3.5**											
Fluorene	86-73-7	0.069 to 3.9	DU-22	DU-13	< Background	**0.1 to 0.22**	< Background	< Background	< Background			< Background		< Background	**0.28 to 0.44**	**2 to 3.9**			< Background	< Background	< Background	**0.069 to 0.13**											
Indeno(1,2,3-c,d)pyrene	193-39-5	0.73 to 9.2	DU-22	DU-13	< Background	**0.81 to 1.8**	< Background	**1 to 1.1**	< Background			< Background		**0.74 to 1.1**	**0.76 to 1.5**	**4.9 to 9.2**			< Background	< Background	< Background	**0.73 to 1.2**											
Naphthalene	91-20-3	0.012 to 1.1	DU-16	DU-13	< Background	**0.044 to 0.067**	< Background	**0 to 0.051**	< Background			< Background		**0.068 to 0.098**	**0.086 to 0.25**	**0.75 to 1.1**			**0.012 to 0.089**	< Background	< Background	**0.053 to 0.066**											
Phenanthrene	85-01-8	0.46 to 27	DU-4	DU-13	< Background	**1.4 to 2.8**	< Background	**0.46 to 3.8**	< Background			< Background		< Background	**2.3 to 3.2**	**15 to 27**			< Background	< Background	< Background	**0.71 to 1.4**											
Pyrene	129-00-0	1.3 to 30	DU-4	DU-13	< Background	**2.5 to 5.5**	< Background	**1.3 to 5.7**	< Background			< Background		< Background	**2.5 to 3.6**	**17 to 30**			< Background	< Background	< Background	**2 to 3.5**											
PCBs																																	
Aroclor 1260	11096-82-5	0.011 to 0.034	DU-25	DU-23	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	**0.019 to 0.034**	**0.011 to 0.016**								
Total PCBs	1336-36-3	0.011 to 0.034	DU-25	DU-23																			**0.019 to 0.034**	**0.011 to 0.016**	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled
Explosives Residues																																	
1,3,5-trinitrobenzene	99-35-4	0.029	EXDU-1		Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled	Not sampled						0.029	---	---	---	---	---	---	---
1,3-dinitrobenzene	99-65-0	0.038 to 0.051																							0.038 to 0.051	---	---	---	---	---	---	---
2,4,6-trinitrotoluene	118-96-7	0.21 to 0.37																							0.21 to 0.37	---	---	---	---	---	---	---
2,4-dinitrotoluene	121-14-2	0.06 to 0.22																							0.06 to 0.22	---	---	---	---	---	---	---

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Table 6-22 Site Contaminants in AOC #16 – Area D (former Dumping Area) Surface Soil

Metals Analyte	CAS #	AOC #16 – Area D (former Dumping Area) Surface Soil Concentration	Contaminant Concentration Range (mg/kg)	Minimum Contaminant Concentration Location	Maximum Contaminant Concentration Location	DU Concentration Range in Surface Soil (mg/kg)		
						DU-17	DU-18	DU-19
TAL Metals								
Aluminum	7429-90-5	5,300 to 25,000	16,000 to 25,000	DU-19	DU-19	< Background	< Background	**16,000 to 25,000**
Antimony	7440-36-0	0.28 to 9.9	6.2 to 9.9	DU-18	DU-17	**6.5 to 9.9**	**6.2 to 6.9**	< Background
Arsenic	7440-38-2	2.7 to 15	6.8 to 15	DU-19	DU-18	< Background	**7.8 to 15**	**6.8 to 12**
Barium	7440-39-3	63 to 360	63 to 360	DU-19	DU-18	**120 to 150**	**230 to 360**	**63 to 83**
Cadmium	7440-43-9	0.25 to 20	0.25 to 20	DU-19	DU-17	**5 to 20**	**4.2 to 5.2**	**0.25 to 0.33**
Calcium	7440-70-2	10,000 to 74,000	10,000 to 74,000	DU-19	DU-17	**43,000 to 74,000**	**12,000 to 13,000**	**10,000 to 15,000**
Chromium, Total	7440-47-3	6.9 to 240	14 to 240	DU-18	DU-18	< Background	**14 to 240**	< Background
Cobalt	7440-48-4	4.9 to 19	7 to 19	DU-18	DU-19	< Background	**7 to 7.6**	**14 to 19**
Copper	7440-50-8	40 to 1700	83 to 1,700	DU-17	DU-18	**83 to 280**	**40 to 1,700**	**130 to 180**
Iron	7439-89-6	14,000 to 3,6000	23,000 to 36,000	DU-19	DU-19	< Background	**27,000 to 35,000**	**23,000 to 36,000**
Lead	7439-92-1	38 to 2,900	1,200 to 2,900	DU-18	DU-18	**1,200 to 2,900**	**1,400 to 1,500**	< Background
Magnesium	7439-95-4	5,700 to 45,000	5,700 to 45,000	DU-19	DU-17	**26,000 to 45,000**	**7,800 to 7,900**	**5,700 to 8,300**
Manganese	7439-96-5	380 to 550	380 to 550	DU-17	DU-18	**380 to 440**	**450 to 550**	**410 to 470**
Mercury	7439-97-6	0.11 to 4.3	0.61 to 4.3	DU-17	DU-18	**0.61 to 0.98**	**1.5 to 4.3**	< Background
Potassium	2023695	920 to 2,300	920 to 2,300	DU-18	DU-18	**1,100 to 1,400**	**920 to 2,300**	**1,200 to 1,600**
Silver	7440-22-4	0.12 to 0.92	0.56 to 0.92	DU-17	DU-18	**0.56 to 0.72**	**0.63 to 0.92**	< Background
Sodium	7440-23-5	370 to 3,100	370 to 810	DU-17	DU-18	**370 to 490**	**590 to 810**	**1700 to 3100**
Zinc	7440-66-6	83 to 8,200	83 to 8,200	DU-18	DU-17	**5,700 to 8,200**	**83 to 1,800**	**90 to 120**
PAHs								
1-Methylnaphthalene	90-12-0	0.012 to 0.041	0.026 to 0.041	DU-17	DU-18	**0.026 to 0.037**	**0.04 to 0.041**	< Background
2-Methylnaphthalene	91-57-6	0.018 to 0.072	0.018 to 0.072	DU-19	DU-18	**0.039 to 0.056**	**0.06 to 0.072**	**0.018 to 0.035**
Acenaphthylene	208-96-8	0.059 to 0.27	0.059 to 0.27	DU-18	DU-19	**0.11 to 0.18**	**0.059 to 0.12**	**0.13 to 0.27**
Anthracene	120-12-7	0.13 to 0.43	0.13 to 0.43	DU-18	DU-19	**0.15 to 0.24**	**0.13 to 0.21**	**0.19 to 0.43**
Benzo(a)anthracene	56-55-3	0.48 to 2.5	1.1 to 2.5	DU-19	DU-19	< Background	< Background	**1.1 to 2.5**
Benzo(a)pyrene	50-32-8	0.41 to 1.9	0.44 to 1.9	DU-18	DU-19	< Background	**0.44 to 0.92**	**0.9 to 1.9**
Benzo(b)fluoranthene	205-99-2	0.71 to 3.4	0.86 to 3.4	DU-18	DU-19	< Background	**0.86 to 1.6**	**1.6 to 3.4**
Benzo(g,h,i)perylene	191-24-2	0.29 to 1.1	0.55 to 1.1	DU-19	DU-19	< Background	< Background	**0.55 to 1.1**
Benzo(k)fluoranthene	207-08-9	0.21 to 1.2	0.59 to 1.2	DU-19	DU-19	< Background	< Background	**0.59 to 1.2**
Chrysene	218-01-9	0.57 to 2.3	0.86 to 2.3	DU-18	DU-19	< Background	**0.86 to 1.5**	**0.98 to 2.3**
Dibenz(a,h)anthracene	53-70-3	0.093 to 0.41	0.11 to 0.41	DU-18	DU-19	< Background	**0.11 to 0.19**	**0.26 to 0.41**
Fluoranthene	206-44-0	0.94 to 4	1.6 to 4	DU-19	DU-19	< Background	< Background	**1.6 to 4**
Indeno(1,2,3-	193-39-5	0.3 to 1.5	0.77 to 1.5	DU-19	DU-19	< Background	< Background	**0.77 to 1.5**
Naphthalene	91-20-3	0.046 to 0.24	0.046 to 0.24	DU-19	DU-18	**0.069 to 0.094**	**0.2 to 0.24**	**0.046 to 0.083**
PCBs								
Aroclor 1248	12672-29-6	0.084 to 0.14	0.84 to 0.14	DU-17	DU-18	**0.084 to 0.095**	**0.099 to 0.14**	Not detected
Aroclor 1260	11096-82-5	0.0022 to 0.25	0.0022 to 0.25	DU-19	DU-18	**0.041 to 0.048**	**0.074 to 0.25**	**0.0022 to 0.011**
PCB, Total	1336-36-3	0.0071 to 0.4	0.0071 to 0.4	DU-19	DU-18	**0.13 to 0.14**	**0.17 to 0.4**	**0.0071 to 0.011**

Note: Metals analytes in Red denote CERCLA hazardous metals.

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Table 6-23 Site Contaminants in AOC #16 – Area D (former Dumping Area) Subsurface Soil

Metals Analyte	CAS #	Contaminant Concentration Range (mg/kg)	Minimum Contaminant Concentration Location	Maximum Contaminant Concentration Location	DU Concentration Range in Subsurface Soil (mg/kg)		
					DU-17	DU-18	DU-19
TAL Metals							
Aluminum	7429-90-5	20,000 to 25,000	DU-19	DU-19	< Background	< Background	**20,000 to 25,000**
Antimony	7440-36-0	4.4 to 13	DU-17	DU-18	**4.4 to 4.8**	**5.5 to 13**	< Background
Arsenic	7440-38-2	16 to 25	DU-18	DU-17	**22 to 25**	**16 to 19**	< Background
Barium	7440-39-3	270 to 460	DU-18	DU-17	**280 to 460**	**270 to 330**	< Background
Beryllium	7440-41-7	1.2 to 1.5	DU-17	DU-17	**1.2 to 1.5**	< Background	< Background
Cadmium	7440-43-9	3.2 to 24	DU-17	DU-18	**3.2 to 3.9**	**4.7 to 24**	< Background
Calcium	7440-70-2	14,000 to 44,000	DU-17	DU-18	**14,000 to 22,000**	**20,000 to 44,000**	**17,000 to 20,000**
Chromium, Total	7440-47-3	29 to 33	DU-18	DU-18	< Background	**29 to 33**	< Background
Cobalt	7440-48-4	16 to 18	DU-19	DU-19	< Background	< Background	**16 to 18**
Copper	7440-50-8	130 to 5,600	DU-17	DU-18	**130 to 180**	**5,100 to 5,600**	**210 to 210**
Iron	7439-89-6	25,000 to 43,000	DU-17	DU-18	**25,000 to 26,000**	**33,000 to 43,000**	**33,000 to 36,000**
Lead	7439-92-1	820 to 2,900	DU-17	DU-18	**820 to 2,700**	**2,000 to 2,900**	< Background
Magnesium	7439-95-4	6,400 to 24,000	DU-17	DU-18	**6,400 to 9,800**	**11,000 to 24,000**	**7,000 to 7,600**
Manganese	7439-96-5	450 to 510	DU-18	DU-18	< Background	**450 to 510**	< Background
Mercury	7439-97-6	0.71 to 0.21	DU-18	DU-18	**0.77 to 0.9**	**0.71 to 2.1**	< Background
Nickel	7440-02-0	52 to 79	DU-18	DU-18	< Background	**52 to 79**	< Background
Potassium	2023695	1,100 to 1,200	DU-19	DU-19	< Background	< Background	**1,100 to 1,200**
Selenium	7782-49-2	1.1 to 1.5	DU-17	DU-17	**1.1 to 1.5**	< Background	< Background
Silver	7440-22-4	0.83 to 2.1	DU-18	DU-18	< Background	**0.83 to 2.1**	< Background
Sodium	7440-23-5	420 to 3,400	DU-18	DU-19	**480 to 510**	**420 to 430**	**2,400 to 3,400**
Thallium	7440-28-0	0.27 to 0.8	DU-18	DU-17	**0.6 to 0.8**	**0.27 to 0.35**	< Background
Vanadium	7440-62-2	52 to 59	DU-19	DU-19	< Background	< Background	**52 to 59**
Zinc	7440-66-6	60 to 5,600	DU-19	DU-18	**1,600 to 2,900**	**3,100 to 5,600**	**60 to 62**
PAHs							
1-Methylnaphthalene	90-12-0	0.08 to 0.11	DU-18	DU-17	**0.087 to 0.11**	**0.08 to 0.1**	< Background
2-Methylnaphthalene	91-57-6	0.095 to 0.16	DU-18	DU-17	**0.12 to 0.16**	**0.095 to 0.12**	< Background
Acenaphthene	83-32-9	0.18 to 0.23	DU-18	DU-18	< Background	**0.18 to 0.23**	< Background
Anthracene	120-12-7	0.081 to 0.23	DU-17	DU-18	**0.081 to 0.21**	**0.12 to 0.23**	< Background
Chrysene	218-01-9	0.65 to 1.7	DU-18	DU-18	< Background	**0.65 to 1.7**	< Background
Fluorene	86-73-7	0.14 to 0.16	DU-18	DU-18	< Background	**0.14 to 0.16**	< Background
Naphthalene	91-20-3	0.2 to 0.71	DU-17	DU-18	**0.2 to 0.28**	**0.46 to 0.71**	< Background
Phenanthrene	85-01-8	0.66 to 1.4	DU-18	DU-18	< Background	**0.66 to 1.4**	< Background
PCBs							
Aroclor 1260	11096-82-5	0.049 to 0.054	DU-19	DU-19	Not detected	Not detected	**0.049 to 0.054**
Aroclor 1262	37324-23-5	0.057 to 0.15	DU-18	DU-18		**0.057 to 0.15**	Not detected
PCB, Total	1336-36-3	0.049 to 0.15	DU-19	DU-18		**0.057 to 0.15**	**0.049 to 0.054**

Note: Metals analytes in Red denote CERCLA hazardous metals.

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Table 6-24 Site Contaminants in Surface Water

Metals Analyte	CAS #	Con Hook Hudson River Shoreline Concentration Range (µg/L)	Con Hook Marsh Concentration Range (µg/L)	Iona Island Concentration Range in Surface Water (µg/L)			
				AOC #16 – Area D (Former Dumping Area) (DUMP-SW-01 to DUMP-SW-20)	Aadjacent to AOC #16 – Area D (Former Dumping Area) (IHRS-SW-01 to IHRS-SW-20)	Iona Marsh At Outlet of Riprap Filled Drainage Swale (RRDS-SW-01 to RRDS-SW-20)	Iona Marsh At Outlet of Tidal Wetland Swale (TWS-SW-01 to TWS-SW-20)
TAL Metals							
Arsenic	7440-38-2	0 to 0.46	0 to 2.7	< Background	**0.4 to 0.64**	< Background	< Background
Barium	7440-39-3	12 to 13	4.8 to 18	< Background	**12 to 26**	< Background	< Background
Chromium, Total	7440-47-3	0 to 0.55	0 to 0.64	< Background	< Background	Not detected	**0.58 to 0.69**
Copper	7440-50-8	0.95 to 3.4	0.61 to 1.3	**1.3 to 7.1**	**2.3 to 11**	**1.2 to 1.6**	**1 to 1.5**
Magnesium	7439-95-4	3,400 to 4,000	2,900 to 13,000	< Background	**3,600 to 5,900**	< Background	< Background
Potassium	2023695	1,100 to 1,400	1,200 to 3,300	< Background	**1,500 to 2,500**	< Background	< Background
Sodium	7440-23-5	15,000 to 18,000	17,000 to 110,000	< Background	**14,000 to 34,000**	< Background	< Background
Zinc	7440-66-6	0 to 90	0 to 4.2	**2 to 44**	< Background	Not detected	< Background

Note: Metals analytes in Red denote CERCLA hazardous metals.

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Table 6-25 Site Contaminants in Sediment

Metals Analyte	CAS #	Iona Island Concentration Range in Sediment (mg/kg)		
		Iona Island Hudson River Shoreline Adjacent to AOC #16 – Area D (former Dumping Area) (IHRS-DU-01)	Iona Marsh at Outlet of Riprap Filled Drainage Swale (RRDS-DU-01)	Iona Marsh at Outlet of Tidal Wetland Swale (TWS-DU-01)
TAL Metals				
Antimony	7440-36-0	**89 to 110**	0.73 to 0.77	0.73 to 1
Arsenic	7440-38-2	**32 to 35**	**9.4 to 9.7**	**8 to 9.3**
Barium	7440-39-3	**370 to 510**	**100 to 110**	**92 to 95**
Cadmium	7440-43-9	**8.9 to 9.6**	**0.91 to 0.96**	**0.84 to 2.2**
Chromium, Total	7440-47-3	**130 to 150**	**40 to 43**	**41 to 43**
Cobalt	7440-48-4	12 to 14	**14 to 15**	**13 to 14**
Copper	7440-50-8	**4,600 to 7,600**	**51 to 58**	**55 to 72**
Iron	7439-89-6	**140,000 to 180,000**	**35,00 to 37,000**	**29,000 to 36,000**
Lead	7439-92-1	**7,700 to 14,000**	**56 to 67**	**65 to 97**
Manganese	7439-96-5	1200	**2,700 to 2,800**	**1,000 to 1,200**
Nickel	7440-02-0	**69 to 110**	**34**	**31 to 35**
Silver	7440-22-4	**1 to 2**	0.31 to 0.33	0.28 to 0.36
Vanadium	7440-62-2	**30 to 37**	29 to 31	**33 to 35**
Zinc	7440-66-6	**3,600 to 3,800**	**190 to 200**	**230 to 990**

Note: Metals analytes in Red denote CERCLA hazardous metals.

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Table 7-1 Metal Partition Coefficient Summary

Analyte	CAS #	Median Partition Coefficient (K_d) in L/kg[1]		
		Soil/Soil Water	Suspended Matter/ Water	Sediment
Antimony	7440-36-0	2.3	4.8	3.6
Arsenic	7440-38-2	3.2	3.9	2.4
Beryllium	7440-41-7	3.1	4.1	No value indicated / available
Cadmium	7440-43-9	2.7	4.9	3.3
Chromium (as trivalent)	7440-47-3	3.8	4.2	4.9
Copper	7440-50-8	2.5	4.7	3.5
Lead	7439-92-1	3.7	5.7	4.6
Mercury	7439-97-6	3.6	5.3	4.9
Nickel	7440-02-0	2.9	4.4	3.9

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Table 7-2 PAH, PCB, and Explosives Residues Chemical Characteristics[1]

Analyte	CAS #	Molecular Weight (g/mol)	log K_{ow}	Aqueous Solubility (mg/L at 25 degrees Celsius)	Melting Point (degrees Celsius)	Boiling Point (degrees Celsius)	Vapor Pressure (mm Hg)	Henry's Law Constant ($atm/m^3/mole$)
Polycyclic Aromatic Hydrocarbons								
1-Methylnaphthalene	90-12-0	142.2	3.87	25.8	-30.4	244.7	6.70E-02	5.14E-05
2-Methylnaphthalene	91-57-6	142.2	3.86	24.6	34.4	241.1	5.50E-02	5.18E-04
Acenaphthene	83-32-9	154.21	3.92	3.9	93.4	279	2.15E-03	1.84E-04
Acenaphthylene	208-96-8	152.19	3.94	16.1	92.5	280	6.68E-03	1.14E-04
Anthracene	120-12-7	178.23	4.45	0.0434	215	340	6.53E-06	5.56E-05
Benzo(a)anthracene	56-55-3	228.29	5.76	0.0094	84	438	2.10E-07	1.20E-05
Benzo(a)pyrene	50-32-8	252.31	6.13	0.00162	176.5	495	5.49E-09	4.57E-07
Benzo(b)fluoranthene	205-99-2	252.31	5.78	0.0015	168	No value indicated	5.00E-07	6.57E-07
Benzo(g,h,i)perylene	191-24-2	276.33	6.63	0.00026	278	>500	1.00E-10	3.31E-07
Benzo(k)fluoranthene	207-08-9	252.31	6.11	0.0008	217	480	9.65E-10	5.84E-07
Chrysene	218-01-9	228.29	5.81	0.002	258.2	448	6.23E-09	5.23E-06
Dibenz(a,h)anthracene	53-70-3	278.35	6.75	0.00249	269.5	524	9.55E-10	No value indicated
Fluoranthene	206-44-0	202.26	5.16	0.26	107.8	384	9.22E-06	8.86E-06
Fluorene	86-73-7	166.22	4.18	1.69	114.8	295	6.00E-04	9.62E-05
Indeno(1,2,3-c,d)pyrene	193-39-5	276.33	No value indicated	0.00019	163.6	536	No value indicated	3.48E-07
Naphthalene	91-20-3	128.17	3.3	31	80.2	217.9	8.50E-02	4.40E-04
Phenanthrene	85-01-8	178.23	4.46	1.15	99.24	340	1.21E-04	4.23E-05
Pyrene	129-00-0	202.26	4.88	0.135	1512	404	4.50E-06	1.19E-05
Polychlorinated Biphenyls								
Aroclor (1248)	12672-29-6	291.99	6.2	1.00E-01	No value indicated	340	4.94E-04	4.40E-04
Aroclor (1260)	11096-82-5	395.33	7.55	0.0144	No value indicated	385	4.05E-05	3.36E-04
Aroclor (1262)	37324-23-5	No value indicated	No value indicated	No value indicated	No value indicated	No value indicated	No value indicated	No value indicated
Explosives Residues								
1,3,5-trinitrobenzene	99-35-4	213.11	1.18	2.78E+02	121.5	315	6.44E-06	No value indicated
1,3-dinitrobenzene	99-65-0	168.11	1.49	5.33E+02	90	291	9.00E-04	4.90E-08
2,4,6-trinitrotoluene	118-96-7	227.13	1.6	1.15E+02	80.1	No value indicated	8.02E-06	No value indicated
2,4-dinitrotoluene	121-14-2	182.14	1.98	2.00E+02	71	300	1.47E-04	5.40E-08

1. United States Environmental Protection Agency, Estimation Programs Interface (EPI) Suite application

NA: not available

mg/L = milligrams per liter

log K_{ow} – n-Octanol/Water Partition Coefficient

mm Hg = millimeter mercury

$atm/m^3/mole$ = atmosphere per cubic meter per mole

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Table 8-1 Soil, Sediment, and Surface Water Human Health Screening Criteria

Analyte	CAS Number	Soil and Sediment Screening Levels		Surface Water Screening Levels	
		Residential Soil RSL (mg/kg)[1,2]	Industrial Soil RSL (mg/kg)[1]	Tapwater RSL (µg/L)[3]	MCL (µg/L)[4]
Target Analyte List Metals					
Aluminum	7429-90-5	7,700	110,000	2,000	No standard
Antimony	7440-36-0	3.1	47	0.78	6
Arsenic	7440-38-2	0.68	3	0.052	10
Barium	7440-39-3	1,500	22,000	380	2,000
Beryllium	7440-41-7	16	230	2.5	4
Cadmium	7440-43-9	7.1	98	0.92	5
Calcium	7440-70-2	NS	No standard	No standard	No standard
Chromium, Total	7440-47-3	12,000	180,000	2,200	100
Cobalt	7440-48-4	2.3	35	0.6	No standard
Copper	7440-50-8	310	4,700	80	1,300
Iron	7439-89-6	5,500	82,000	1,400	No standard
Lead	7439-92-1	400	800	15	15
Magnesium	7439-95-4	NS	No standard	No standard	No standard
Manganese	7439-96-5	180	2,600	43	No standard
Mercury	7439-97-6	1.1	4.6	0.063	2
Nickel	7440-02-0	150	2,200	39	No standard
Potassium	9/7/7440	NS	No standard	No standard	No standard
Selenium	7782-49-2	39	580	10	50
Silver	7440-22-4	39	580	9.4	No standard
Sodium	7440-23-5	NS	No standard	No standard	No standard
Thallium	7440-28-0	0.078	1.2	0.02	2
Vanadium	7440-62-2	39	580	8.6	No standard
Zinc	7440-66-6	2,300	35,000	600	No standard
Polycyclic Aromatic Hydrocarbons (PAHs)					
1-Methylnaphthalene	90-12-0	18	73	Not applicable: surface water samples were not collected for PAH analysis	
2-Methylnaphthalene	91-57-6	24	300		
Acenaphthene	83-32-9	360	4,500		
Acenaphthylene	208-96-8	NS	No standard		
Anthracene	120-12-7	1,800	23,000		
Benzo(a)anthracene	56-55-3	1.1	21		
Benzo(a)pyrene	50-32-8	0.11	2.1		
Benzo(b)fluoranthene	205-99-2	1.1	21		
Benzo(g,h,i)perylene	191-24-2	NS	No standard		
Benzo(k)fluoranthene	207-08-9	11	210		
Chrysene	218-01-9	110	2,100		
Dibenz(a,h)anthracene	53-70-3	0.11	2.1		
Fluoranthene	206-44-0	240	3,000		
Fluorene	86-73-7	240	3,000		
Indeno(1,2,3-cd)pyrene	193-39-5	1.1	21		
Naphthalene	91-20-3	3.8	17		
Phenanthrene	85-01-8	NS	No standard		
Pyrene	129-00-0	180	2,300		
Volatile Organic Compounds (VOCs)					
Benzene	71-43-2	1.2	5.1	Not applicable: surface water samples were not collected for VOC analysis	
Ethylbenzene	100-41-4	5.8	25		
m,p-Xylene	108-38-3	55	240		
o-Xylene	95-47-6	65	280		
Toluene	108-88-3	490	4,700		
Xylenes (total)	1330-20-7	58	250		

Table 8-1 Soil, Sediment, and Surface Water Human Health Screening Criteria

Analyte	CAS Number	Soil and Sediment Screening Levels		Surface Water Screening Levels	
		Residential Soil RSL (mg/kg)[1,2]	Industrial Soil RSL (mg/kg)[1]	Tapwater RSL (µg/L)[3]	MCL (µg/L)[4]
Polychlorinated Biphenyls (PCBs)					
Aroclor 1016	12674-11-2	0.41	5.1	Not applicable: surface water samples were not collected for PCB analysis	
Aroclor 1221	11104-28-2	0.2	0.83		
Aroclor 1232	11141-16-5	0.17	0.72		
Aroclor 1242	53469-21-9	0.23	0.95		
Aroclor 1248	12672-29-6	0.23	0.95		
Aroclor 1254	11097-69-1	0.12	0.97		
Aroclor 1260	11096-82-5	0.24	0.99		
Aroclor 1262	37324-23-5	NS	No standard		
Aroclor 1268	11100-14-4	NS	No standard		
Total PCBs	1336-36-3	0.23	0.94		
Explosives Residues					
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	390	5,700	Not applicable: surface water samples were not collected for explosives residue analysis	
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	8.3	38		
2,4,6-Trinitrotoluene (TNT)	118-96-7	3.6	51		
1,3,5-Trinitrobenzene (TNB)	99-35-4	220	3,200		
1,3-Dinitrobenzene (DNB)	99-65-0	0.63	8.2		
N-Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	479-45-8	0.16	230		
Nitrobenzene (NB)	98-95-3	5.1	22		
2-Amino-4,6-dinitrotoluene (2AMDNT)	35572-78-2	15	230		
4-Amino-2,6-dinitrotoluene (4AMDNT)	19406-51-0	NS	No standard		
2,6-Dinitrotoluene (26DNT)	606-20-2	0.36	1.5		
2,4-Dinitrotoluene (24DNT)	121-14-2	1.7	7.4		
2-Nitrotoluene (2NT)	88-72-2	3.2	15		
3-Nitrotoluene (3NT)	99-08-1	0.63	8.2		
4-Nitrotoluene (4NT)	99-99-0	25	140		
Nitroglycerin (NG)	55-63-0	0.63	8.2		
3,5-Dinitroaniline	618-87-1	NS	No standard		
PETN	78-11-5	13	160		

1. U.S. Environmental Protection Agency (EPA) Regional Screening Levels Table, EPA, November 2023 (EPA 2023a). Value shown is equal to Hazard Index

2. A deed restriction is in place noting that there is to be no residential development at the site (Unitied States Army Corps of Engineers 1995); however, EPA residential soil RSLs are included to assess for children receptors including site visitation for nature walks and potential camping.

3. EPA Regional Screening Levels (RSLs) Table, EPA, November 2023 (EPA 2023a). Value shown is equal to HI=0.1. Carcinogenic values equal to $1x10^{-6}$.

4. EPA Maximum Contaminant Levels (MCLs) (EPA 2023a).

NOTES:

µg/L = micrograms per liter

mg/kg = milligrams per kilogram

RSL = Regional Screening Level

Table 8-2 Ecological Screening Criteria for Soil

Analyte	Chemical Abstracts Service Number	EPA Region 4 Ecological Screening Levels (mg/kg)[1]
Target Analyte List Metals		
Aluminum	7429-90-5	No standard
Antimony	7440-36-0	0.27
Arsenic	7440-38-2	6.8
Barium	7440-39-3	110
Beryllium	7440-41-7	2.5
Cadmium	7440-43-9	0.36
Calcium	7440-70-2	No standard
Chromium, Total	7440-47-3	23
Cobalt	7440-48-4	13
Copper	7440-50-8	28
Iron	7439-89-6	No standard
Lead	7439-92-1	11
Magnesium	7439-95-4	No standard
Manganese	7439-96-5	220
Mercury	7439-97-6	0.013
Nickel	7440-02-0	38
Potassium	9/7/7440	No standard
Selenium	7782-49-2	0.52
Silver	7440-22-4	4.2
Sodium	7440-23-5	No standard
Thallium	7440-28-0	0.05
Vanadium	7440-62-2	7.8
Zinc	7440-66-6	46
Polycyclic Aromatic Hydrocarbons (PAHs)		
1-Methylnaphthalene	90-12-0	29
2-Methylnaphthalene	91-57-6	29
Acenaphthene	83-32-9	29
Acenaphthylene	208-96-8	29
Anthracene	120-12-7	29
Benzo(a)anthracene	56-55-3	1.1
Benzo(a)pyrene	50-32-8	1.1
Benzo(b)fluoranthene	205-99-2	1.1
Benzo(g,h,i)perylene	191-24-2	1.1
Benzo(k)fluoranthene	207-08-9	1.1
Chrysene	218-01-9	1.1
Dibenz(a,h)anthracene	53-70-3	1.1
Fluoranthene	206-44-0	1.1
Fluorene	86-73-7	29
Indeno(1,2,3-cd)pyrene	193-39-5	1.1
Naphthalene	91-20-3	29
Phenanthrene	85-01-8	29
Pyrene	129-00-0	1.1

Table 8-2 Ecological Screening Criteria for Soil

Analyte	Chemical Abstracts Service Number	EPA Region 4 Ecological Screening Levels (mg/kg)[1]
Target Analyte List Metals		
Volatile Organic Compounds (VOCs)		
Benzene	71-43-2	No standard
Ethylbenzene	100-41-4	No standard
m,p-Xylene	108-38-3	No standard
o-Xylene	95-47-6	No standard
Toluene	108-88-3	No standard
Xylenes (total)	1330-20-7	No standard
Polychlorinated Biphenyls (PCBs)		
Aroclor 1016	12674-11-2	No standard
Aroclor 1221	11104-28-2	No standard
Aroclor 1232	11141-16-5	No standard
Aroclor 1242	53469-21-9	No standard
Aroclor 1248	12672-29-6	No standard
Aroclor 1254	11097-69-1	No standard
Aroclor 1260	11096-82-5	No standard
Aroclor 1262	37324-23-5	No standard
Aroclor 1268	11100-14-4	No standard
Total PCBs	1336-36-3	0.041
Explosives Residues		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	16
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	2.3
2,4,6-Trinitrotoluene (TNT)	118-96-7	7.5
1,3,5-Trinitrobenzene (TNB)	99-35-4	0.3
1,3-Dinitrobenzene (DNB)	99-65-0	0.034
N-Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	479-45-8	0.018
Nitrobenzene (NB)	98-95-3	2.2
2-Amino-4,6-dinitrotoluene (2AMDNT)	35572-78-2	14
4-Amino-2,6-dinitrotoluene (4AMDNT)	19406-51-0	12
2,6-Dinitrotoluene (26DNT)	606-20-2	4
2,4-Dinitrotoluene (24DNT)	121-14-2	6
2-Nitrotoluene (2NT)	88-72-2	0.19
3-Nitrotoluene (3NT)	99-08-1	0.13
4-Nitrotoluene (4NT)	99-99-0	0.14
Nitroglycerin (NG)	55-63-0	13
3,5-Dinitroaniline	618-87-1	NS
PETN	78-11-5	2.2

1. EPA Region 4 Ecological Risk Assessment Supplemental Guidance. Scientific Support Section Superfund Division EPA Region 4, March 2018 (EPA 2018).

NOTES:
µg/L = micrograms per liter
mg/kg = milligrams per kilogram
RSL = Regional Screening Level

Table 8-3 Ecological Screening Criteria for Freshwater

Analyte	Chemical Abstracts Service Number	NRWQC (current values)[1]	EPA BTAG Region 3 Freshwater Screening Values 2006 (µg/L)	EPA BTAG Region 3 Freshwater Screening Values Source[1,2,3]	EPA Region 4 Ecological Screening Levels Freshwater Chronic 2018 (µg/L)	EPA Region 4 Ecological Screening Levels Freshwater Chronic Source[1,2,4]
Target Analyte List Metals						
Aluminum	7429-90-5	NA	87	NRWQC 2004	**87**	NRWQC
Antimony	7440-36-0	NA	30	Suter et al. 1996	**190**	GLI
Arsenic	7440-38-2	**150**	5	CCME	150	NRWQC
Barium	7440-39-3	NA	4	Suter et al. 1996	**220**	GLI
Beryllium	7440-41-7	NA	0.66	Suter et al. 1996	**11**	GLI
Cadmium	7440-43-9	**0.923****	0.25	NRWQC 2004	0.45	NRWQC
Calcium	7440-70-2	NA	116,000	Suter et al. 1996	**116,000**	Suter et al. 1996
Chromium	7440-47-3	**74**	85	NRWQC 2004	42	NRWQC
Cobalt	7440-48-4	NA	23	Suter et al. 1996	**19**	GLI
Copper	7440-50-8	NA	9	NRWQC 2004	**4.95**	NRWQC
Iron	7439-89-6	**1,000**	300	CCME	1,000	NRWQC
Lead	7439-92-1	**0.841****	2.5	NRWQC 2004	1.25	NRWQC
Magnesium	7439-95-4	NA	82,000	Suter et al. 1996	**82,000**	Suter et al. 1996
Manganese	7439-96-5	NA	120	Suter et al. 1996	**93**	GLI
Mercury	7439-97-6	**0.77**	0.026	CCME	0.77	NRWQC
Nickel	7440-02-0	**52**	52	NRWQC 2004	28.9	NRWQC
Potassium	9/7/7440	NA	53,000	Suter et al. 1996	**53,000**	Suter et al. 1996
Selenium	7782-49-2	NA	1	CCME	**5**	NRWQC
Silver	7440-22-4	**1.6**	3.2	NRWQC 2004	0.06	NRWQC
Sodium	7440-23-5	NA	680,000	Suter et al. 1996	**680,000**	Suter et al. 1996
Thallium	7440-28-0	NA	0.8	CCME	**6**	GLI
Vanadium	7440-62-2	NA	20	Suter et al. 1996	**27**	GLI
Zinc	7440-66-6	**120**	120	NRWQC 2004	66	NRWQC

Ecological screening values for freshwater, chronic exposure. Hierarchy for selected values is as follows:

1. National Recommended Water Quality Criteria (NRWQC), updated October 2023 (EPA 2023b).

2. Canadian Council of Ministries of the Environment (CCME 2003). CCME values were not selected as these are Canadian numbers.

3. Values from the publication by Suter and Tsao 1996. Toxicological benchmarks for screening potential contaminants of concern for effects on aquatic biota: 1996 Revision. ES/ER/TM-96/R2. This source was used when no other values were available.

4. Great Lakes Initiative (GLI), Clearinghouse Resources Tier II criteria revised 2013 (EPA 2013).

Notes:

µg/L = Microgram(s) per liter

EPA = U.S. Environmental Protection Agency

**Lead and cadmium values are based on water hardness, as follows, using a 95%LCL of 71 mg/L calcium carbonate ($CaCO_3$) for hardness:

Cadmium: 1.101672-[(ln hardness) x 0.041838)]

Lead: 1.46203-[(ln hardness) x 1.45712)]

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Table 8-4 Ecological Screening Criteria for Sediment

Analyte	CAS Number	Freshwater Sediment Screening Value		
		Ecological Screening Value	Refinement Screening Value	Source
Metals (mg/kg dw)				
Aluminum	7429-90-5	25,000	58,000	e
Antimony	7440-36-0	2	25	a
Arsenic	7440-38-2	9.8	33	b
Barium	7440-39-3	20	60	b
Cadmium	7440-43-9	1	5	b
Chromium (Total)	7440-47-3	43.4	111	b
Cobalt	7440-48-4	50		b
Copper	7440-50-8	31.6	149	b
Iron	7439-89-6	20,000	40,000	c
Lead	7439-92-1	35.8	128	b
Manganese	7439-96-5	460	1,100	c
Mercury (inorganic - aquatic life)	7439-97-6	0.18	1.1	b
Mercury (inorganic - wildlife based)	7439-97-6	0.17	0.17	e
Methylmercury (wildlife based)	22967-92-6	0.00045	0.0045	e
Nickel	7440-02-0	22.7	48.6	b
Selenium	7782-49-2	0.72	2.9	e
Selenium (wildlife)	7782-49-2	0.8	1.2	e
Silver	7440-22-4	1	2.2	b
Uranium	7440-61-1	100	1,000	e
Zinc	7440-66-6	121	459	b
Other Inorganics (mg/kg dw)				
Ammonia	7664-41-7	230	300	d
Sulfides (Total)	18946-25-8	39	61	d

Notes:

a. Long, Edward R., and Lee G. Morgan. 1991. The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program.

b. MacDonald, et al. 2003. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters. Florida Department of Environmental Protection, Tallahassee, FL. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters. Used threshold effect concentration (TEC) for the ESV and probable effect concentration (PEC) for the RSV.

c. Persaud, D., R. Jaagumagi and A. Hayton. 1993. Guidelines for the protection and management of aquatic sediment quality in Ontario. Ontario Ministry of the Environment. Queen's Printer of Ontario.

d. Washington State Sediment Management Standards, Cleanup Objectives.

e. Los Alamos National Laboratory ECORISK Database. September 2017.

Notes:

CAS = Chemical Abstracts Service
EPA = U.S. Environmental Protection Agency
mg/kg dw = Milligram(s) per kilograms dry weight

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Table 8-5 Human Health Risk Assessment Contaminants of Potential Concern in Soil

Analyte	CAS No.	95UCL (mg/kg)	EPA Residential Soil RSL[(1)] (mg/kg)	Exceeds Background?	COPC
DU-1 (AOC 10 – Former Building 406)					
Aluminum	7429-90-5	11,000	7,700	No	No
Arsenic	7440-38-2	14.6	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	8.01	2.3	**Yes**	**Yes**
Iron	7439-89-6	17,100	5,500	No	No
Manganese	7439-96-5	488	180	**Yes**	**Yes**
Thallium	7440-28-0	0.156	0.078	No	No
Benzo(a)pyrene	50-32-8	0.2	0.11	No	No
DU-2 (AOC 17 – Former Coal Trestle and Storage Area)					
Aluminum	7429-90-5	13,000	7,700	No	No
Arsenic	7440-38-2	15.1	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	7.95	2.3	**Yes**	**Yes**
Iron	7439-89-6	20,100	5,500	No	No
Manganese	7439-96-5	690	180	**Yes**	**Yes**
Thallium	7440-28-0	0.13	0.078	No	No
Benzo(a)anthracene	56-55-3	4.76	1.1	**Yes**	**Yes**
Benzo(a)pyrene	50-32-8	3.84	0.11	**Yes**	**Yes**
Benzo(b)fluoranthene	205-99-2	5.59	1.1	**Yes**	**Yes**
Dibenz(a,h)anthracene	53-70-3	0.608	0.11	**Yes**	**Yes**
Indeno(1,2,3-c,d)pyrene	193-39-5	2.57	1.1	**Yes**	**Yes**
DU-3 (AOC 11 – Former Building 407; AOC 12 – Former Building 410)					
Aluminum	7429-90-5	13,000	7,700	No	No
Arsenic	7440-38-2	17.2	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	8.52	2.3	**Yes**	**Yes**
Iron	7439-89-6	20,100	5,500	No	No
Manganese	7439-96-5	740	180	**Yes**	**Yes**
Thallium	7440-28-0	0.148	0.078	No	No
Benzo(a)pyrene	50-32-8	0.871	0.11	No	No
Benzo(b)fluoranthene	205-99-2	1.34	1.1	No	No
Dibenz(a,h)anthracene	53-70-3	0.151	0.11	No	No
DU-4					
Aluminum	7429-90-5	10,000	7,700	No	No
Arsenic	7440-38-2	54.2	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	8.56	2.3	**Yes**	**Yes**
Iron	7439-89-6	20,800	5,500	No	No
Manganese	7439-96-5	575	180	**Yes**	**Yes**
Thallium	7440-28-0	0.236	0.078	No	No
Benzo(a)anthracene	56-55-3	1.67	1.1	**Yes**	**Yes**
Benzo(a)pyrene	50-32-8	1.1	0.11	**Yes**	**Yes**
Benzo(b)fluoranthene	205-99-2	3.61	1.1	**Yes**	**Yes**
Dibenz(a,h)anthracene	53-70-3	0.33	0.11	**Yes**	**Yes**
Indeno(1,2,3-c,d)pyrene	193-39-5	1.18	1.1	**Yes**	**Yes**

Table 8-5 Human Health Risk Assessment Contaminants of Potential Concern in Soil

Analyte	CAS No.	95UCL (mg/kg)	EPA Residential Soil RSL[1] (mg/kg)	Exceeds Background?	COPC
DU-5 (AOC 3 – Former Building 123)					
Aluminum	7429-90-5	13,000	7,700	No	No
Arsenic	7440-38-2	12.8	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	8.05	2.3	No	No
Iron	7439-89-6	21,100	5,500	**Yes**	**Yes**
Manganese	7439-96-5	883	180	**Yes**	**Yes**
Thallium	7440-28-0	0.118	0.078	No	No
Benzo(a)pyrene	50-32-8	0.437	0.11	No	No
DU-6					
Aluminum	7429-90-5	13,600	7,700	No	No
Arsenic	7440-38-2	13.5	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	9.33	2.3	**Yes**	**Yes**
Iron	7439-89-6	21,200	5,500	No	No
Manganese	7439-96-5	1,130	180	**Yes**	**Yes**
Thallium	7440-28-0	0.175	0.078	No	No
DU-7					
Aluminum	7429-90-5	12,100	7,700	No	No
Antimony	7440-36-0	3.82	3.1	No	No
Arsenic	7440-38-2	18.8	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	7.25	2.3	No	No
Iron	7439-89-6	20,100	5,500	No	No
Lead[2]	7439-92-1	1,087	400	**Yes**	**Yes**
Manganese	7439-96-5	757	180	**Yes**	**Yes**
Thallium	7440-28-0	0.232	0.078	**Yes**	**Yes**
DU-9 (AOC 8 – Former Building 219; AOC 9 – Former Building 220))					
Aluminum	7429-90-5	12,100	7,700	No	No
Arsenic	7440-38-2	7.59	0.68	No	No
Cobalt	7440-48-4	7.82	2.3	**Yes**	**Yes**
Iron	7439-89-6	17,800	5,500	No	No
Manganese	7439-96-5	546	180	**Yes**	**Yes**
Thallium	7440-28-0	0.162	0.078	No	No
Benzo(a)pyrene	50-32-8	0.254	0.11	No	No
DU-10					
Aluminum	7429-90-5	12,900	7,700	No	No
Arsenic	7440-38-2	8.36	0.68	No	No
Cobalt	7440-48-4	8.47	2.3	**Yes**	**Yes**
Iron	7439-89-6	20,200	5,500	No	No
Manganese	7439-96-5	610	180	**Yes**	**Yes**
Thallium	7440-28-0	0.15	0.078	No	No

Table 8-5 Human Health Risk Assessment Contaminants of Potential Concern in Soil

Analyte	CAS No.	95UCL (mg/kg)	EPA Residential Soil RSL[(1)] (mg/kg)	Exceeds Background?	COPC
DU-11 (AOC 18 – Former Coal Storage Area)					
Aluminum	7429-90-5	11,900	7,700	No	No
Arsenic	7440-38-2	47.4	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	7.24	2.3	**Yes**	**Yes**
Iron	7439-89-6	21,200	5,500	No	No
Manganese	7439-96-5	600	180	**Yes**	**Yes**
Thallium	7440-28-0	0.254	0.078	**Yes**	**Yes**
Benzo(a)anthracene	56-55-3	1.3	1.1	**Yes**	**Yes**
Benzo(a)pyrene	50-32-8	1.53	0.11	**Yes**	**Yes**
Benzo(b)fluoranthene	205-99-2	1.97	1.1	**Yes**	**Yes**
Dibenz(a,h)anthracene	53-70-3	0.281	0.11	**Yes**	**Yes**
Indeno(1,2,3-c,d)pyrene	193-39-5	1.37	1.1	**Yes**	**Yes**
DU-12 (AOC 6 – Former Building 213)					
Aluminum	7429-90-5	11,000	7,700	No	No
Arsenic	7440-38-2	15.1	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	8.19	2.3	**Yes**	**Yes**
Iron	7439-89-6	17,000	5,500	No	No
Manganese	7439-96-5	1,050	180	**Yes**	**Yes**
Thallium	7440-28-0	0.161	0.078	No	No
Benzo(a)anthracene	56-55-3	2.89	1.1	**Yes**	**Yes**
Benzo(a)pyrene	50-32-8	2.47	0.11	**Yes**	**Yes**
Benzo(b)fluoranthene	205-99-2	3.95	1.1	**Yes**	**Yes**
Dibenz(a,h)anthracene	53-70-3	0.571	0.11	**Yes**	**Yes**
Indeno(1,2,3-c,d)pyrene	193-39-5	2.23	1.1	**Yes**	**Yes**
DU-13 (AOC 1 – Former Building 103)					
Aluminum	7429-90-5	12,800	7,700	No	No
Antimony	7440-36-0	3.46	3.1	**Yes**	**Yes**
Arsenic	7440-38-2	12.5	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	8.96	2.3	**Yes**	**Yes**
Copper	7440-50-8	885	310	**Yes**	**Yes**
Iron	7439-89-6	19,800	5,500	**Yes**	**Yes**
Manganese	7439-96-5	1,320	180	**Yes**	**Yes**
Thallium	7440-28-0	0.196	0.078	No	No
Benzo(a)anthracene	56-55-3	24.5	1.1	**Yes**	**Yes**
Benzo(a)pyrene	50-32-8	18.6	0.11	**Yes**	**Yes**
Benzo(b)fluoranthene	205-99-2	25.2	1.1	**Yes**	**Yes**
Dibenz(a,h)anthracene	53-70-3	3.64	0.11	**Yes**	**Yes**
Indeno(1,2,3-c,d)pyrene	193-39-5	12.9	1.1	**Yes**	**Yes**
DU-14					
Aluminum	7429-90-5	11,800	7,700	No	No
Arsenic	7440-38-2	19.5	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	7.67	2.3	**Yes**	**Yes**
Iron	7439-89-6	17,800	5,500	No	No
Manganese	7439-96-5	760	180	**Yes**	**Yes**
Thallium	7440-28-0	0.145	0.078	No	No

Table 8-5 Human Health Risk Assessment Contaminants of Potential Concern in Soil

Analyte	CAS No.	95UCL (mg/kg)	EPA Residential Soil RSL[1] (mg/kg)	Exceeds Background?	COPC
DU-15					
Aluminum	7429-90-5	11,000	7,700	No	No
Arsenic	7440-38-2	7.68	0.68	No	No
Cobalt	7440-48-4	6.91	2.3	**Yes**	**Yes**
Iron	7439-89-6	19,800	5,500	No	No
Manganese	7439-96-5	531	180	**Yes**	**Yes**
Thallium	7440-28-0	0.171	0.078	No	No
DU-16 (AOC 4 – Former Buildings 124, 125, 126, 127, and 128)					
Aluminum	7429-90-5	16,500	7,700	No	No
Arsenic	7440-38-2	7.56	0.68	No	No
Cobalt	7440-48-4	8.97	2.3	**Yes**	**Yes**
Iron	7439-89-6	23,500	5,500	**Yes**	**Yes**
Manganese	7439-96-5	465	180	**Yes**	**Yes**
Thallium	7440-28-0	0.138	0.078	No	No
Benzo(a)pyrene	50-32-8	0.689	0.11	No	No
Dibenz(a,h)anthracene	53-70-3	0.151	0.11	No	No
DU-17 (AOC #16 – Area D (Former Dumping Area]) Surface Soil (0 to 6 inches)					
Aluminum	7429-90-5	8,300	7700	No	No
Antimony	7440-36-0	12.4	3.1	**Yes**	**Yes**
Arsenic	7440-38-2	15	0.68	**Yes**	**Yes**
Cadmium	7440-43-9	33.2	0.71	**Yes**	**Yes**
Cobalt	7440-48-4	8.87	2.3	No	No
Copper	7440-50-8	442	310	**Yes**	**Yes**
Iron	7439-89-6	22,700	5,500	**Yes**	**Yes**
Lead[2]	7439-92-1	1,867	400	**Yes**	**Yes**
Manganese	7439-96-5	484	180	**Yes**	**Yes**
Thallium	7440-28-0	0.187	0.078	**Yes**	**Yes**
Zinc	7440-66-6	10,000	2,300	**Yes**	**Yes**
Benzo(a)anthracene	56-55-3	1.19	1.1	No	No
Benzo(a)pyrene	50-32-8	0.997	0.11	No	No
Benzo(b)fluoranthene	205-99-2	1.73	1.1	No	No
Dibenz(a,h)anthracene	53-70-3	0.193	0.11	No	No
DU-17 (AOC #16 – Area D (Former Dumping Area]) Subsurface Soil (6 to 36 inches)					
Antimony	7440-36-0	5.09	3.1	**Yes**	**Yes**
Arsenic	7440-38-2	27.2	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	7.2	2.3	No	No
Iron	7439-89-6	27,100	5,500	**Yes**	**Yes**
Lead[2]	7439-92-1	1,573	400	**Yes**	**Yes**
Thallium	7440-28-0	0.96	0.078	**Yes**	**Yes**
Zinc	7440-66-6	3,850	2,300	**Yes**	**Yes**
Benzo(a)pyrene	50-32-8	0.72	0.11	No	No
Benzo(b)fluoranthene	205-99-2	1.47	1.1	No	No
Dibenz(a,h)anthracene	53-70-3	0.224	0.11	No	No

Table 8-5 Human Health Risk Assessment Contaminants of Potential Concern in Soil

Analyte	CAS No.	95UCL (mg/kg)	EPA Residential Soil RSL[1] (mg/kg)	Exceeds Background?	COPC
DU-18 (AOC #16 – Area D (Former Dumping Area]) Surface Soil (0 to 6 inches)					
Aluminum	7429-90-5	16,000	7,700	No	No
Antimony	7440-36-0	7.42	3.1	**Yes**	**Yes**
Arsenic	7440-38-2	23.1	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	8.04	2.3	**Yes**	**Yes**
Copper	7440-50-8	3,010	310	**Yes**	**Yes**
Iron	7439-89-6	44,000	5,500	**Yes**	**Yes**
Lead[2]	7439-92-1	1,433	400	**Yes**	**Yes**
Manganese	7439-96-5	652	180	**Yes**	**Yes**
Mercury	7439-97-6	6.33	1.1	**Yes**	**Yes**
Thallium	7440-28-0	0.29	0.078	No	No
Zinc	7440-66-6	3,520	2,300	**Yes**	**Yes**
Benzo(a)anthracene	56-55-3	1.37	1.1	No	No
Benzo(a)pyrene	50-32-8	1.27	0.11	**Yes**	**Yes**
Benzo(b)fluoranthene	205-99-2	2.14	1.1	**Yes**	**Yes**
Dibenz(a,h)anthracene	53-70-3	0.255	0.11	**Yes**	**Yes**
Aroclor 1260	11096-82-5	0.383	0.24	**Yes**	**Yes**
DU-18 (AOC #16 – Area D (Former Dumping Area]) Subsurface Soil (6 to 36 inches)					
Antimony	7440-36-0	19.6	3.1	**Yes**	**Yes**
Arsenic	7440-38-2	21.2	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	9.5	2.3	No	No
Copper	7440-50-8	6,070	310	**Yes**	**Yes**
Iron	7439-89-6	50,200	5,500	**Yes**	**Yes**
Lead[2]	7439-92-1	2,433	400	**Yes**	**Yes**
Manganese	7439-96-5	555	180	**Yes**	**Yes**
Mercury	7439-97-6	3.19	1.1	**Yes**	**Yes**
Thallium	7440-28-0	0.411	0.078	**Yes**	**Yes**
Zinc	7440-66-6	7,850	2,300	**Yes**	**Yes**
Benzo(a)anthracene	56-55-3	0.995	1.1	No	No
Benzo(a)pyrene	50-32-8	1.27	0.11	No	No
Benzo(b)fluoranthene	205-99-2	1.93	1.1	No	No
Dibenz(a,h)anthracene	53-70-3	0.299	0.11	No	No
DU-19 (AOC #16 – Area D (Former Dumping Area]) Surface Soil (0 to 6 inches)					
Aluminum	7429-90-5	31,700	7,700	**Yes**	**Yes**
Arsenic	7440-38-2	16	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	22.7	2.3	**Yes**	**Yes**
Iron	7439-89-6	45,700	5,500	**Yes**	**Yes**
Manganese	7439-96-5	517	180	**Yes**	**Yes**
Thallium	7440-28-0	0.156	0.078	No	No
Vanadium	7440-62-2	57.8	39	No	No
Benzo(a)anthracene	56-55-3	3.6	1.1	**Yes**	**Yes**
Benzo(a)pyrene	50-32-8	2.66	0.11	**Yes**	**Yes**
Benzo(b)fluoranthene	205-99-2	4.75	1.1	**Yes**	**Yes**
Dibenz(a,h)anthracene	53-70-3	0.524	0.11	**Yes**	**Yes**
Indeno(1,2,3-c,d)pyrene	193-39-5	2.06	1.1	**Yes**	**Yes**

Table 8-5 Human Health Risk Assessment Contaminants of Potential Concern in Soil

Analyte	CAS No.	95UCL (mg/kg)	EPA Residential Soil RSL[(1)] (mg/kg)	Exceeds Background?	COPC
DU-19 (Dump Area) (AOC #16 – Area D (Former Dumping Area]) Subsurface Soil (6 to 36 inches)					
Aluminum	7429-90-5	28,700	7,700	**Yes**	**Yes**
Arsenic	7440-38-2	3.15	0.68	No	No
Cobalt	7440-48-4	19.5	2.3	**Yes**	**Yes**
Iron	7439-89-6	38,500	5500	**Yes**	**Yes**
Manganese	7439-96-5	291	180	No	No
Thallium	7440-28-0	0.0804	0.078	No	No
Vanadium	7440-62-2	64.2	39	**Yes**	**Yes**
DU-20 (AOC 13 – Former Fuel Oil AST)					
Benzo(a)pyrene	50-32-8	0.185	0.11	No	No
DU-21 (AOC 14 – Former Fuel Oil AST)					
Benzo(a)pyrene	50-32-8	0.319	0.11	No	No
DU-22 (AOC 15 – Former Fuel Oil AST)					
Benzo(a)anthracene	56-55-3	2.6	1.1	**Yes**	**Yes**
Benzo(a)pyrene	50-32-8	2.48	0.11	**Yes**	**Yes**
Benzo(b)fluoranthene	205-99-2	4.09	1.1	**Yes**	**Yes**
Dibenz(a,h)anthracene	53-70-3	0.513	0.11	**Yes**	**Yes**
Indeno(1,2,3-c,d)pyrene	193-39-5	1.55	1.1	**Yes**	**Yes**

1) EPA, 2023a. Residential Soil Regional Screening Level (RSL) Table, Dated November 2023. Protective of a target cancer risk of 1×10^{-6} and hazard quotient of 0.1.

2) Lead DU concentrations are represented by the mean concentration of the replicate samples.

Notes:

COPC = contaminant of potential concern

DU = decision unit

mg/kg = milligrams per kilogram

RSL = regional screening level

Table 8-6 Human Health Risk Assessment Contaminants of Potential Concern in Surface Water

Analyte	CAS No.	Maximum Concentration (µg/L)	EPA Tapwater RSL[1] (µg/L)	EPA MCL (µg/L)	Exceeds Background?	COPC
Iona Island Hudson River Shoreline (IHRS) Adjacent to AOC #16 – Area D (former Dumping Area)						
No chemicals above screening criteria						
Iona Marsh at Outlet of Riprap Filled Drainage Swale (RRDS)						
Manganese	7439-96-5	130	43	NA	No	No
Iona Marsh at Outlet of Tidal Wetland Swale (TWS)						
Manganese	7439-96-5	120	43	NA	No	No
AOC #16 – Area D (former Dumping Area) (DUMP)						
Antimony	7440-36-0	1.4	0.78	6	No	No
Thallium	7440-28-0	0.02	0.17	2	No	No

1) EPA, 2023a. Tapwater Regional Screening Level (RSL) Table, Dated November 2023. Protective of a target cancer risk of 1×10^{-6} and hazard quotient of 0.1.

Notes:

COPC = contaminant of potential concern

NA = not applicable

µg/L = micrograms per liter

RSL = regional screening level

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Table 8-7 Human Health Risk Assessment Contaminants of Potential Concern in Sediment

Analyte	CAS No.	95UCL (mg/kg)	EPA Residential Soil RSL[1] (mg/kg)	Exceeds Background?	COPC
Iona Island Hudson River Shoreline (IHRS) Adjacent to AOC #16 – Area D (Former Dumping Area)					
Antimony	7440-36-0	123	3.1	**Yes**	**Yes**
Arsenic	7440-38-2	36.2	0.68	**Yes**	**Yes**
Cadmium	7440-43-9	9.86	0.71	**Yes**	**Yes**
Cobalt	7440-48-4	15.3	2.3	No	No
Copper	7440-50-8	10,100	310	**Yes**	**Yes**
Iron	7439-89-6	192,000	55,00	**Yes**	**Yes**
Lead[2]	7439-92-1	9,900(2)	400	**Yes**	**Yes**
Manganese	7439-96-5	1,200	180	No	No
Thallium	7440-28-0	0.083	0.078	**Yes**	**Yes**
Vanadium	7440-62-2	39.1	39	No	No
Zinc	7440-66-6	3,930	2,300	No	No
Iona Marsh at Outlet of RipRap Filled Drainage Swale (RRDS)					
Aluminum	7429-90-5	22,500	7700	No	No
Arsenic	7440-38-2	9.82	0.68	**Yes**	**Yes**
Cadmium	7440-43-9	0.979	0.71	No	No
Iron	7439-89-6	37,600	5,500	**Yes**	**Yes**
Manganese	7439-96-5	2,870	180	**Yes**	**Yes**
Thallium	7440-28-0	0.207	0.078	No	No
Iona Marsh at Outlet of Tidal Wetland Swale (TWS)					
Aluminum	7429-90-5	16,600	7700	No	No
Arsenic	7440-38-2	9.69	0.68	**Yes**	**Yes**
Cadmium	7440-43-9	3.19	0.71	**Yes**	**Yes**
Cobalt	7440-48-4	14.3	2.3	**Yes**	**Yes**
Iron	7439-89-6	38,100	5500	**Yes**	**Yes**
Manganese	7439-96-5	1,270	180	**Yes**	**Yes**
Thallium	7440-28-0	0.18	0.078	No	No

1) EPA, 2023a. Residential Soil Regional Screening Level (RSL) Table, Dated November 2023. Protective of a target cancer risk of 1×10^{-6} and hazard quotient of 0.1.

2) The concentration for lead is the mean concentration of the replicate samples.

Notes:

COPC = contaminant of potential concern

mg/kg = milligrams per kilogram

RSL = regional screening level

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Table 8-8 Outputs of the ALM for Soil and Sediment DUs and Exposure Areas

Receptor	Percent Exceeding	95th percentile Fetal Blood Lead Level (µg/dL)
DU-7 Surface Soil		
Park Personnel	2.4	4.1
Construction Worker	**24.9**	**8.8**
Adult Recreational	0.22	2.5
Adolescent Recreational	0.07	2
DU-17 Surface Soil		
Park Personnel	**9.4**	**6.1**
Construction Worker	**54.9**	**14.1**
Adult Recreational	0.84	3.2
Adolescent Recreational	0.4	2.8
DU-17 – subsurface soil		
Park Personnel	**6.3**	**5.3**
Construction Worker	**44.6**	**12.1**
DU-18 – surface soil		
Park Personnel	5	5
Construction Worker	**39.2**	**11.2**
Adult Recreational	0.43	2.8
Adolescent Recreational	0.2	2.4
DU-18 – subsurface soil		
Park Personnel	**16.9**	**7.5**
Construction Worker	**70.4**	**18**
Iona Island Exposure Area		
Park Personnel	0.1	2.2
Construction Worker	1.2	3.5
Adult Recreational	0.03	1.7
Adolescent Recreational	0.003	1.3
Dump Area Exposure Area		
Park Personnel	**8.9**	**6**
Construction Worker	**53.6**	**13.9**
Adult Recreational	0.8	3.2
Adolescent Recreational	0.4	2.7
IHRS-DU-01 (Iona Island Hudson River shoreline adjacent to AOC #16 - Area D [former Dumping Area]) –Sediment		
Park Personnel	**87.8**	**26.1**
Adult Recreational	**38.1**	**11**
Adolescent Recreational	**35.4**	**10.6**

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Table 8-9 Outputs of the ALM Using Mean Lead Concentrations of all DUs in Soil

Receptor	Percent Exceeding	95th percentile Fetal Blood Lead Level (µg/dL)
Entire Site		
Park Personnel	0.7	3.1

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Appendix A

Field Documentation and Photos

A1: Phase I Field Book
A2: Phase I pH Meter Calibration Forms
A3: Phase I Sample Tracking Table
A4: Phase I Photo Log
A5: Phase II Field Book
A6: Phase II Calibration Forms
A7: Phase II Sample Tracking Table
A8: Phase II Photo Log

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A1
Phase I Field Book

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2 3/16/2020 Iona Island Naval Ammunition Depot
Formerly used Defense Site (FUDs)

1100 Amanda Kohn on site. JD Marlow gives health & safety briefing. AK signs in, signs accident prevention plan form / tailgate briefing form.
1115 AK & JD drive to each Hazardous, Toxic, & Radioactive Waste (HTRW) incremental sampling (ISM) grid location to scope conditions. Exposed bedrock and roads, shallow soil. Plan for day: attempt ISM of surface soil (0-6 inches below ground surface [bgs]), collect samples for polycyclic aromatic hydrocarbons (PAHs), evaluate potential for collection of subsurface soil (0.5-3 ft bgs). Working w/ Tim Reese
1330 DU-20. Move grid against building 222 60x60 grid, 5x6 lanes for ISM to collect 30 increments of soil
1530 Finish surface soil at DU-20. Collected 3 ISM samples, ~950 g each:
IINY-DU-20A-SSIS-20200316 @1530
IINY-DU-20B-SSIS-20200316 @1530
IINY-DU-20C-SSIS-20200316 @1530
pH readings: Surface Soil at DU-20:
20A = 6.1
20B = 6.5
20C = 6.6

Iona Island Naval Ammunition Depot FUDS 3/16/2020

Subsurface soil at DU-20 ~18" deep. Will collect subsurface soil at 6"-18" bgs

TR, Josh (UXO Tech), Derek collecting surface soil

1625 At DU-22. 60x60 ft grid. 5x6 lanes for ISM to collect 30 increments of soil. Sampling 0-6" for PAHs

Evaluate subsurface soil potential w/ hand auger: advanced 6 borings w/in DU-22. Depths ranged from ~6 to ~8" bgs

1645 Finish collecting surface soil at DU-22

Collected 3 ISM samples

IINY-DU-22A-SSIS-2020316 @ 1645

IINY-DU-22B-SSIS-2020316 @ 1645

IINY-DU-22C-SSIS-2020316 @ 1645

pH readings: surface soil at DU-22:

A= 6.7

B= 6.8

C= 6.8

Chain of custody = ~~061620-A~~ AK 3/16/20 031620-A

Will not collect subsurface soil at DU-22:

6 hand auger borings advanced. Soil is less than 12" deep. Will notify USACE representative for path forward for subsurface soil

Rite in the Rain

3/17/2020 Iona Island Naval Ammunition Depot FUDS

0700 AK on site. Sign in, attend tailgate safety briefing.
Plan for day: check DU-21 condition for brush clearing. Surface soil at exDU-1 through Ex-DU 7. Explosives sampling only.
Working w/ Josh (UXO tech), Derek

0855 DU-20 subsurface soil
Silty soil with some sand (fine to coarse) and gravel (fine to coarse). Brown. Poorly sorted. Dry. Recovery to 18" (0.5 to 1.5 ft)

VOC sample collection: one sample = 6 x 60mL VOA w/ methanol preservative. 5 x 5 grams per VOA vial. Additional volume in ziploc bag for % moisture

0930 Collect subsurface from DU-20
IINY-DU-20A-SBIS1-20200317 @ 0930
IINY-DU-20B-SBIS1-20200317 @ 0930
IINY-DU-20C-SBIS1-20200317 @ 0930

VOC and PAH SIM samples
pH field screening subsurface soil @ DU-20:
DU-20A = 6.8
DU-20B = 6.9
DU-20C 6.8

Iona Island Naval Ammunition Depot FUDs 3/17/2020

1145 Collect subsurface from DU-21

IINY-DU-21A-SBIS1-20200317 @1145

IINY-DU-21B-SBIS1-20200317 @1145

IINY-DU-21C-SBIS1-20200317 @1145

Collected for VOCs and PAHs

pH subsurface soil @ DU-21:

DU-21A = 7.0

DU-21B = 7.1

DU-21C = 7.3

Silty soil w/ some fine to coarse sand and fine to medium gravel, trace coarse gravel. Brown, poorly sorted. Dry. Recovery to a ft bgs (6" - 24")

1240: Collected surface soil from DU-21 for PAHs only

IINY-DU-21A-SSIS-20200317 @1240

IINY-DU-21B-SSIS-20200317 @1240

IINY-DU-21C-SSIS-20200317 @1240

pH surface soil @ DU-21:

DU-21A = 6.3

DU-21B = 6.8

DU-21C = 6.8

DU-21 soil = silty topsoil, trace F-C sand, Trace F-C gravel. Brown, dry

Rite in the Rain

6

3/17/2020 Iona Island Naval Ammunition Depot FUDS

1430 Collected surface soil at ExDU-4

IINY-ExDU-4A-SSIS-20200317 @ 1430

IINY-ExDU-4B-SSIS-20200317 @ 1430

IINY-ExDU-4C-SSIS-20200317 @ 1430

Explosives analysis only, no subsurface soil sampling at ExDUs.

pH Surface soil ExDU-4:

ExDU4A: 6.5 (6.5)

ExDU4B: 6.3

ExDU4C: 6.8

Methanol Trip blank: TB03172020 @ 1500

Methanol Field Blank: FB03172020 @ 1545

1535 Collected Surface Soil at ExDU-1

IINY-ExDU-1A-SSIS-20200317 @ 1535

IINY-ExDU-1B-SSIS-20200317 @ 1535

IINY-ExDU-1C-SSIS-20200317 @ 1535

Explosives analysis only at ExDU-1

pH Surface Soil ExDU-1

ExDU-1A = 7.0

ExDU-1B = 6.9

ExDU-1C 6.9

No Subsurface soil sampling at ExDUs

Iona Island N

1610 Collected

IINY-ExDU-

IINY-ExDU-

IINY-ExDU-

Explosives

pH Surfac

ExDU-

ExDU-

ExDU-

No subsurface

Soil @ ExDU-4=

trace F-

Soil @ ExDU-1

trace F-C

Soil @ ExDU-2

trace F-C

Shipping 3 co

for ISM

Shipping 1 co

for VOA

1730 Offsite

Iona Island Naval Ammunition Depot FUDS 3/17/2020

1610 Collected surface soil at EXDU-2

IINY-EXDU-2A-SSIS-20200317 @ 1610

IINY-EXDU-2B-SSIS-20200317 @ 1610

IINY-EXDU-2C-SSIS-20200317 @ 1610

Explosives analysis only at EXDU-2

pH Surface Soil EXDU-2

EXDU-2A = 7.0

EXDU-2B = 6.8

EXDU-2C = 6.9

No subsurface soil sampling at EXDUs

Soil @ EXDU-4: silty topsoil, some F-C sand, trace F-C gravel. Brown, Dry

Soil @ EXDU-1 : silty topsoil, some F-C sand, trace F-C gravel, Brown, dry

Soil @ EXDU-2 : silty topsoil, some F-C sand, trace F-C gravel, Brown, dry

Shipping 3 coolers to Test America St Louis for ISM processing

Shipping 1 cooler to Test America Denver for VOA analysis

1730 Offsite

3/17/2020

Rite in the Rain

8
3/18/2020 Iona Island Naval Ammunition Depot FUDS

0700 AK on site. Attend tailgate safety briefing, sign in at site.

Plan for morning: Finish ExDUs (ExDU-3, ExDU-5, ExDU-6, ExDU-7). Working w/ Josh (Uxo Tech), Derek H. Explosives analysis in surface soil only.

0800 Collect surface soil at ExDU-3

IINY-ExDU-3A-SSIS-20200318 @ 0800

IINY-ExDU-3B-SSIS-20200318 @ 0800

IINY-ExDU-3C-SSIS-20200318 @0800

pH surface soil at ExDU-3:

ExDU-3A= 6.3

ExDU-3B= 6.5

ExDU-3C= 5.5

0930 Collect surface soil at ExDU-5

IINY-ExDU-5A-SSIS-20200318 @ 0930

IINY-ExDU-5B-SSIS-20200318 @ 0930

IINY-ExDU-5C-SSIS-20200318 @ 0930

pH surface soil at ExDU-5

ExDU-5A = 7.1

ExDU-5B = 7.2

ExDU-5C = 7.3

Iona Island

1015 Collect

IINY-E

IINY-E

IINY-E

pH su

1145 Collect

IINY-E

IINY-

IINY-

Use ExDU

pH surf

Ex

Ex

Ex

Soil at ExD

trace

dry to

Iona Island Naval Ammunition Depot FUDS 31/8/2020

1015 Collect surface soil at EXDU-6
IINY-EXDU-6A-SSIS-20200318 @ 1015
IINY-EXDU-6B-SSIS-20200318 @ 1015
IINY-EXDU-6C-SSIS-20200318 @ 1015

pH surface soil at EXDU-6
EXDU-6A : 7.2
EXDU-6B = 7.3
EXDU-6C : 7.3

1145 Collect surface soil at EXDU-7
IINY-EXDU-7A-SSIS-20200318 @ 1145
IINY-EXDU-7B-SSIS-20200318 @ 1145
IINY-EXDU-7C-SSIS-20200318 @ 1145
Use EXDU-7A for MS/MSD
pH surface soil at EXDU-7:
EXDU-7A: 7.0
EXDU-7B: 7.0
EXDU-7C: 7.1

Soil at EXDU-3 = silty topsoil, trace clay, trace very fine sand, some organics. brown, dry to slightly moist

Rite in the Rain

3/18/2020 Iona Island Naval Ammunition Depot FUDs

Soil at ExDU-5: Silty topsoil, trace clay. Brown, slightly moist. Some organics

Soil at ExDU-6: Silty topsoil, trace clay, trace coarse gravel, some organics. Brown, slightly moist

Soil at ExDU-7: Silty topsoil, trace very fine sand, trace clay, some organics. Brown, slightly moist

COC: 031820.-A

1500 Collect surface soil at OU-1 for PAHs, target analyte list (TAL) metals, mercury
IINY-DU-1A-SSIS-20200318 @ 1500
IINY-DU-1B-SSIS-20200318 @ 1500
IINY-DU-1C-SSIS-20200318 @ 1500
pH at DU-1 surface soil:
DU-1A = 5.6
DU-1B = 6.5
DU-1C = 6.8.
IINY-DU-1A-SSIS-20200318 use for MS/MSD
Advanced borings at OU-1 to evaluate subsurface soil collection. Refusal at 6-8". Will not collect Subsurface Soil- consult USACE for path forward.

Iona Island Naval Ammunition Depot FUDS 3/18/2020

1430 Collect surface soil at DU-4 for
PAHs, TAL metals, mercury
IINY-DU-4A-SSIS-20200318 @ 1430
IINY-DU-4B-SSIS-20200318 @ 1430
IINY-DU-4C-SSIS-20200318 @ 1430

pH at DU-4 surface soil:
DU-4A = 6.9
DU-4B = 7.0
DU-4C = 7.1

Advance auger borings at DU-4 to evaluate subsurface potential. Significant anomalies, difficult to advance auger. 1 boring to 12", other borings 4-6" to refusal. Will not collect subsurface soil - consult w/ USACE for path forward

1545 Collect surface soil at DU-3 for
PAHs, TAL Metals, mercury
IINY-DU-3A-SSIS-20200318 @ 1545
IINY-DU-3B-SSIS-20200318 @ 1545
IINY-DU-3C-SSIS-20200318 @ 1545

pH at DU-3 surface soil:
DU-3A = 7.0
DU-3B = 7.0
DU-3C = 7.1

Rite in the Rain

3/18/2020 Iona Island Naval Ammunition Depot FUDS

ExDU analyses: Explosives by SW 8330B
DU-1, DU-4, DU-3 = ICP metals by SW 6010C,
ICPMS Metals by SW 6020A,
mercury Solid by SW 7471B,
BNA SIM by BNASIM

Pack 2 coolers: ExDU samples COC = 031820-A
DU-1, DU-4, DU-3 samples COC = 031820-B

Soil DU-1 = Silty topsoil, some fine - coarse sand,
trace fine gravel, some organics. Brown. Dry

Soil DU-4 = Silty topsoil, some f-c sand, trace
f-c gravel, some organics. Brown. Dry

Soil DU-3 = Silty topsoil, some f-c sand, trace
f gravel, some organics. Brown. Dry.

1730 AK offsite. Josh (UXO tech) drops off
samples at Fld Ex

3/18/2020

Iona Island Naval Ammunition Depot FUDS 3/19/2020

0700 AK on site. Sign in, attend health & safety briefing. Plan for morning: collect ~~sub~~surface soil at DU-2 and DU-5. Evaluate subsurface soil depth at DU-3, DU-2, DU-5. Working w/ Josh (UXO Tech), Derek H. 4K 3/19/2020

0730 Mob to DU-2

0815 Collect surface soil at DU-2

IINY-DU-2A-SSIS-20200319 @ 0815

IINY-DU-2B-SSIS-20200319 @ 0815

IINY-DU-2C-SSIS-20200319 @ 0815

pH surface soil at DU-2

DU-2A = 5.6

DU-2B = 6.6

DU-2C = 6.8

0900 Collect surface soil at DU-5

IINY-DU-5A-SSIS-20200319 @ 0900

IINY-DU-5B-SSIS-20200319 @ 0900

IINY-DU-5C-SSIS-20200319 @ 0900

pH surface soil at DU-5

DU-5A = 7.1

DU-5B = 7.1

DU-5C = 7.1

 3/19/2020 Iona Island Naval Ammunition Depot FUDs

Subsurface soil at DU-3, DU-2, DU-5:
Advanced 5 borings at each DU- hard to locate areas to advance borings due to exposed/ shallow bedrock and refusal. Depth of borings less than 8". Will not collect subsurface soil- consult USACE for path foward

Surface soil at DU-2: silty clay topsoil, very fine sand (trace). Brown, slightly moist. Trace medium gravel. Some organics.

Surface soil at DU-5: silty clay topsoil, very fine sand (trace). Brown, slightly moist. some organics.

1020 At DU-9 /DU-10 to collect surface soil
1040 Collect Surface soil at DU-9
IINY-DU-9A-SSIS-20200319 @1040
IINY-DU-9B-SSIS-20200319 @1040
IINY-DU-9C-SSIS-20200319 @1040
* Use IINY-DU-9C-SSIS-20200319 for MS/MSD
pH at DU-9 Surface soil:
DU-9A= 7.1
DU-9B= 6.9
DU-9C= 7.0

Iona Island Naval Ammunition Depot FUDS 3/19/2020

1120 Collect surface soil at DU-10
IINY-DU-10A-SSIS-20200319 @ 1120
IINY-DU-10B-SSIS-20200319 @ 1120
IINY-DU-10C-SSIS-20200319 @ 1120

pH at DU-10 Surface soil:
DU-10A = 7.1
DU-10B = 7.1
DU-10C = 7.2

Evaluate subsurface soil at DU-9 and DU-10:
Advance 5 borings in each DU. All borings <8"
to refusal. Exposed bedrock, bedrock wall
along DU-10. Will not collect subsurface soil -
consult USACE for path forward
Surface soil at DU-9 = Silty topsoil, little clay,
trace vf sand, some organics. Brown, slightly
moist.

Surface soil at DU-10 =

16
3/19/2020 Iona Island Naval Ammunition Depot FUDS

1300 At OU-7 and OU-C to collect surface soil

1345 Collect surface soil at OU-7

IIN-OU-7A-SSIS-20200319 @ 1345

IIN-OU-7B-SSIS-20200319 @ 1345

IIN-OU-7C-SSIS-20200319 @ 1345

Soil pH at OU-7: Surface soil

OU-7A = 7.4

OU-7B = 7.4

OU-7C = 7.5

1500 Collect surface soil at OU-6

IIN-OU-6A-SSIS-20200319 @ 1500

IIN-OU-6B-SSIS-20200319 @ 1500

IIN-OU-6C-SSIS-20200319 @ 1500

Soil pH at OU-6 surface soil

OU-6A = 7.5

OU-6B = 7.5

OU-6C = 7.5

Evaluate subsurface soil potential at OU-6 and OU-7: Advance 5 borings at each OU with hand auger. Borings advanced to maximum of 8 inches bgs, encountered refusal Will not collect subsurface soil - consult USACE for path forward

Iona Island Na

Surface soil
very fine
brown. S

Surface soil
vf sand.

Shipped 2 c
metals
OU-3, OU-2
metals, merc
-ICP me
- ICPMS
- Mercur
- PAHs

OU-10, OU
1630 offsite

Iona Island Naval Ammunition Depot FUDS 3/19/2020

Surface Soil at OU-6: silty soil, trace clay, trace very fine sand. Brown, some light brown/yellow brown. Some organics. Slightly moist

Surface soil at DU-7: silty topsoil, trace clay, trace vf sand. Brown. Some organics. dry

Shipped 2 coolers samples to Test America via Fed Ex.

Metals

~~DU-3~~, DU-2, DU-5, DU-9 analyzed for metals, mercury, PAHs.

- ICP metals via SW 6010C
- ICPMS Metals via SW 6020A
- Mercury (sol.d) via SW 7471B
- PAHs BNASIM via BNA SIM method

OU-10, DU-7, DU-6 analyzed for metals only

1630 Offsite

3/19/2020

Rite in the Rain

3/20/2020 Iona Island Naval Ammunition Depot FUDS

0700 AK on site. Attend tailgate safety meeting, sign in. Working w/ Josh (UXO tech), Derek H. Plan for day: check OU-24 for sampling potential (bedrock area on round Island) Sample PCBs at OU-23, OU-25 and metals at OU-14.

0730 Evaluate OU-24 and dump area. OU-24 extends from shoreline up cliff face. Exposed bedrock, little/no soil. Took photos of conditions. Dump area grids extend up cliff face - limit sampling to w/in dump area/marsh

0830 At OU-14. Collect surface soils for metals
IINY-OU-14A-SSIS-20200320 @0830
IINY-OU-14B-SSIS-20200320 @0830
IINY-OU-14C-SSIS-20200320 @0830

pH surface soil at OU-14:
OU-14A: 6.7
OU-14B: 6.9
OU-14C: 7.0

Surface soil at OU-14: sandy silty topsoil, well sorted, dark brown, dry

Iona Island N

0915 Collect

SSIS -

SSIS -

SS

IINY-O

IINY-O

IINY-

pH surf

Surface s
moderately
Dry.

Exposed
<6" de
Will
of con

1030 Collect

Iona Island Naval Ammunition Depot FUDS 3/20/2020

0915 Collect surface soil at DU-23 for PCBs
SSIS-DU-23A-1K 3/20/2020
SSIS-DU-23B-
SSS

IINY-DU-23A-SSIS-20200320 @ 0915
IINY-DU-23B-SSIS-20200320 @ 0915
IINY-DU-23C-SSIS-20200320 @ 0915

pH surface soil at DU-23:
DU-23A= 6.0
DU-23B= 5.4 1K 3/20/2020
DU-23C= 5.5

Surface soil at DU-23: Dark brown/black moderately sorted sandy silty topsoil. Some organics. Dry.

Exposed bedrock, very shallow soil at DU-23. <6" depth. Difficult to collect surface soil. Will not collect subsurface soil. Took photos of conditions.

1030 Collect surface soil at DU-25 for PCBs

3/20/2020 Iona Island Naval Ammunition Depot FUDs

IINY-DU-25A-SSIS-20200320 @ 1030

IINY-DU-25B-SSIS-20200320 @ 1030

IINY-DU-25C-SSIS-20200320 @ 1030

* use IINY-DU-25A-SSIS-20200320 for mg/kg

pH surface soil at DU-25

DU-25A = 6.2

DU-25B = 6.4

DU-25C = 6.4

Surface soil DU-25 = Silty topsoil, high organic content, moderately sorted, Dry

Evaluate subsurface soil potential at DU-25:
Advanced 5 borings w/in DU. All borings <8" to bedrock/refusal. Will not collect subsurface soil- consult USACE for path forward

Evaluate subsurface soil potential at DU-14: Advanced 5 borings w/in DU. All borings <8" to bedrock/refusal. Will not collect subsurface soil- consult USACE for path forward

1 Cooler Samples, COC 032020-A
PCBs by SW 8082 A (DU-23, DU-25)
Metals/SW 6010A and 6020C, Mercury/7471B for DU-14

Iona Island N

Shipped 1 co
Potentially sho
mandat, w.l

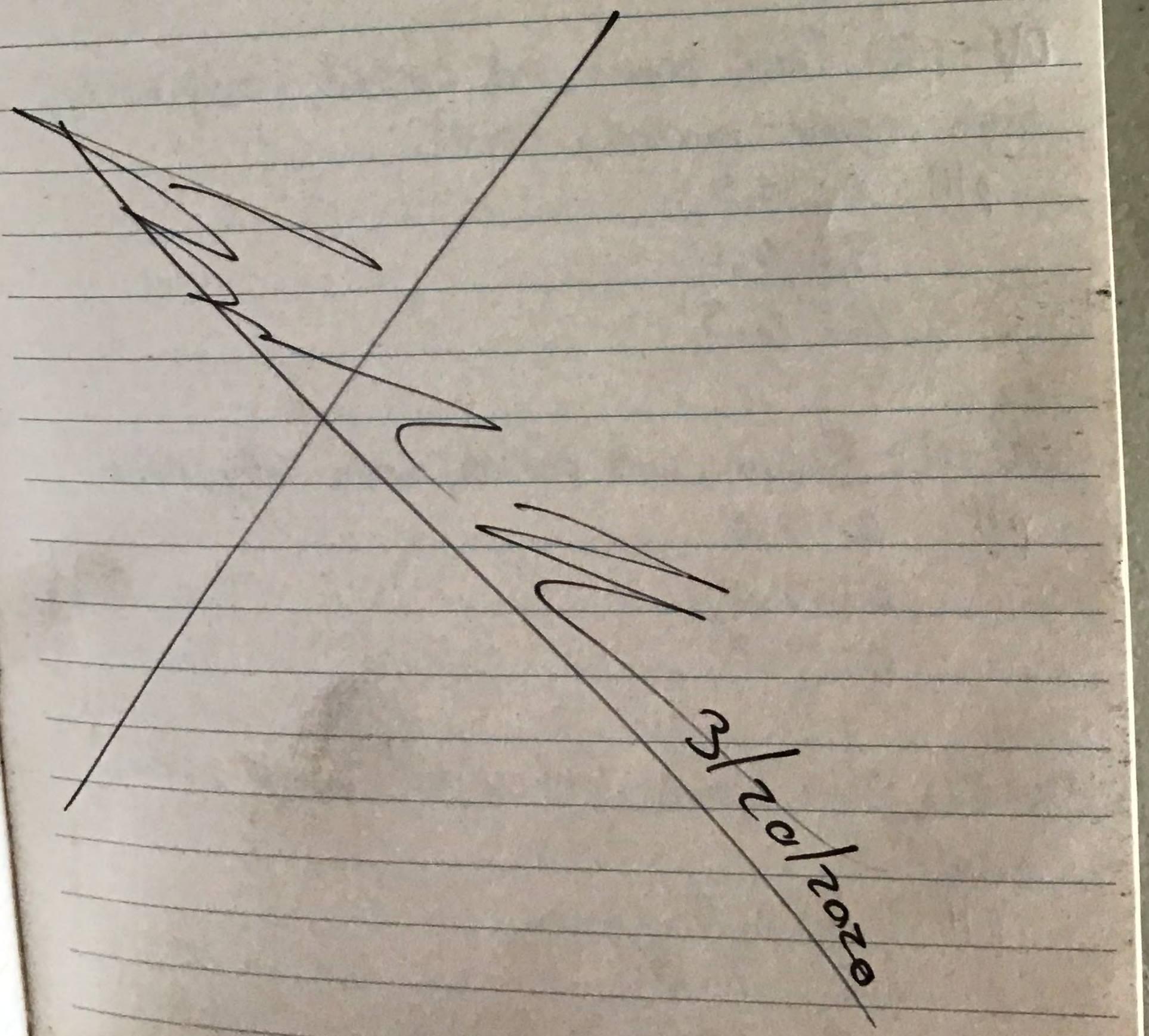
USACE

At offs.te at

Iona Island Naval Ammunition Depot FUDS 3/20/2020

Shipped 1 cooler via Fed Ex
Potentially stopping work due to government mandate, will coordinate rescheduling w/ Parks and USACE

At offsite at 1230



Rite in the Rain

22 3/30/2020 Iona Island Naval Ammunition Depot Fuels

1000 A. Shaub, D Hendricks onsite
1030 Initiate setup on DU-11
1115 Complete collection at DU-11 - MS/MSD
initiate setup on DU-12
1215 Complete collection at DU-12
1230 initiate setup on DU-13
1340 Complete sampling at DU-13
return to Coney to process samples

DU-12: Dark brown, well sorted, sandy silty, high organic content, moist.
pH: A: 5.5
B: 6.1
C: 6.3

DU-11: Brown, well sorted, sandy silty, moist
pH: A: 7.0
B: 7.0
C: 7.0

DU-13: Dark brown, well sorted, sandy silty, moist.
pH: A. 6.8
B. 7.0
C. 6.9

Iona Island
1 cooler
samples -
All anal
1645 off
- plans
on

Iona Island Naval Ammunition Depot FUDS 313.1202a

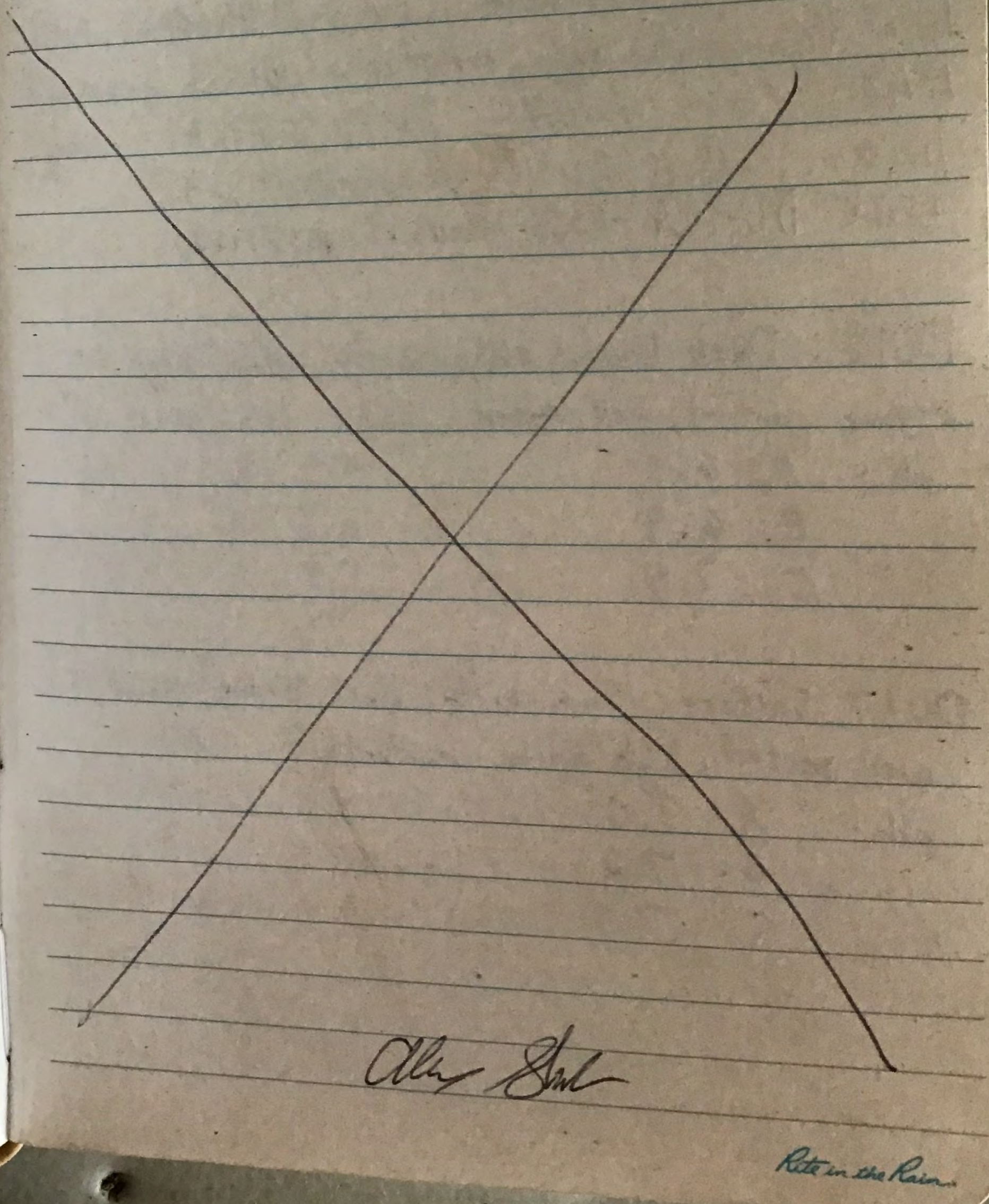
1 cooler to be shipped to TA-54. Lab

samples - 11A/11BA/11C, 12A, 12B, 12C, 13A/13BA/13C

All analyzed for - metals, PAHs, total mercury

1645 offsite

- Plans to collect DU-16, DU-17, DU-18, and DU-19 on morning of 3/31/2020



Rite in the Rain

24 3/3/2020 Iona Island Naval Ammunition Depot Flats

645 A. Shaub + D. Hendricks on site
715 Initiate Setup on DU-17
DU-17 surface collected at 815
DU-17 subsurface collected at 845
900 Initiate setup on DU-16
950 Finish collecting surface soil at DU-16
no subsurface soil collected
1000 Begin setup and collection at DU-19
1045 finish collecting DU-19 surface
1100 Collect DU-19 subsurface
IINK DU-19A-SSIS-20200331.ms/msD

DU16: Dark brown, silty sandy, dry, high organic content, well sorted.
pH - A: 6.9
B: 6.9
C: 7.4

DU17 Surface: Sandy-silty, dark brown, moist, well sorted, high organic content.
pH - A: 7.2
B: 7.2
C: 7.1

Iona Island Naval Ammition Dep. t FUDS 3/31/2025

DU17 Sub Surface: Sandy, black, very moist, poorly sorted.
pH - A: 7.0
B: 7.4
C: 7.7

DU19 Surface: Dark brown, silty-sandy, moderately sorted, moist, high organic content
pH - A: 7.7
B: 7.5
C: 7.4

DU19 Sub Surface: Dark grey-bluish tint, silty-sandy, well sorted, moist
pH - A: 7.3
B: 7.6
C: 7.7

1300 setup on DU-18
-collect DU-18 at 1345
subsurface collected at 1420
refusal generally betwen 14-19 inches
DU 18 surface sandy silt, dark brown, moist, mod. sorted
pH A: 7.5
B: 8.0
C: 7.8

Rite in the Rain

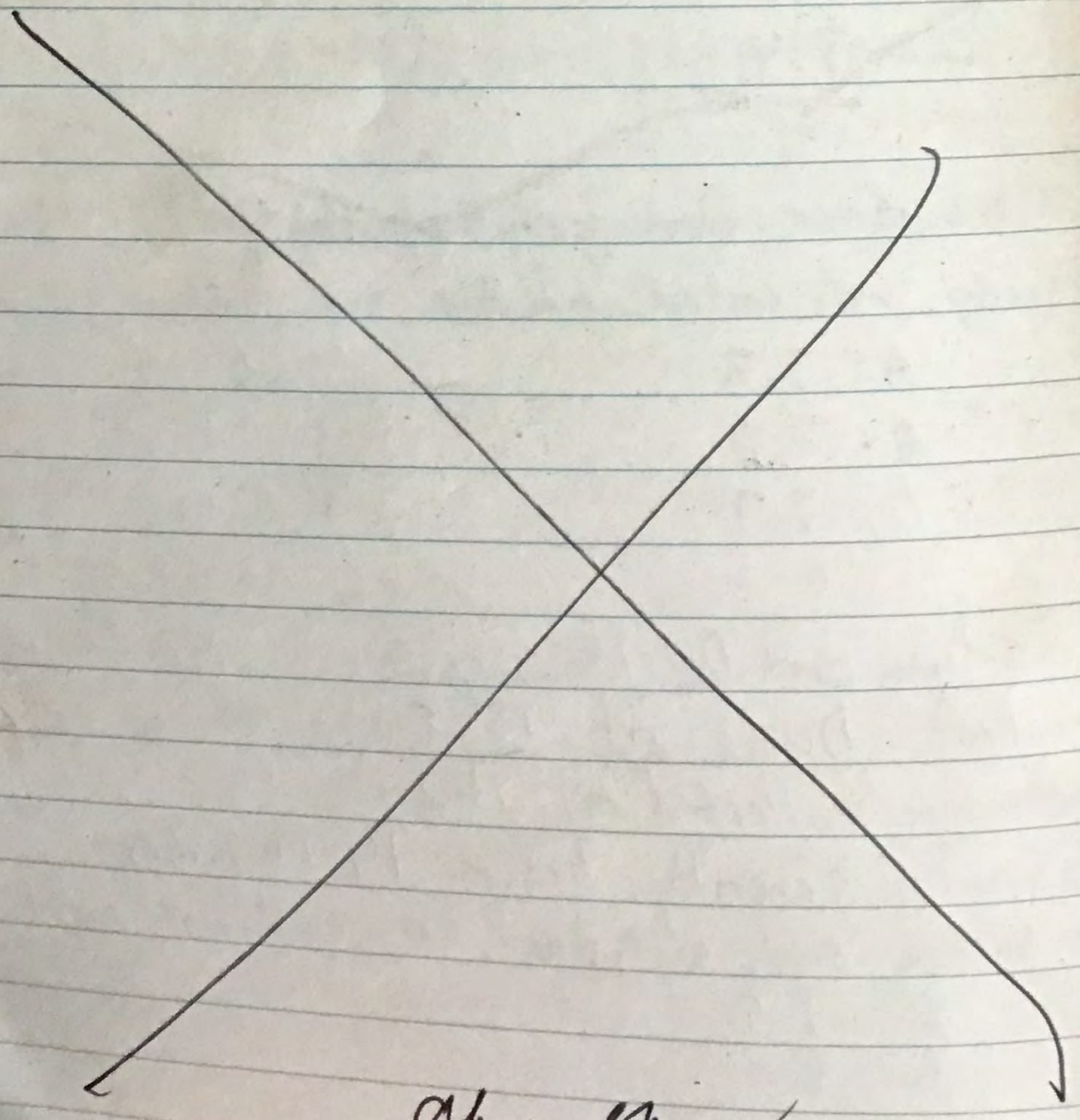
26 3/31/2020 Iona Island FUDS

DU 18 Subsurface: fine-course sandy silt, coarsening downward sequence, dark brown with grey increasing with depth, wet

pH A: 8.1
B: 8.1
C: 8.0

1630 Depart for Fed Ex with 2 coolers bound for TA-54. Lavs

1730 End of day



Iona Island
645 A. Shaw
730 initiate
DU-15
no
840 Arrive
BADU
BADU
BADU
BADU
940 Arrive
1100 Arr
11
BA
BA
BA
pH 15
is
15
BA
BA
B

Tara Island Naval Armaments Dept FUDS 4/1/2025

645 A. Shuck D. Herbrick on site
730 initial setup on DU-15
DU-15 collected at 820
no subsurface soil collected
840 Arrive at BADU-5, 6, 7, and 8
BADU-7 collected at 900
BADU-8 collected at 925
BADU-5 collected at 955-MS/MSD
BADU-6 collected at 920
940 Arrive at corn to drop off sample
1100 Arrive at BADU-1, 2, 3 and 4
1145 collect BADU-1
BADU-2 collected at 1215
BADU-3 collected at 1245
BADU-4 collected at 1320

pH	15a - 6.2	7.5YR 3/2
	15b - 6.3	↓
	15c - 6.6	
	BADU2 - 6.3	7.5YR 2.5/1
	BADU2 - 6.7	7.5YR 2.5/2
	BADU3 - 6.0	10YR 2/2
	BADU4 - 6.1	7.5YR 2.5/2
	BADU5 - 6.1	7.5YR 3/3
	BADU6 - 5.9	7.5YR 3/2
	BADU7 - 6.1	10YR 2/2
	BADU8 - 6.0	7.5YR 2/2

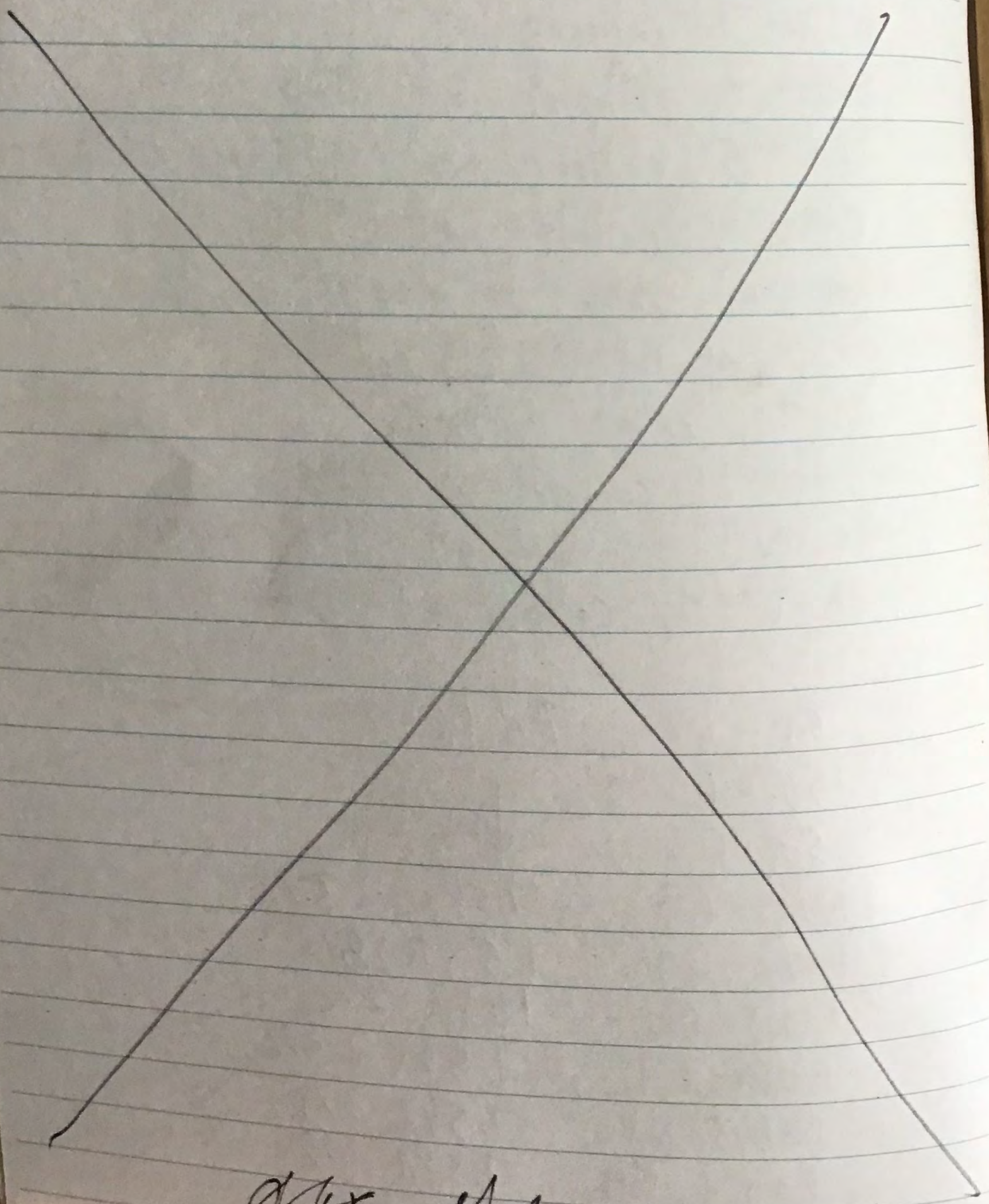
Rite in the Rain

28 Iona Island Naval Ammunition Depot 4/11/2024

1400 process samples at conoy
- 1 cooler to be shipped to TA. St Louis
- 11 samples total

1630 cooler delivered to FedEx

1730 End of day



Alex Shultz 4/11/2024

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A2
Phase I pH Meter
Calibration Forms

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EA Engineering, Science, and Technology, Inc.

pH METER DAILY FIELD CALIBRATION FORM

pH CALIBRATION
Time: 1400

pH STANDARD	PRE-CALIBRATION READING	POST-CALIBRATION READING (calibration requirement: within 0.2 pH unit of standard)
4.0	4.0	4.0
7.0	7.1	7.1
10.0	9.9	10.0

COMMENTS

N/A 3/16/20

SIGNATURE _____

EA Engineering, Science, and Technology, Inc.

pH METER DAILY FIELD CALIBRATION FORM

pH CALIBRATION

Time: 1900 3/17/20

pH STANDARD	PRE-CALIBRATION READING	POST-CALIBRATION READING (calibration requirement: within 0.2 pH unit of standard)
4.0	4.0	4.0
7.0	7.3	7.1
10.0	9.9	10.1

COMMENTS

N/A

SIGNATURE _____

EA Engineering, Science, and Technology, Inc.

pH METER DAILY FIELD CALIBRATION FORM

pH CALIBRATION

Time: 1300

pH STANDARD	PRE-CALIBRATION READING	POST-CALIBRATION READING (calibration requirement: within 0.2 pH unit of standard)
4.0	4.1	4.1
7.0	7.0	7.1
10.0	10.0	10.0

3/17/20

COMMENTS

N/A

SIGNATURE _____

EA Engineering, Science, and Technology, Inc.

pH METER DAILY FIELD CALIBRATION FORM

pH CALIBRATION

Time: 0700

pH STANDARD	PRE-CALIBRATION READING	POST-CALIBRATION READING (calibration requirement: within 0.2 pH unit of standard)
4.0	4.0	4.0
7.0	7.0	7.0
10.0	10.2	10.1

COMMENTS

NA 3/18/23

SIGNATURE _____

EA Engineering, Science, and Technology, Inc.

pH METER DAILY FIELD CALIBRATION FORM

pH CALIBRATION

Time: 1200

pH STANDARD	PRE-CALIBRATION READING	POST-CALIBRATION READING (calibration requirement: within 0.2 pH unit of standard)
4.0	3.7	3.9
7.0	7.1	7.0
10.0	9.9	10.0

COMMENTS

N/A

3/18/20

SIGNATURE _____

EA Engineering, Science, and Technology, Inc.

pH METER DAILY FIELD CALIBRATION FORM

3/19/20

pH CALIBRATION
Time: ~~Stat~~ 0700

pH STANDARD	PRE-CALIBRATION READING	POST-CALIBRATION READING (calibration requirement: within 0.2 pH unit of standard)
4.0	4.3	4.1
7.0	7.0	7.0
10.0	10.0	10.0

COMMENTS

N/A

SIGNATURE _____

EA Engineering, Science, and Technology, Inc.

pH METER DAILY FIELD CALIBRATION FORM

pH CALIBRATION

Time: 1035

pH STANDARD	PRE-CALIBRATION READING	POST-CALIBRATION READING (calibration requirement: within 0.2 pH unit of standard)
4.0	4.0	4.0
7.0	7.1	7.1
10.0	10.3	10.1

COMMENTS

NA 3/19/20

SIGNATURE _____

EA Engineering, Science, and Technology, Inc.

pH METER DAILY FIELD CALIBRATION FORM

3/30/20

pH CALIBRATION
Time: 0800

pH STANDARD	PRE-CALIBRATION READING	POST-CALIBRATION READING (calibration requirement: within 0.2 pH unit of standard)
4.0	4.1	4.0
7.0	7.0	7.0
10.0	10.1	10.0

COMMENTS

N/A

SIGNATURE _____

EA Engineering, Science, and Technology, Inc.

pH METER DAILY FIELD CALIBRATION FORM

pH CALIBRATION

3/20 Time: 1200

pH STANDARD	PRE-CALIBRATION READING	POST-CALIBRATION READING (calibration requirement: within 0.2 pH unit of standard)
4.0	4.1	4.1
7.0	7.4	7.2
10.0	10.0	10.0

COMMENTS

NA

SIGNATURE _____

EA Engineering, Science, and Technology, Inc.

pH METER DAILY FIELD CALIBRATION FORM

pH CALIBRATION

Time: 1400 3/30/2C

pH STANDARD	PRE-CALIBRATION READING	POST-CALIBRATION READING (calibration requirement: within 0.2 pH unit of standard)
4.0	4.1	4.1
7.0	7.1	7.0
10.0	9.8	9.9

COMMENTS

NA

SIGNATURE _____

EA Engineering, Science, and Technology, Inc.

pH METER DAILY FIELD CALIBRATION FORM

pH CALIBRATION

Time: 1130 3/31/20

pH STANDARD	PRE-CALIBRATION READING	POST-CALIBRATION READING (calibration requirement: within 0.2 pH unit of standard)
4.0	4.6	4.2
7.0	7.3	7.1
10.0	9.7	9.9

COMMENTS

N/A

SIGNATURE [signature]

EA Engineering, Science, and Technology, Inc.

pH METER DAILY FIELD CALIBRATION FORM

pH CALIBRATION

Time: 1130 4/1/20

pH STANDARD	PRE-CALIBRATION READING	POST-CALIBRATION READING (calibration requirement: within 0.2 pH unit of standard)
4.0	4.3	4.1
7.0	7.0	7.0
10.0	10.2	9.9

COMMENTS

N/A

SIGNATURE [signature]

A3
Phase I Sample Tracking Table

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Decision Unit #	Sample Type	Sample Identification Code	Analyses	Sample Date	Sample Time	QA/QC Sample	COC ID	Soil pH
Phase I Investigation Area: Surface and Subsurface Soil, Groundwater								
DU-1	Surface Soil Incremental Sample collected in triplicate	IINY-DU-1A-SSIS-20200318	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH (screened in the field with pH meter)	3/18/2020	1500	MS/MSD	031820-B	5.6
		IINY-DU-1B-SSIS-20200318		3/18/2020	1500		031820-B	6.5
		IINY-DU-1C-SSIS-20200318		3/18/2020	1500		031820-B	6.8
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-1A-SBIS1-YYYYMMDD	Advanced 6 hand auger borings at DU-1. Soil depth to refusal ranged from 6 to 8 inches bgs (<1 ft). Will not collect subsurface soil.					
		IINY-DU-1B-SBIS1-YYYYMMDD						
		IINY-DU-1C-SBIS1-YYYYMMDD						
DU-2	Surface Soil Incremental Sample collected in triplicate	IINY-DU-2A-SSIS-20200319	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH (screened in the field with pH meter)	3/19/2020	815		031920-A	5.6
		IINY-DU-2B-SSIS-20200319		3/19/2020	815		031920-A	6.6
		IINY-DU-2C-SSIS-20200319		3/19/2020	815		031920-A	6.8
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-2A-SBIS1-YYYYMMDD	Advanced >5 hand auger borings at DU-2. Hard to locate areas to advance borings due to exposed bedrock and shallow bedrock/refusal. Soil depth to refusal less than 8 inches bgs (<1 ft). Will not collect subsurface soil.					
		IINY-DU-2B-SBIS1-YYYYMMDD						
		IINY-DU-2C-SBIS1-YYYYMMDD						
DU-3	Surface Soil Incremental Sample collected in triplicate	IINY-DU-3A-SSIS-20200318	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH (screened in the field with pH meter)	3/18/2020	1545		031820-B	7.0
		IINY-DU-3B-SSIS-20200318		3/18/2020	1545		031820-B	7.0
		IINY-DU-3C-SSIS-20200318		3/18/2020	1545		031820-B	7.1
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-3A-SBIS1-YYYYMMDD	Advanced >5 hand auger borings at DU-3. Hard to locate areas to advance borings due to exposed bedrock and shallow bedrock/refusal. Soil depth to refusal less than 8 inches bgs (<1 ft). Will not collect subsurface soil.					
		IINY-DU-3B-SBIS1-YYYYMMDD						
		IINY-DU-3C-SBIS1-YYYYMMDD						
DU-4	Surface Soil Incremental Sample collected in triplicate	IINY-DU-4A-SSIS-20200318	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH (screened in the field with pH meter)	3/18/2020	1430		031820-B	6.9
		IINY-DU-4B-SSIS-20200318		3/18/2020	1430		031820-B	7.0
		IINY-DU-4C-SSIS-20200318		3/18/2020	1430		031820-B	7.1
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-4A-SBIS1-YYYYMMDD	Advanced 6 hand auger borings at DU-4. Significant anomalies in 1-acre DU. Soil depth to refusal at one boring was 12 inches bgs, soil depth to refusal at remaining borings ranged from 4 to 8 inches bgs (<1 ft). Will not collect subsurface soil.					
		IINY-DU-4B-SBIS1-YYYYMMDD						
		IINY-DU-4C-SBIS1-YYYYMMDD						
DU-5	Surface Soil Incremental Sample collected in triplicate	IINY-DU-5A-SSIS-20200319	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH (screened in the field with pH meter)	3/19/2020	900		031920-A	7.1
		IINY-DU-5B-SSIS-20200319		3/19/2020	900		031920-A	7.1
		IINY-DU-5C-SSIS-20200319		3/19/2020	900		031920-A	7.1
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-5A-SBIS1-YYYYMMDD	Advanced >5 hand auger borings at DU-5. Hard to locate areas to advance borings due to exposed bedrock and shallow bedrock/refusal. Soil depth to refusal less than 8 inches bgs (<1 ft). Will not collect subsurface soil.					
		IINY-DU-5B-SBIS1-YYYYMMDD						
		IINY-DU-5C-SBIS1-YYYYMMDD						
DU-6	Surface Soil Incremental Sample collected in triplicate	IINY-DU-6A-SSIS-20200319	TAL Metals by EPA Methods 6010C/6020A, pH (screened in the field with pH meter)	3/19/2020	1500		031920-B	7.5
		IINY-DU-6B-SSIS-20200319		3/19/2020	1500		031920-B	7.5
		IINY-DU-6C-SSIS-20200319		3/19/2020	1500		031920-B	7.5
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-6A-SBIS1-YYYYMMDD	Advanced >5 hand auger borings at DU-6. Exposed bedrock / bedrock wall in DU-6. Soil depth to refusal less than 8 inches bgs (<1 ft). Will not collect subsurface soil.					
		IINY-DU-6B-SBIS1-YYYYMMDD						
		IINY-DU-6C-SBIS1-YYYYMMDD						
DU-7	Surface Soil Incremental Sample collected in triplicate	IINY-DU-7A-SSIS-20200319	TAL Metals by EPA Methods 6010C/6020A, pH (screened in the field with pH meter)	3/19/2020	1345		031920-B	7.4
		IINY-DU-7B-SSIS-20200319		3/19/2020	1345		031920-B	7.4
		IINY-DU-7C-SSIS-20200319		3/19/2020	1345		031920-B	7.5
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-7A-SBIS1-YYYYMMDD	Advanced >5 hand auger borings at DU-7. Soil depth to refusal less than 8 inches bgs (<1 ft). Will not collect subsurface soil.					
		IINY-DU-7B-SBIS1-YYYYMMDD						
		IINY-DU-7C-SBIS1-YYYYMMDD						
DU-8	Surface Soil Incremental Sample collected in triplicate	IINY-DU-8A-SSIS-YYYYMMDD	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH (screened in the field with pH meter)	DU-8 Deletion – DU-8 was placed at former Building 207 that was a small garage located between existing Buildings 222, 201, and 212. Building 207 is also known as HTRW AOC #5. DU-8 is a 200x200 ft decision unit that was established around former Building 207 to determine whether former operations at this building served as a source of contaminants to the environment at concentrations that may result in potential risks to human and ecological receptors. Following mark-out DU-8 in the field and site reconnaissance conducted on 18 March 2020, numerous rusted and deteriorating 55-gallon drums, deteriorating pallets, piles of roofing shingles, chain link fencing, and other debris were observed in DU-8. Several empty 55-gallon drums were lying on their sides, while other drums were upright and filled with fluid. The material contained within the drums is not known. Residue indicative of roofing tar was observed on the outside of several drums, and staining was noted on the ground surface. Per discussion with USACE on 24 March 2020, DU-8 will not be sampled because it would not be possible to separate metals and PAH contaminants originating from former Building 207, from contaminants originating from drums and other debris observed in DU-8.				
		IINY-DU-8B-SSIS-YYYYMMDD						
		IINY-DU-8C-SSIS-YYYYMMDD						
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-8A-SBIS1-YYYYMMDD						
		IINY-DU-8B-SBIS1-YYYYMMDD						
		IINY-DU-8C-SBIS1-YYYYMMDD						
DU-9	Surface Soil Incremental Sample collected in triplicate	IINY-DU-9A-SSIS-20200319	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH (screened in the field with pH meter)	3/19/2020	1040		031920-A	7.1
		IINY-DU-9B-SSIS-20200319		3/19/2020	1040		031920-B	6.9
		IINY-DU-9C-SSIS-20200319		3/19/2020	1040	MS/MSD	031920-B	7.0
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-9A-SBIS1-YYYYMMDD	Advanced >5 hand auger borings at DU-9. Soil depth to refusal less than 8 inches bgs (<1 ft). Will not collect subsurface soil.					
		IINY-DU-9B-SBIS1-YYYYMMDD						
		IINY-DU-9C-SBIS1-YYYYMMDD						
DU-10	Surface Soil Incremental Sample collected in triplicate	IINY-DU-10A-SSIS-20200319	TAL Metals by EPA Methods 6010C/6020A, pH (screened in the field with pH meter)	3/19/2020	1120		031920-B	7.1
		IINY-DU-10B-SSIS-20200319		3/19/2020	1120		031920-B	7.1
		IINY-DU-10C-SSIS-20200319		3/19/2020	1120		031920-B	7.2
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-10A-SBIS1-YYYYMMDD	Advanced >5 hand auger borings at DU-10. Exposed bedrock and bedrock wall within DU. Soil depth to refusal less than 8 inches bgs (<1 ft). Will not collect subsurface soil.					
		IINY-DU-10B-SBIS1-YYYYMMDD						
		IINY-DU-10C-SBIS1-YYYYMMDD						
DU-11	Surface Soil Incremental Sample collected in triplicate	IINY-DU-11A-SSIS-20200330	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH (screened in the field with pH meter)	3/30/2020	1115	MS/MSD	033020-A	7.0
		IINY-DU-11B-SSIS-20200330		3/30/2020	1115		033020-A	7.0
		IINY-DU-11C-SSIS-20200330		3/30/2020	1115		033020-A	7.2
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-11A-SBIS1-YYYYMMDD	Advanced >5 hand auger borings at DU-11. Soil depth to refusal less than 2 inches bgs (<1 ft). Will not collect subsurface soil.					
		IINY-DU-11B-SBIS1-YYYYMMDD						
		IINY-DU-11C-SBIS1-YYYYMMDD						
DU-12	Surface Soil Incremental Sample collected in triplicate	IINY-DU-12A-SSIS-20200330	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH (screened in the field with pH meter)	3/30/2020	1215		033020-A	5.5
		IINY-DU-12B-SSIS-20200330		3/30/2020	1215		033020-A	6.1
		IINY-DU-12C-SSIS-20200330		3/30/2020	1215		033020-A	6.3
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-12A-SBIS1-YYYYMMDD	Advanced >5 hand auger borings at DU-12. Soil depth to refusal less than 2 inches bgs (<1 ft). Will not collect subsurface soil.					
		IINY-DU-12B-SBIS1-YYYYMMDD						
		IINY-DU-12C-SBIS1-YYYYMMDD						

Decision Unit #	Sample Type	Sample Identification Code	Analyses	Sample Date	Sample Time	QA/QC Sample	COC ID	Soil pH
Phase I Investigation Area: Surface and Subsurface Soil, Groundwater								
DU-13	Surface Soil Incremental Sample collected in triplicate	IINY-DU-13A-SSIS-20200330	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH (screened in the field with pH meter)	3/30/2020	1340		033020-A	6.8
		IINY-DU-13B-SSIS-20200330		3/30/2020	1340		033020-A	7.0
		IINY-DU-13C-SSIS-20200330		3/30/2020	1340		033020-A	6.9
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-13A-SBIS1-YYYYMMDD	Advanced >5 hand auger borings at DU-13. Soil depth to refusal less than 2 inches bgs (<1 ft). Will not collect subsurface soil.					
		IINY-DU-13B-SBIS1-YYYYMMDD						
		IINY-DU-13C-SBIS1-YYYYMMDD						
DU-14	Surface Soil Incremental Sample collected in triplicate	IINY-DU-14A-SSIS-20200320	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, pH (screened in the field with pH meter)	3/20/2020	830		032020-A	6.7
		IINY-DU-14B-SSIS-20200320		3/20/2020	830		302020-A	6.9
		IINY-DU-14C-SSIS-20200320		3/20/2020	830		032020-A	7.0
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-14A-SBIS1-YYYYMMDD	Advanced >5 hand auger borings at DU-9. Soil depth to refusal less than 8 inches bgs (<1 ft). Will not collect subsurface soil.					
		IINY-DU-14B-SBIS1-YYYYMMDD						
		IINY-DU-14C-SBIS1-YYYYMMDD						
DU-15	Surface Soil Incremental Sample collected in triplicate	IINY-DU-15A-SSIS-20200401	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, pH (screened in the field with pH meter)	4/1/2020	820		040120-A	6.2
		IINY-DU-15B-SSIS-20200401		4/1/2020	820		040120-A	6.3
		IINY-DU-15C-SSIS-20200401		4/1/2020	820		040120-A	6.6
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-15A-SBIS1-YYYYMMDD	Advanced >5 hand auger borings at DU-15. Soil depth to refusal less than 12 inches bgs (<1 ft). Will not collect subsurface soil.					
		IINY-DU-15B-SBIS1-YYYYMMDD						
		IINY-DU-15C-SBIS1-YYYYMMDD						
DU-16	Surface Soil Incremental Sample collected in triplicate	IINY-DU-16A-SSIS-20200331	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, pH (screened in the field with pH meter)	3/31/2020	950		033120-B	6.9
		IINY-DU-16B-SSIS-20200331		3/31/2020	950		033120-B	6.9
		IINY-DU-16C-SSIS-20200331		3/31/2020	950		033120-B	7.4
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-16A-SBIS1-YYYYMMDD	Advanced >5 hand auger borings at DU-16. Soil depth to refusal less than 12 inches bgs (<1 ft). Will not collect subsurface soil.					
		IINY-DU-16B-SBIS1-YYYYMMDD						
		IINY-DU-16C-SBIS1-YYYYMMDD						
DU-17	Surface Soil Incremental Sample collected in triplicate	IINY-DU-17A-SSIS-20200331	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, Aroclor PCBs by EPA Method 8082A, explosives by EPA Method 8330B, and pH (screened in the field with pH meter)	3/31/2020	815		033120-B	7.2
		IINY-DU-17B-SSIS-20200331		3/31/2020	815		033120-B	7.2
		IINY-DU-17C-SSIS-20200331		3/31/2020	815		033120-B	7.1
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-17A-SBIS1-20200331		3/31/2020	845		033120-A	7.0
		IINY-DU-17B-SBIS1-20200331		3/31/2020	845		033120-A	7.4
		IINY-DU-17C-SBIS1-20200331		3/31/2020	845		033120-A	7.7
DU-18	Surface Soil Incremental Sample collected in triplicate	IINY-DU-18A-SSIS-20200331	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, Aroclor PCBs by EPA Method 8082A, explosives by EPA Method 8330B, and pH (screened in the field with pH meter)	3/31/2020	1345		033120-B	7.5
		IINY-DU-18B-SSIS-20200331		3/31/2020	1345		033120-B	8.0
		IINY-DU-18C-SSIS-20200331		3/31/2020	1345		033120-B	7.8
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-18A-SBIS1-20200331		3/31/2020	1420		033120-B	8.1
		IINY-DU-18B-SBIS1-20200331		3/31/2020	1420		033120-B	8.1
		IINY-DU-18C-SBIS1-20200331		3/31/2020	1420		033120-b	8.0
DU-19	Surface Soil Incremental Sample collected in triplicate	IINY-DU-19A-SSIS-20200331	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM, Aroclor PCBs by EPA Method 8082A, explosives by EPA Method 8330B, and pH (screened in the field with pH meter)	3/31/2020	1045	MS/MSD	033120-A	7.7
		IINY-DU-19B-SSIS-20200331		3/31/2020	1045		033120-A	7.5
		IINY-DU-19C-SSIS-20200331		3/31/2020	1045		033120-A	7.4
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-19A-SBIS1-20200331		3/31/2020	1100		033120-A	7.0
		IINY-DU-19B-SBIS1-20200331		3/31/2020	1100		033120-A	7.4
		IINY-DU-19C-SBIS1-20200331		3/31/2020	1100		033120-A	7.7
DU-20	Surface Soil Incremental Sample collected in triplicate	IINY-DU-20A-SSIS-20200316	PAHs by EPA Method 8270 SIM (surface and subsurface soil), BTEX by EPA Method 8260B (subsurface soil only), and pH (screened in the field with pH meter)	3/16/2020	1530		031620-A	6.1
		IINY-DU-20B-SSIS-20200316		3/16/2020	1530		031620-A	6.5
		IINY-DU-20C-SSIS-20200316		3/16/2020	1530		031620-A	6.6
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-20A-SBIS1-20200317		3/17/2020	930	MS/MSD	031720-A / 031720-C	6.8
		IINY-DU-20B-SBIS1-20200317		3/17/2020	930		031720-A / 031720-C	6.9
		IINY-DU-20C-SBIS1-20200317		3/17/2020	930		031720-A / 031720-C	6.8
DU-21	Surface Soil Incremental Sample collected in triplicate	IINY-DU-21A-SSIS-20200317	PAHs by EPA Method 8270 SIM (surface and subsurface soil), BTEX by EPA Method 8260B (subsurface soil only), and pH (screened in the field with pH meter)	3/17/2020	1240		031720-A	6.3
		IINY-DU-21B-SSIS-20200317		3/17/2020	1240		031720-A	6.8
		IINY-DU-21C-SSIS-20200317		3/17/2020	1240		031720-A	6.8
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-21A-SBIS1-20200317		3/17/2020	1145		031720-A / 031720-C	7.0
		IINY-DU-21B-SBIS1-20200317		3/17/2020	1145		031720-A / 031720-C	7.1
		IINY-DU-21C-SBIS1-20200317		3/17/2020	1145		031720-A / 031720-C	7.3
DU-22	Surface Soil Incremental Sample collected in triplicate	IINY-DU-22A-SSIS-20200316	PAHs by EPA Method 8270 SIM (surface and subsurface soil), BTEX by EPA Method 8260B (subsurface soil only), and pH (screened in the field with pH meter)	3/16/2020	1530		031620-A	6.7
		IINY-DU-22B-SSIS-20200316		3/16/2020	1530		031620-A	6.8
		IINY-DU-22C-SSIS-20200316		3/16/2020	1530		031620-A	6.8
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-22A-SBIS1-YYYYMMDD	Advanced 6 hand auger borings at DU-22. Soil depth to refusal ranged from 6 to 8 inches bgs (<1 ft). Will not collect subsurface soil.E124					
		IINY-DU-22B-SBIS1-YYYYMMDD						
		IINY-DU-22C-SBIS1-YYYYMMDD						
DU-23	Surface Soil Incremental Sample collected in triplicate	IINY-DU-23A-SSIS-20200320	Aroclor PCBs by EPA Method 8082A, and pH (screened in the field with pH meter)	3/20/2020	915		032020-A	6.0
		IINY-DU-23B-SSIS-20200320		3/20/2020	915		032020-A	5.4
		IINY-DU-23C-SSIS-20200320		3/20/2020	915		032020-A	5.5
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-23A-SBIS1-YYYYMMDD	Advanced >5 hand auger borings at DU-23. Soil depth to refusal less than 6 inches bgs (<1 ft). Majority of DU is exposed bedrock. Very shallow soil. Will not collect subsurface soil.					
		IINY-DU-23B-SBIS1-YYYYMMDD						
		IINY-DU-23C-SBIS1-YYYYMMDD						
DU-24	Surface Soil Incremental Sample collected in triplicate	IINY-DU-24A-SSIS-YYYYMMDD	Aroclor PCBs by EPA Method 8082A, and pH (screened in the field with pH meter)	DU-24 Deletion – Historical documents indicate that a former transformers on a pole was located along the former eastern sentry path from Iona Island onto Round Island. A 60x60 ft decision unit, DU-24, was established on Round Island to evaluate the presence/absence of PCBs associated with the former transformer. DU-24 was one of three transformer decision units that is known as HTRW AOC #19 on Iona Island (Note: the other two transformer decision units were collect). DU-24 is bounded by the Hudson River to east/northeast and the former dump area between Iona and Round Islands to the northwest. A downed former electric pole was noted during a reconnaissance on 20 March 2020. The majority of DU-24 is exposed bedrock with little to thin soil cover. Sediment and soil was noted along the northeastern edge of DU-24 off the bedrock outcrop of Round Island, however this sediment/soil is along the shoreline of the tidally influenced Hudson River. Per a call with USACE on 24 March 2020, DU-24 will not be sampled. There is little/no soil available for sampling in the area of the former transformer. Any PCBs that may have been released from former transformers would have been transported via runoff and overland flow across the bedrock outcrop of Round Island to the Hudson River. However, as the Hudson River itself					
		IINY-DU-24B-SSIS-YYYYMMDD						
		IINY-DU-24C-SSIS-YYYYMMDD						
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-24A-SBIS1-YYYYMMDD						
		IINY-DU-24B-SBIS1-YYYYMMDD						

Decision Unit #	Sample Type	Sample Identification Code	Analyses	Sample Date	Sample Time	QA/QC Sample	COC ID	Soil pH
Phase I Investigation Area: Surface and Subsurface Soil, Groundwater								
		IINY-DU-24C-SBIS1-YYYYMMDD		Released from former transformers would have been transported via runoff and overland flow across the bedrock outcrop of Roundi Island to the Hudson River. However, as the Hudson River itself is a PCB source, collecting PCBs from soil/sediment along the Hudson River will not provide information that could be used to evaluate a potential release related to former transformers.				
DU-25	Surface Soil Incremental Sample collected in triplicate	IINY-DU-25A-SSIS-20200320	Aroclor PCBs by EPA Method 8082A, and pH (screened in the field with pH meter)	3/20/2020	1030	MS/MSD	032020-A	6.2
		IINY-DU-25B-SSIS-20200320		3/20/2020	1030	032020-A	032020-A	6.4
		IINY-DU-25C-SSIS-20200320		3/20/2020	1030		032020-A	6.4
	Subsurface Soil Incremental Sample collected in triplicate	IINY-DU-25A-SBIS1-YYYYMMDD		Advanced >5 hand auger borings at DU-25. Exposed bedrock and bedrock wall within DU. Soil depth to refusal less than 8 inches bgs (<1 ft). Will not collect subsurface soil.				
		IINY-DU-25B-SBIS1-YYYYMMDD						
		IINY-DU-25C-SBIS1-YYYYMMDD						
Former Buildings Identified as Having Significant Potential for Explosive Hazard (EXDU; pending direction of contracting offer): Surface and Subsurface Soil								
EXDU-1	Surface Soil Incremental Sample collected in triplicate	IINY-DU-1A-SSIS-20200317	Explosives residues by EPA Method 8330B, and pH (screened in the field with pH meter)	3/17/2020	1535		031720-B	7.0
		IINY-DU-1B-SSIS-20200317		3/17/2020	1535		031720-B	6.9
		IINY-DU-1C-SSIS-20200317		3/17/2020	1535		031720-B	6.9
EXDU-2	Surface Soil Incremental Sample collected in triplicate	IINY-DU-2A-SSIS-20200317	Explosives residues by EPA Method 8330B, and pH (screened in the field with pH meter)	3/17/2020	1610		031720-B	7.0
		IINY-DU-2B-SSIS-20200317		3/17/2020	1610		031720-B	6.8
		IINY-DU-2C-SSIS-20200317		3/17/2020	1610		031720-B	6.9
EXDU-3	Surface Soil Incremental Sample collected in triplicate	IINY-DU-3A-SSIS-20200318	Explosives residues by EPA Method 8330B, and pH (screened in the field with pH meter)	3/18/2020	800		031820-A	6.3
		IINY-DU-3B-SSIS-20200318		3/18/2020	800		031820-A	6.5
		IINY-DU-3C-SSIS-20200318		3/18/2020	800		031820-A	5.5
EXDU-4	Surface Soil Incremental Sample collected in triplicate	IINY-DU-4A-SSIS-20200317	Explosives residues by EPA Method 8330B, and pH (screened in the field with pH meter)	3/17/2020	1430	MS/MSD	031720-A	6.5
		IINY-DU-4B-SSIS-20200317		3/17/2020	1430		031720-B	6.3
		IINY-DU-4C-SSIS-20200317		3/17/2020	1430		031720-B	6.8
EXDU-5	Surface Soil Incremental Sample collected in triplicate	IINY-DU-5A-SSIS-20200318	Explosives residues by EPA Method 8330B, and pH (screened in the field with pH meter)	3/18/2020	930		031820-A	7.1
		IINY-DU-5B-SSIS-20200318		3/18/2020	930		031820-A	7.2
		IINY-DU-5C-SSIS-20200318		3/18/2020	930		031820-A	7.3
EXDU-6	Surface Soil Incremental Sample collected in triplicate	IINY-DU-6A-SSIS-20200318	Explosives residues by EPA Method 8330B, and pH (screened in the field with pH meter)	3/18/2020	1015		031820-A	7.2
		IINY-DU-6B-SSIS-20200318		3/18/2020	1015		031820-A	7.3
		IINY-DU-6C-SSIS-20200318		3/18/2020	1015		031820-A	7.3
EXDU-7	Surface Soil Incremental Sample collected in triplicate	IINY-DU-7A-SSIS-20200318	Explosives residues by EPA Method 8330B, and pH (screened in the field with pH meter)	3/18/2020	1145	MS/MSD	031820-A	7.0
		IINY-DU-7B-SSIS-20200318		3/18/2020	1145		031820-A	7.0
		IINY-DU-7C-SSIS-20200318		3/18/2020	1145		031820-A	7.1
Phase I Background: Surface and Subsurface Soil								
BDU-1	Surface Soil Incremental Sample	IINY-BADU-1-SSIS-20200401	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM	4/1/2020	1145		040120-A	6.3
	Subsurface Soil Incremental Sample	IINY-BADU-1-SBIS1-YYYYMMDD		<12" to refusal. Did not collect subsurface soil.				
BDU-2	Surface Soil Incremental Sample	IINY-BADU-2-SSIS-20200401	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM	4/1/2020	1215		040120-A	6.7
	Subsurface Soil Incremental Sample	IINY-BADU-2-SBIS1-YYYYMMDD		<12" to refusal. Portions of DU is rock outcrop. Soil typically only 3" to 8" in depth. Did not collect subsurface soil.				
BDU-3	Surface Soil Incremental Sample	IINY-BADU-3-SSIS-20200401	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM	4/1/2020	1245		040120-A	6.0
	Subsurface Soil Incremental Sample	IINY-BADU-3-SBIS1-YYYYMMDD		<12" to refusal. Portions of DU is rock outcrop. Soil typically only 3" to 8" in depth. Did not collect subsurface soil.				
BDU-4	Surface Soil Incremental Sample	IINY-BADU-4-SSIS-20200401	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM	4/1/2020	1320		040120-A	6.1
	Subsurface Soil Incremental Sample	IINY-BADU-4-SBIS1-YYYYMMDD		<12" to refusal. Portions of DU is rock outcrop. Soil typically only 3" to 8" in depth. Did not collect subsurface soil.				
BDU-5	Surface Soil Incremental Sample	IINY-BADU-5-SSIS-20200401	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM	4/1/2020	955	MS/MSD	040120-A	6.1
	Subsurface Soil Incremental Sample	IINY-BADU-5-SBIS1-YYYYMMDD		<12" to refusal. Portions of DU is rock outcrop. Soil typically only 3" to 8" in depth. Did not collect subsurface soil.				
BDU-6	Surface Soil Incremental Sample	IINY-BADU-6-SSIS-20200401	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM	4/1/2020	920		040120-A	5.9
	Subsurface Soil Incremental Sample	IINY-BADU-6-SBIS1-YYYYMMDD		<12" to refusal. Portions of DU is rock outcrop. Soil typically only 3" to 8" in depth. Did not collect subsurface soil.				
BDU-7	Surface Soil Incremental Sample	IINY-BADU-7-SSIS-20200401	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM	4/1/2020	900		040120-A	6.1
	Subsurface Soil Incremental Sample	IINY-BADU-7-SBIS1-YYYYMMDD		<12" to refusal. Portions of DU is rock outcrop. Soil typically only 3" to 8" in depth. Did not collect subsurface soil.				
BDU-8	Surface Soil Incremental Sample	IINY-BADU-8-SSIS-20200401	TAL Metals by EPA Methods 6010C/6020A, Mercury by EPA Method 7471B, PAHs by EPA Method 8270 SIM	4/1/2020	925		040120-A	6.0
	Subsurface Soil Incremental Sample	IINY-BADU-8-SBIS1-YYYYMMDD		<12" to refusal. Portions of DU is rock outcrop. Soil typically only 3" to 8" in depth. Did not collect subsurface soil.				
Shoreline Reconnaissance Survey Sediment Sampling								
SD-01	Discrete Sediment Sample	IINY-SD01-YYYYMMDD	TOC by Walkley-Black, grain size by ASTM D422					
SD-02	Discrete Sediment Sample	IINY-SD02-YYYYMMDD	TOC by Walkley-Black, grain size by ASTM D422					
SD-03	Discrete Sediment Sample	IINY-SD03-YYYYMMDD	TOC by Walkley-Black, grain size by ASTM D422					
SD-04	Discrete Sediment Sample	IINY-SD04-YYYYMMDD	TOC by Walkley-Black, grain size by ASTM D422					
SD-05	Discrete Sediment Sample	IINY-SD05-YYYYMMDD	TOC by Walkley-Black, grain size by ASTM D422					
SD-06	Discrete Sediment Sample	IINY-SD06-YYYYMMDD	TOC by Walkley-Black, grain size by ASTM D422					
TB	Grab	TB03172020	VOCs by 8260B	3/17/2020	1500	Trip Blank (VOCs)	031720-C	N/A
FB	Grab	FB03172020	VOCs by 8260B	3/17/2020	1545	Field Blank (VOCs)	031720-C	N/A

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A4
Phase I Photo Log

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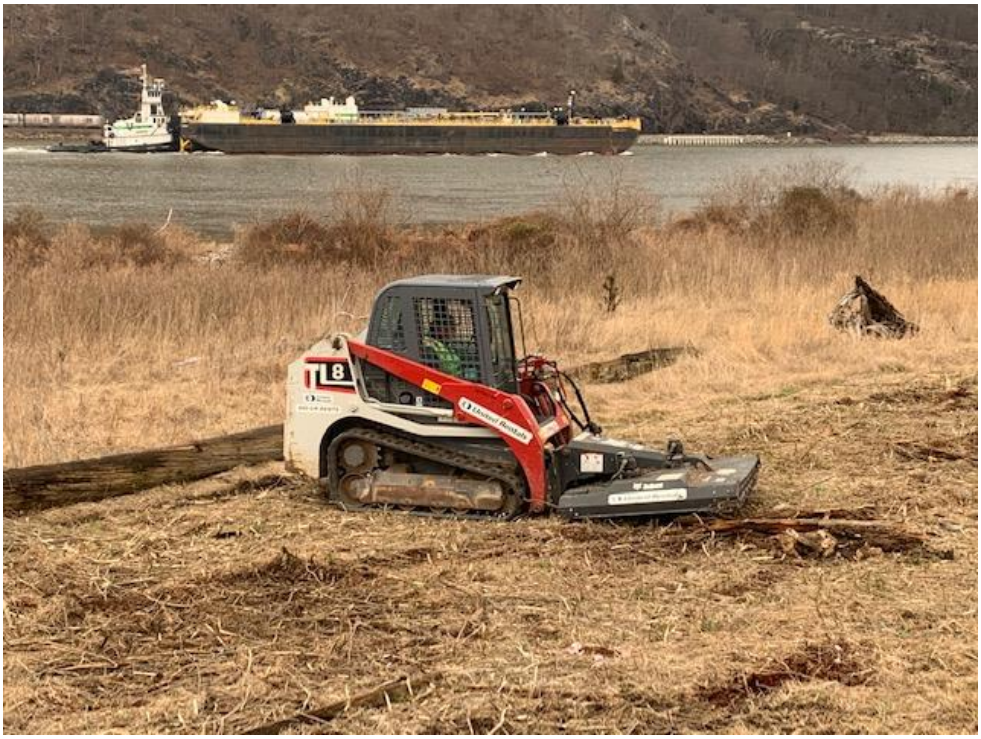
PHASE I SOIL SAMPLING PHOTO LOG

Photographic Documentation
Location: Iona Island, New York



Photograph 01: Brush clearing, looking west from DU-22.

Photograph 02: Brush clearing of dump area DUs, looking northwest from Round Island across DU-18 and DU-17

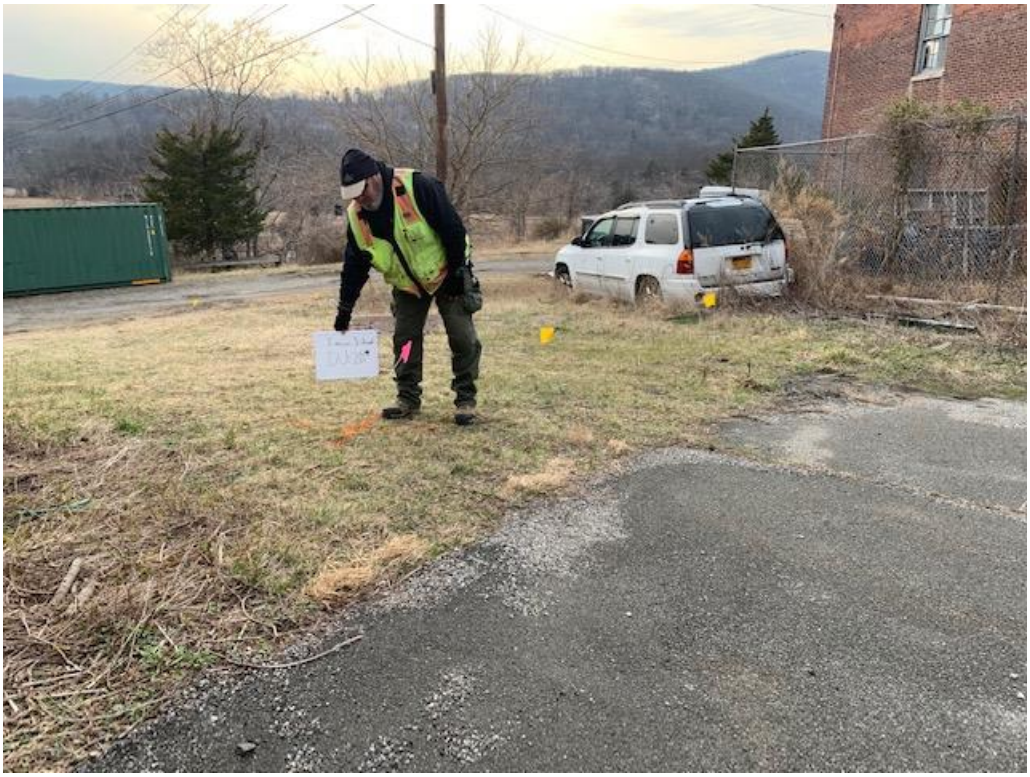
Photographic Documentation
Location: Iona Island, New York

Photograph 03: UXO Clearance Surface Sweep DU-16 looking southwest

Photograph 04: UXO Clearance Dump Area Surface Sweep looking southeast

Photographic Documentation
Location: Iona Island, New York

Photograph 05: Flagging DU Grid Corners, DU-20 looking northeast



Photograph 06: Flagging DU lanes, DU-20 looking west

Photographic Documentation
Location: Iona Island, New York

Photograph 07: Incremental sample collection, DU-9 looking northeast

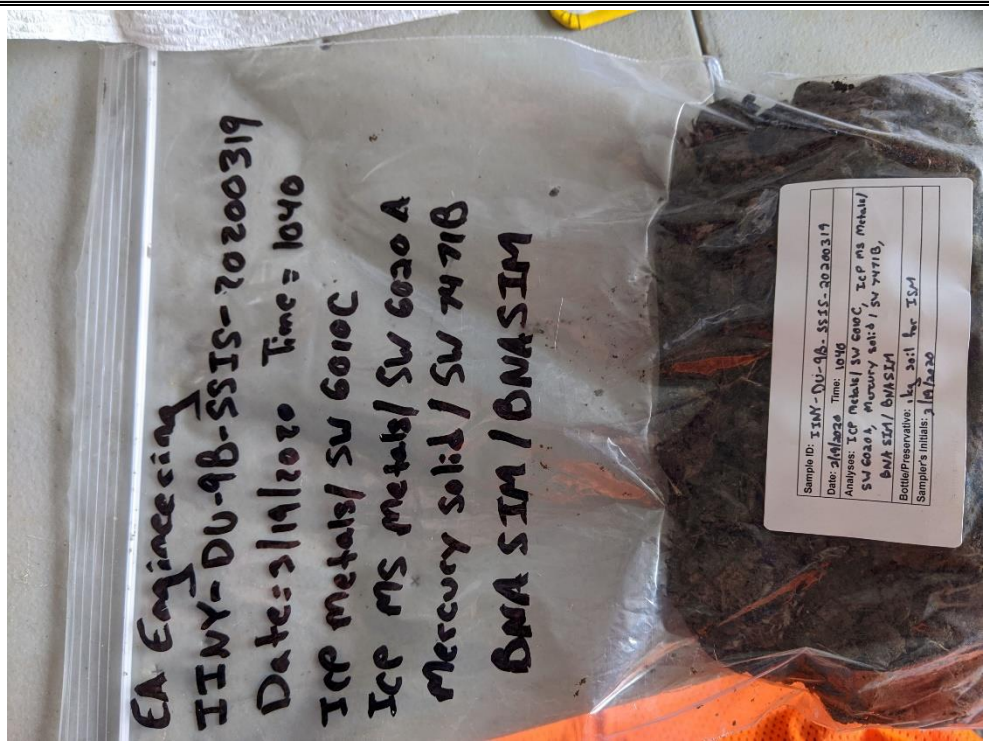
Photograph 08: Incremental sample collection, DU-10 looking northeast

Photographic Documentation
Location: Iona Island, New York

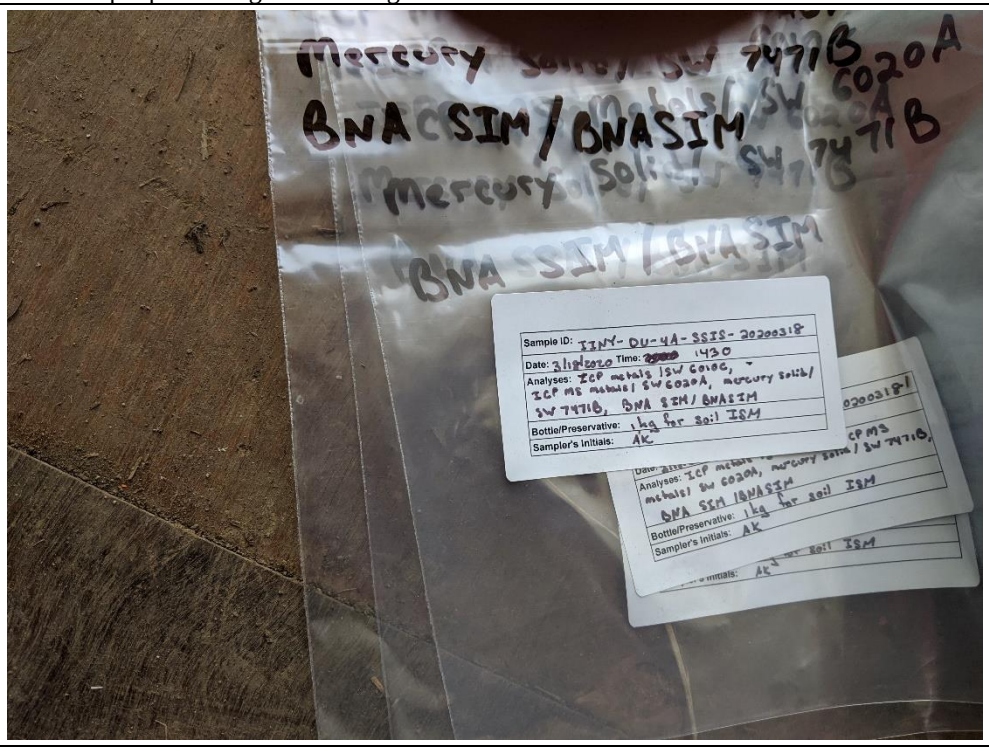
Photograph 09: Subsurface soil sampling at DU-8

Photograph 10: Attempting subsurface soil sampling

Photographic Documentation
Location: Iona Island, New York



Photograph 11: Sample processing and labeling



Photograph 12: Sample processing and labeling

Photographic Documentation
Location: Iona Island, New York

Photograph 13: Exposed bedrock and shallow soil, DU-23 looking east.

Photograph 14: Exposed bedrock and shallow soil, DU-23 looking southeast.

Photographic Documentation
Location: Iona Island, New York

Photograph 15: Looking southwest through center of DU-18. Round Island to southeast.

Photograph 16: Looking southeast across DU-17 and DU-18.

Photographic Documentation
Location: Iona Island, New York

Photograph 17: Exposed bedrock, limited soil looking southeast across DU-24.

Photograph 18: Looking southeast along edge of DU-24. Hudson River shoreline and sediment. Area is within tidal influence of the Hudson River, which is a known PCB source.

Photographic Documentation
Location: Iona Island, New York

Photograph 19: Exposed bedrock, limited soil, looking southwest across DU-24.

Photograph 20: Du-8, looking west toward Building 212.

Photographic Documentation
Location: Iona Island, New York

Photograph 21: DU-8, looking toward south toward Building 222 (area between Building 212 and Building 222)

Photograph 22: Drums in DU-8 between Building 212 and Building 222

Photographic Documentation
Location: Iona Island, New York

Photograph 23: Drums in DU-8 between Building 212 and Building 222.

Photograph 24: Roofing tiles in DU-8 near Building 212.

Photographic Documentation
Location: Iona Island, New York

Photograph 25: Surface conditions in central portion of Iona Island, looking northeast.

Photograph 26: Exposed bedrock and surface conditions in DU-15 looking west/southwest

Photographic Documentation
Location: Iona Island, New York

Photograph 27: Surface conditions looking north/northeast from DU-15

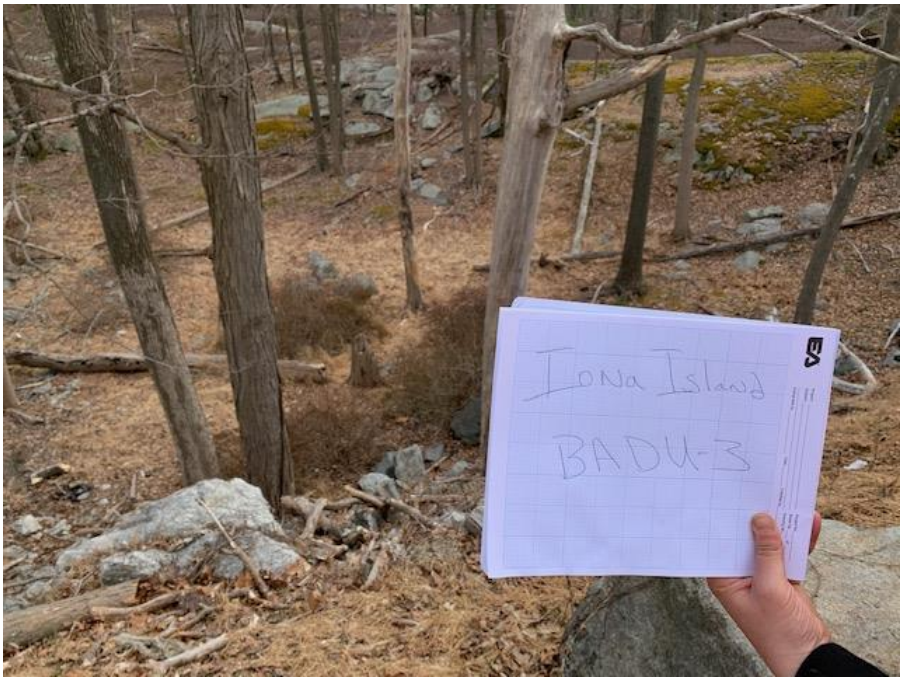
Photograph 28: Surface conditions looking north/northeast from DU-4

Photographic Documentation
Location: Iona Island, New York

Photograph 29: BADU-1 looking north

Photograph 30: BADU-2 looking north

Photographic Documentation
Location: Iona Island, New York



Photograph 31: Surface conditions at BADU-3 looking south

Photograph 32: BADU-4 looking south

Photographic Documentation
Location: Iona Island, New York

Photograph 33: BADU-5 looking north

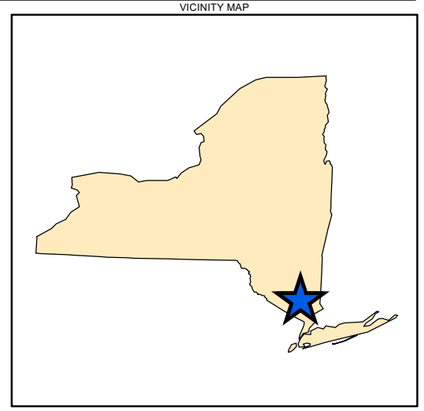
Photograph 34: BADU-6 looking south

Photographic Documentation
Location: Iona Island, New York

Photograph 35: BADU-7 looking north

Photograph 36: BADU-8 looking south

VICINITY MAP



Legend

- FUDS Boundary
- Former Buildings with Significant Potential for Explosive Hazard
- HTRW Project Areas of Concern
- Remaining Structure (Not FUDS Eligible)
- 1-Acre DU
- 60 x 60 ft DU
- Explosives Building DU
- Photo Location
- Photo Location Direction

0 200 400
Feet
1 in = 200 ft

N

FIGURE 1
Phase I RI Soil Sampling Photo Location Map

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
PROJECT REMEDIAL INVESTIGATION
PHASE I SOIL SAMPLING PHOTO LOG

Source
Aerial: EA Engineering, Science, and Technology. April 7, 2020

Map Date: 8/21/2020

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A5
Phase II Field Book and Field Notes

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Iona Island MMRP 6302-9587

4-18-22

T. Kinney

T. Roese

D. Hendricks

48°F - overcast

windy

arrive @ 12:15

1215. 12:30 EQT setup + planning

1230-1300 - store extra eqt in site shed

1300 - 1345 13:30 sample DU-7 soils

1330-1335 - prepare samples from DU-7 into ziplock bags (DH)

1330-1335 stake out @ limits of DU-11

1338- Begin sail sample DU-11

* MS-MSD Collected at DU-11

End DU-11 @ 1401

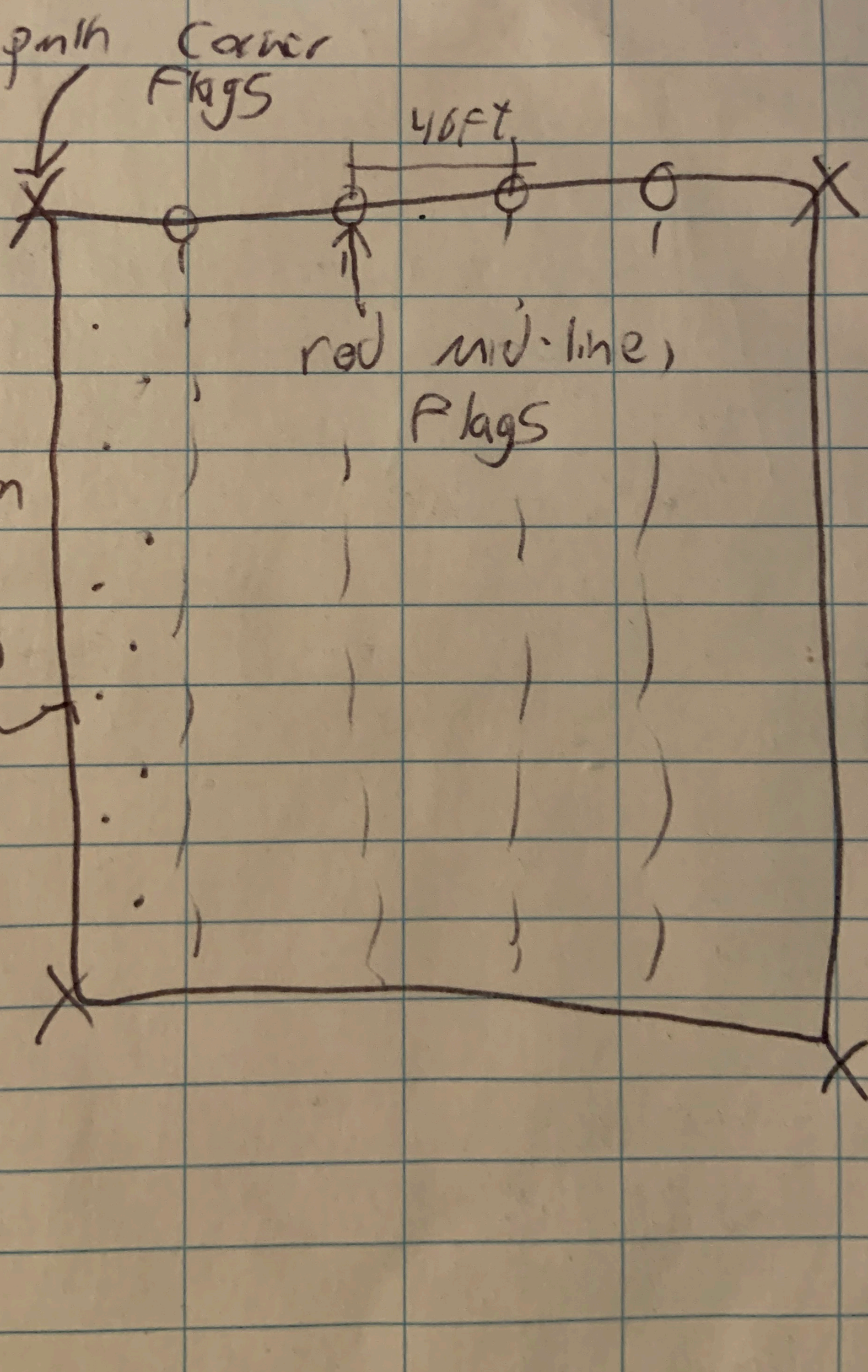
Begin DU-4 @ 1410

End DU-4 @

Begin DU-13 @

End DU-13 @

Rite in the Rain.


pmlh
Corner
Flags
46ft
red
mid-line)
Flags
10 random
points
for
collection
per
row

Begin DU-9 @
End DU-9 @ 1550

EQT organization @ shed 1605
leave site @ 1645

4-19-22

Arrive 8:15
Start sampling @ 8:45

DU-19 sediment 845-920 MS/MSD
DU-17 sediment 930-950
DU-18 Sediment 950-1002

10:30 Hudson River shallow (HRS)
1015- Ione Island Sediment Triplicate
1015-1030 " " " discrete samples

1050-1130 RRDS - DU-1 sediment collected
Triplicates + 3 discrete samples

1200-1230 TWS - DU1

12:40- Begin SW sampling in Dump Area
Calibrated YSI @ 1242

Dump Area SW sampling

Water Quality

Time	Location	Temp °C	PH	Cond µS/cm	ORP mV	Turbidity NTU	DO mg/L	Salin ppt	TSS
1320	Temp 19	10.7	6.65	311.1	219.0	1011.6	9.62	.25	
1320	18	9.5	7.40	232.1	236.5	1153.6	5.38	.16	
1331	13	10.1	7.18	236.6	215.1	28.11	8.04	.16	
1344	08	9.8	7.22	203.5	205.7	27.62	11.27	.11	
1352	17	10.0	7.69	241.4	222.4	25.61	9.11	.18	
1358	12	9.3	7.25	261.4	58.9	54.60	7.26	.18	
1400	07	10.1	7.10	230.4	68.4	30.99	9.21	.15	
1405	03	12.7	7.13	378.9	114.0	17.04	7.45	.24	
1424	16	10.2	7.18	239.8	222.3	19.41	9.10	.22	
1435	11	9.8	7.24	214.7	207.4	23.19	8.98	.18	
1442	06	9.8	7.22	209.9	219.1	18.43	10.42	.18	
1450	02	9.9	7.19	224.6	213.4	13.98	10.01	.20	
1459	15	11.5	7.18	1841.9	111.91	88.4	7.24	.12	
1510	10	10.9	7.40	241.3	207.7	27.8	7.18	.14	
1515	05	11.4	7.18	220.9	221.8	19.7	8.00	.18	
1525	01	10.8	7.24	301.4	208.6	31.0	9.12	.22	
1530	20	10.3	7.30	265.5	215.3	27.4	7.98	.17	
1532	14	10.9	6.99	239.4	196.8	26.5	8.14	.16	
1535	09	11.4	7.11	255.5	210.0	19.8	9.73	.19	
1540	04	10.8	7.24	232.9	184.4	17.4	8.44	.17	

Rite in the Rain.

Dump Area SW sampling

Water Quality

Time	Location	Temp C°	PH	Cond C·µS/cm	ORP mV	Turb NTU	DO mg/L	Salin ppt	T
1320	Temp 19	10.7	6.65	311.1	219.0	1011.6	9.62	.25	
1320	18	9.5	7.40	232.1	236.5	1153.6	8.38	.16	
1331	13	10.1	7.18	236.6	215.1	28.11	8.04	.16	
1344	08	9.8	7.22	203.5	205.7	27.62	11.27	.11	
1352	17	10.0	7.69	241.4	222.4	25.61	9.11	.18	
1358	12	9.30	7.25	261.4	58.9	54.60	7.26	.18	
1400	07	10.1	7.10	230.4	68.4	30.99	9.21	.15	
1405	03	12.7	7.13	378.9	114.0	17.04	7.45	.24	
1424	16	10.2	7.18	239.8	222.3	19.41	9.10	.22	
1435	11	9.8	7.24	214.7	207.4	23.19	8.98	.18	
1442	06	9.8	7.22	209.9	219.1	18.43	10.42	.15	
1450	02	9.9	7.19	224.6	213.4	13.98	10.01	.20	
1459	15	11.5	7.18	184.9	111.91	88.4	7.24	.12	
1510	10	10.9	7.40	241.3	207.7	27.8	7.18	.14	
1515	05	11.4	7.18	220.9	221.8	19.7	8.00	.18	
1525	01	10.8	7.24	301.4	208.6	31.0	9.12	.22	
1530	20	10.3	7.30	265.5	215.3	27.4	7.98	.17	
1532	14	10.9	6.99	239.4	196.8	26.5	8.14	.16	
1535	09	11.4	7.11	255.5	210.0	19.8	9.73	.19	
1540	04	10.8	7.24	232.9	184.4	17.4	8.44	.17	

Rite in the Rain

- Finish Dump area @ SW @ 1545

- Setup for SW sampling @ Hudson Shoreline on Iona

- Iona Hudson shoreline SW sampling begin @ 1800 until 1730

1730 - demob and pack up Eqt

leave site @ 1800

Hudson River WQ on Iona

Station	Temp	PH	Cond	ORP	Turb	DO	Salin
1 (1610)	10.2	7.73	176.5	154.8	105.11	11.01	.12
2 (1612)	10.2	7.74	178.5	156.0	104.22	11.06	.12
3(1614)	10.3	7.74	177.3	155.8	104.19	11.00	.12
4(1617)	10.3	7.73	180.4	157.0	104.21	11.04	.12
5 (1620)	10.3	7.74	174.8	156.9	104.20	11.02	.12
6 (1623)	10.2	7.72	175.7	154.3	109.40	11.03	.13
7(1627)	9.6	7.69	174.9	166.6	89.45	11.08	.12
8 (1629)	9.6	7.70	175.2	167.2	107.42	11.17	.12
9 (1630)	9.9	7.74	174.8	168.4	97.8	11.19	.12
10 (1634)	9.9	7.74	170.9	169.5	98.9	11.24	.12
11 (1638)	10.1	7.71	171.7	170.5	105.8	11.00	.12
12 (1641)	10.2	7.70	175.4	164.3	109.8	11.15	.12
13 (1644)	10.3	7.69	171.8	162.9	99.8	11.90	.12
14 (1652)	10.3	7.72	177.4	158.3	98.4	11.74	.12
15 (1655)	10.3	7.73	180.3	159.7	107.8	11.74	.12
16 (1702)	9.8	7.68	179.4	166.0	106.4	11.64	.13
17 (1706)	10.1	7.72	179.5	167.9	109.7	11.58	.13
18 (1710)	9.9	7.73	171.0	158.2	99.8	11.19	.12
19 (1714)	9.8	7.70	172.3	158.2	99.8	11.24	.12
20 (1720)	10.0	7.78	178.4	149.1	102.1	11.32	.13

4/20/22

Sample prep, COC, sample mngnt between 1000 - 1130

Shipment of Day 1 and 2 samples

arrive onsite @ 1300 and complete eqt run @ shed onsite

-setup for ~~TWS~~ SW sampling @ 1345 @ TWS marsh area

	tem	PH	cond	orp	turbidity	DO	salin
1	13.2	7.66	338.2	154.8	99.62	10.98	.17
2	13.5	7.63	278.9	187.9	99.79	9.95	.19
3	13.3	7.68	297.6	172.2	98.54	11.01	.17
4	13.4	7.62	304.8	179.0	103.99	10.57	.20
5	13.5	7.59	339.7	168.4	110.44	10.28	.17
6	13.1	7.57	337.6	155.0	98.76	9.98	.21
7	13.5	7.68	304.3	172.8	107.24	11.04	.20
8	13.6	7.61	327.4	170.4	112.31	10.46	.20
9	13.2	7.70	268.7	179.5	106.42	10.98	.17
10	13.2	7.70	270.5	180.6	105.22	11.07	.17

Finish TWS SW @ 1430

1445 begin setup to SW sampling @ BRDS

Begin BRDS WS @ 1500

1	13.2	8.01	194.1	228.0	72.45	11.64	.12
	Temp	PH	Cond	orp	Turb	DO	Salin
2	12.8	7.96	169.4	215.6	76.53	11.58	.12
3	11.7	7.86	183.3	203.1	68.86	11.31	.12
4	13.0	7.8	187.7	198.4	63.94	11.25	.12
5	12.2	7.97	192.3	204.5	64.97	11.36	.12
6	12.3	7.85	184.7	208.4	68.97	11.42	.12
7	12.8	7.79	189.3	213.9	69.77	11.58	.12
8	12.0	7.92	181.2	205.8	70.99	11.53	.12
9	11.9	7.80	181.0	179.8	67.89	11.33	.12
10	11.8	7.75	182.3	182.3	66.00	11.50	.12

~~Rec~~ collect MS/MSD/FD @ Iona Harbor shoreline location 4 @ 1550 including YSI water quality data

Temp	PH	Cond	orp	Turb	DO	Salinity
11.1	7.76	172.2	209.8	66.76	11.15	.11

End Sampling @ 1600

Dump old samples in Dump area 1600 - 1615

Rite in the Rain.

- packup all eqt from Iona sled
- leave site @ 1630
  - ship samples @~ 1715
    @ fedex

-supply run for zip loc bags, ice
+water @ 1755

End day 4/20/22

4/21/22 - Con Hook Day 1

- ~~Meet~~ Ice + lunch pickup @ 0700
- meet @ boat launch in Newbury 0715

- Boat launch, prep + transit
  ~0715-0915

- Boat unload eqt ~0915 + reconsist
  including sample location storkeout

Begin. sampling ~0955

Hudson River shoreline @ Con Hook

begin @ 1000 @ DU-8

	Time	weight		@ 1220	weight (grams)
DU-8	1005	1184	DU-3	~~1447~~	1127
DU-7	1015	MS/MSD 1650	DU-2	1240	1125
DU-6	1040	1120	DU-1	1300	1164
DU-5	1125	1097			
DU 4	~~1140~~ 1140	971			

DU-8, 7, 6 - by hand w/ scoops among cobble sandy areas

DU-5 ponar grabs by hand on foot @ wade depths of 3 feet

Ponar drops - [redacted] with a scoop for each drop until 1kg

End sediment on Hudson shoreline @ Con Hook @ 1310 + process samples until 1330

Begin CHMS sediment @ 1330

CHMS Sediment

location	Time	weight (grams)	
DV-8	1330	1075 g	
DV-7	1345	1132 g	
DV-6	1355	1267 g	MS/MSD
DV5	1407	1052 g	
DV-4	1420	1061 g	
DV-3	1429	1071 g	
DV-2	1437	1002 g	
DV-1	1444	1073 g	

Dr sampling 1450 - @1750
Details w/ D. Hendricks

leave Con hook @ 1800
arrive Cat dock @ 1900
unload at dock 1900 - 1930

DAILY FIELD REPORT

Day: Thursday Date: 21 April 2022

Temperature: (F) (am) 45°F (pm) 60°F

Wind Direction: E-NE (am) 5-10 mph (pm) 15-25 mph

Weather: Clear (am)
Cloudy w/ (pm)
Slight precipitation

Project Name:
Iona Island Phase II

Contract No.

Arrive at site: 0730 (am)

Leave site: 1930 (pm)

HEALTH & SAFETY:

Are there any changes to the Health & Safety Plan? Yes ( ) No (✓)
(If yes, list the deviation under items for concern)

Are monitoring results at acceptable levels?

Soil	Yes ( )	n/a (✓)	* No ( )
Waters	Yes ( )	n/a (✓)	* No ( )
Air	Yes ( )	n/a (✓)	* No ( )

- *If No, provide comments*

OTHER ITEMS:

Site Sketch Attached: Yes ( ) No (✓)
Photos Taken: Yes (✓) No ( )

DESCRIPTION OF DAILY WORK PERFORMED:

- EA personnel (T. King, J. Morris, K. Miller, & D. Hendricks) arrived at Newburgh, NY boat ramp @ ~ 0730.
- Field team departed for Con Hook Island @ 0800 traveling south on the Hudson River. J. Morris provided boat safety in-brief and T. King provided H+S in-brief prior to departure.
- EA team arrived @ Con Hook @ ~ 0830; T. King, K. Miller, & D. Hendricks exited boat for surface water and sediment sampling event.
- D. Hendricks & K. Miller collected surface water samples CHHRS-SW-01 through CHHRS-SW-20 from 0900-1500. T. King collected sediment samples from CHHRS-SU-01 through CHHRS-SU-08, and ~~CHHRS~~ CHMS-SU-01 through CHMS-SU-05 from 0900-1500.
- EA field team collected surface water samples CHMS-SW-01 through CHMS-SW-20 from 1500 to 1730.
- EA departed ~~Iona~~ Con Hook Island @ 1730 and arrived at the boat ramp @ 1830.
- This concludes the Iona Phase II sampling effort.

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A6
Phase II
Calibration Forms

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EA Engineering, Science, and Technology, Inc. April 19 2022

pH METER DAILY FIELD CALIBRATION FORM

pH CALIBRATION

Time: 0700

pH STANDARD	PRE-CALIBRATION READING	POST-CALIBRATION READING (calibration requirement: within 0.2 pH unit of standard)
4.0	4.3	4.1
7.0	7.0	7.0
10.0	10.5	10.2

COMMENTS

SIGNATURE _____

EA Engineering, Science, and Technology, Inc. April 19 2022

pH METER DAILY FIELD CALIBRATION FORM

pH CALIBRATION

Time: 1420

pH STANDARD	PRE-CALIBRATION READING	POST-CALIBRATION READING (calibration requirement: within 0.2 pH unit of standard)
4.0	3.8	4.0
7.0	7.0	7.0
10.0	9.9	10.2

COMMENTS

SIGNATURE _____

EA Engineering, Science, and Technology, Inc. April 20 2022

pH METER DAILY FIELD CALIBRATION FORM

pH CALIBRATION

Time: _____

pH STANDARD	PRE-CALIBRATION READING	POST-CALIBRATION READING (calibration requirement: within 0.2 pH unit of standard)
4.0	4.3	4.2
7.0	7.2	7.1
10.0	10.0	10.1

COMMENTS

SIGNATURE _____

EA Engineering, Science, and Technology, Inc. April 21 2022

pH METER DAILY FIELD CALIBRATION FORM

pH CALIBRATION

Time: 0630

pH STANDARD	PRE-CALIBRATION READING	POST-CALIBRATION READING (calibration requirement: within 0.2 pH unit of standard)
4.0	4.1	4.0
7.0	7.2	7.0
10.0	10.3	10.2

COMMENTS

SIGNATURE _____

EA Engineering, Science, and Technology, Inc. April 21 2022

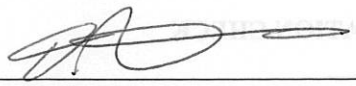
pH METER DAILY FIELD CALIBRATION FORM

pH CALIBRATION

Time: 1245

pH STANDARD	PRE-CALIBRATION READING	POST-CALIBRATION READING (calibration requirement: within 0.2 pH unit of standard)
4.0	3.9	4.1
7.0	7.0	7.0
10.0	10.0	10.0

COMMENTS

SIGNATURE 

DAILY CALIBRATION CHECK FIELD FORM

ORP METER (MILWAUKEE INSTRUMENTS)
ORP

ORP CALIBRATION CHECK

Time: 0716

ORP STANDARD	CALIBRATION CHECK READING (if not within 20 mV of standard, recalibrate)	RECALIBRATION REQUIRED? (Y/N)	POST-RE-CALIBRATION READING
240 millivolts	229	N	-

COMMENTS

Factory calibrated

SIGNATURE _____

April 19 2022

DAILY CALIBRATION CHECK FIELD FORM

ORP METER (MILWAUKEE INSTRUMENTS)
ORP

ORP CALIBRATION CHECK

Time: 1430

ORP STANDARD	CALIBRATION CHECK READING (if not within 20 mV of standard, recalibrate)	RECALIBRATION REQUIRED? (Y/N)	POST-RE-CALIBRATION READING
240 millivolts	222	N	—

COMMENTS

SIGNATURE _____

April 20 2022

DAILY CALIBRATION CHECK FIELD FORM

ORP METER (MILWAUKEE INSTRUMENTS)
ORP

ORP CALIBRATION CHECK
Time: 1005

ORP STANDARD	CALIBRATION CHECK READING (if not within 20 mV of standard, recalibrate)	RECALIBRATION REQUIRED? (Y/N)	POST-RE-CALIBRATION READING
240 millivolts	226	N	—

COMMENTS

SIGNATURE _____

April 21 2022

DAILY CALIBRATION CHECK FIELD FORM

ORP METER (MILWAUKEE INSTRUMENTS)
ORP

ORP CALIBRATION CHECK
Time: 0620

ORP STANDARD	CALIBRATION CHECK READING (if not within 20 mV of standard, recalibrate)	RECALIBRATION REQUIRED? (Y/N)	POST-RE-CALIBRATION READING
240 millivolts	224	N	—

COMMENTS

SIGNATURE _____

April 21 2022

DAILY CALIBRATION CHECK FIELD FORM

ORP METER (MILWAUKEE INSTRUMENTS)
ORP

ORP CALIBRATION CHECK

Time: 1255

ORP STANDARD	CALIBRATION CHECK READING (if not within 20 mV of standard, recalibrate)	RECALIBRATION REQUIRED? (Y/N)	POST-RE-CALIBRATION READING
240 millivolts	227	N	—

COMMENTS

SIGNATURE [signature]

WATER QUALITY METER DAILY CALIBRATION CHECK FIELD FORM

YSI 3800
pH, CONDUCTIVITY, TEMPERATURE, TURBIDITY, ORP, AND DISSOVED OXYGEN

CALIBRATION
DATE: 4/19/2022
METER ID:
SONDE ID:

pH CALIBRATION CHECK
Time: ___1242_____

pH STANDARD	CALIBRATION CHECK READING (if not within 0.2 pH unit of standard, recalibrate)	RECALIBRATION REQUIRED? (Y/N)	POST-RE-CALIBRATION READING
4.0	4.1	N	
7.0	7.1	N	
10.0	10.0	N	

CONDUCTIVITY CALIBRATION CHECK
Time: ____1245____

CONDUCTIVITY STANDARD	CALIBRATION CHECK READING (if not within 10% of standard, recalibrate)	RECALIBRATION REQUIRED? (Y/N)	POST-RE-CALIBRATION READING
1.413	1.410	N	

TURBIDITY CALIBRATION CHECK
Time: ___1247_____

TURBIDITY STANDARD	CALIBRATION CHECK READING (if not within 10% of standard, recalibrate)	RECALIBRATION REQUIRED? (Y/N)	POST-RE-CALIBRATION READING
0 NTU	0	N	
126 NTU	124	N	

ORP CALIBRATION CHECK
Time: __1250_____

ORP STANDARD	CALIBRATION CHECK READING (if not within 20 mV of standard, recalibrate)	RECALIBRATION REQUIRED? (Y/N)	POST-RE-CALIBRATION READING
240 millivolts	231	N	

DISSOLVED OXYGEN CALIBRATION CHECK
Time: ___1255_____

DO STANDARD	CALIBRATION CHECK READING (if <95% of standard, recalibrate)	RECALIBRATION REQUIRED? (Y/N)	POST-RE-CALIBRATION READING
100% AIR SATURATION	98%	N	

COMMENTS

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SIGNATURE _____

WATER QUALITY METER END OF DAY CALIBRATION CHECK FIELD FORM

YSI 3800
pH, CONDUCTIVITY, TEMPERATURE, TURBIDITY, ORP, AND DISSOVED OXYGEN

CALIBRATION
DATE: 4/19/2022
METER ID:
SONDE ID:

pH CALIBRATION CHECK
Time: __1725_____

pH STANDARD	END OF DAY CALIBRATION READING	PASS/FAIL? (if not within 0.2 pH unit of standard, fail)
4.0	4.1	Pass
7.0	7.1	Pass
10.0	10.0	Pass

CONDUCTIVITY CALIBRATION CHECK
Time: __1727_____

CONDUCTIVITY STANDARD	END OF DAY CALIBRATION READING	PASS/FAIL? (if not within 10% of standard, fail)
1.413	1.487	Pass

TURBIDITY CALIBRATION CHECK
Time: __1729_____

STANDARD	END OF DAY CALIBRATION READING	PASS/FAIL? (if not within 10 % of standard, fail)
0 NTU	0 NTU	Pass
126 NTU	125 NTU	Pass

ORP CALIBRATION CHECK
Time: __1732_____

STANDARD	END OF DAY CALIBRATION READING	PASS/FAIL? (if not within 20 mV of standard, fail)
240 millivolts	248 mV	Pass

DISSOLVED OXYGEN CALIBRATION CHECK
Time: __1736_____

STANDARD	END OF DAY CALIBRATION READING	PASS/FAIL? (if <95% of standard, fail)
100% AIR SATURATION	99%	Pass

COMMENTS

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SIGNATURE _____ _____

WATER QUALITY METER DAILY CALIBRATION CHECK FIELD FORM

YSI 3800
pH, CONDUCTIVITY, TEMPERATURE, TURBIDITY, ORP, AND DISSOVED OXYGEN

CALIBRATION
DATE: 4/20/2022
METER ID:
SONDE ID:

pH CALIBRATION CHECK
Time: ___1039_____

pH STANDARD	CALIBRATION CHECK READING (if not within 0.2 pH unit of standard, recalibrate)	RECALIBRATION REQUIRED? (Y/N)	POST-RE-CALIBRATION READING
4.0	4.0	N	
7.0	7.0	N	
10.0	10.1	N	

CONDUCTIVITY CALIBRATION
CHECK Time: ____1043____

CONDUCTIVITY STANDARD	CALIBRATION CHECK READING (if not within 10% of standard, recalibrate)	RECALIBRATION REQUIRED? (Y/N)	POST-RE-CALIBRATION READING
1.413	1.486	N	

TURBIDITY CALIBRATION
CHECK Time: ___1047_____

TURBIDITY STANDARD	CALIBRATION CHECK READING (if not within 10% of standard, recalibrate)	RECALIBRATION REQUIRED? (Y/N)	POST-RE-CALIBRATION READING
0 NTU	0	N	
126 NTU	124	N	

ORP CALIBRATION CHECK
Time: __1052_____

ORP STANDARD	CALIBRATION CHECK READING (if not within 20 mV of standard, recalibrate)	RECALIBRATION REQUIRED? (Y/N)	POST-RE-CALIBRATION READING
240 millivolts	247	N	

DISSOLVED OXYGEN CALIBRATION
CHECK Time: ___1058_____

DO STANDARD	CALIBRATION CHECK READING (if <95% of standard, recalibrate)	RECALIBRATION REQUIRED? (Y/N)	POST-RE-CALIBRATION READING
100% AIR SATURATION	98%	N	

COMMENTS

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SIGNATURE _____

WATER QUALITY METER END OF DAY CALIBRATION CHECK FIELD FORM

YSI 3800
pH, CONDUCTIVITY, TEMPERATURE, TURBIDITY, ORP, AND DISSOVED OXYGEN

CALIBRATION
DATE: 4/20/2022
METER ID:
SONDE ID:

pH CALIBRATION CHECK
Time: __1602_____

pH STANDARD	END OF DAY CALIBRATION READING	PASS/FAIL? (if not within 0.2 pH unit of standard, fail)
4.0	4.0	Pass
7.0	7.1	Pass
10.0	10.1	Pass

CONDUCTIVITY CALIBRATION CHECK Time: __1605_____

CONDUCTIVITY STANDARD	END OF DAY CALIBRATION READING	PASS/FAIL? (if not within 10% of standard, fail)
1.413	1.491	Pass

TURBIDITY CALIBRATION CHECK Time: __1609_____

STANDARD	END OF DAY CALIBRATION READING	PASS/FAIL? (if not within 10 % of standard, fail)
0 NTU	0 NTU	Pass
126 NTU	125 NTU	Pass

ORP CALIBRATION CHECK
Time: __1613_____

STANDARD	END OF DAY CALIBRATION READING	PASS/FAIL? (if not within 20 mV of standard, fail)
240 millivolts	245 mV	Pass

DISSOLVED OXYGEN CALIBRATION CHECK Time: __1617_____

STANDARD	END OF DAY CALIBRATION READING	PASS/FAIL? (if <95% of standard, fail)
100% AIR SATURATION	99%	Pass

COMMENTS

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SIGNATURE _____

WATER QUALITY METER DAILY CALIBRATION CHECK FIELD FORM

YSI 3800
pH, CONDUCTIVITY, TEMPERATURE, TURBIDITY, ORP, AND DISSOVED OXYGEN

CALIBRATION
DATE: 4/21/2022
METER ID:
SONDE ID:

pH CALIBRATION CHECK
Time: ___0920_____

pH STANDARD	CALIBRATION CHECK READING (if not within 0.2 pH unit of standard, recalibrate)	RECALIBRATION REQUIRED? (Y/N)	POST-RE-CALIBRATION READING
4.0	4.1	N	
7.0	7.1	N	
10.0	10.0	N	

CONDUCTIVITY CALIBRATION
CHECK Time: ____0924____

CONDUCTIVITY STANDARD	CALIBRATION CHECK READING (if not within 10% of standard, recalibrate)	RECALIBRATION REQUIRED? (Y/N)	POST-RE-CALIBRATION READING
1.413	1.473	N	

TURBIDITY CALIBRATION
CHECK Time: ___0927_____

TURBIDITY STANDARD	CALIBRATION CHECK READING (if not within 10% of standard, recalibrate)	RECALIBRATION REQUIRED? (Y/N)	POST-RE-CALIBRATION READING
0 NTU	0	N	
126 NTU	128	N	

ORP CALIBRATION CHECK
Time: __0932_____

ORP STANDARD	CALIBRATION CHECK READING (if not within 20 mV of standard, recalibrate)	RECALIBRATION REQUIRED? (Y/N)	POST-RE-CALIBRATION READING
240 millivolts	238	N	

DISSOLVED OXYGEN CALIBRATION
CHECK Time: ___0936_____

DO STANDARD	CALIBRATION CHECK READING (if <95% of standard, recalibrate)	RECALIBRATION REQUIRED? (Y/N)	POST-RE-CALIBRATION READING
100% AIR SATURATION	98%	N	

COMMENTS

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_____

SIGNATURE _____

WATER QUALITY METER END OF DAY CALIBRATION CHECK FIELD FORM

YSI 3800
pH, CONDUCTIVITY, TEMPERATURE, TURBIDITY, ORP, AND DISSOVED OXYGEN

CALIBRATION
DATE: 4/21/2022
METER ID:
SONDE ID:

pH CALIBRATION CHECK
Time: __1750_____

pH STANDARD	END OF DAY CALIBRATION READING	PASS/FAIL? (if not within 0.2 pH unit of standard, fail)
4.0	4.1	Pass
7.0	7.1	Pass
10.0	10.1	Pass

CONDUCTIVITY CALIBRATION CHECK Time: __1752_____

CONDUCTIVITY STANDARD	END OF DAY CALIBRATION READING	PASS/FAIL? (if not within 10% of standard, fail)
1.413	1.481	Pass

TURBIDITY CALIBRATION CHECK Time: __1755_____

STANDARD	END OF DAY CALIBRATION READING	PASS/FAIL? (if not within 10 % of standard, fail)
0 NTU	0 NTU	Pass
126 NTU	127 NTU	Pass

ORP CALIBRATION CHECK
Time: __1757_____

STANDARD	END OF DAY CALIBRATION READING	PASS/FAIL? (if not within 20 mV of standard, fail)
240 millivolts	237 mV	Pass

DISSOLVED OXYGEN CALIBRATION CHECK Time: __1759_____

STANDARD	END OF DAY CALIBRATION READING	PASS/FAIL? (if <95% of standard, fail)
100% AIR SATURATION	98%	Pass

COMMENTS

_____

_____

_____

_____

_____

SIGNATURE _____

A7
Phase II Sample Tracking Table

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Sample Location	Field Description	Field USCS Code	USCS Group Name	Field ORP (mV)	StandardHydrogen Electrode ORP (mV)
Phase II Investigation Area: Surface Soil					
DU-04	Brown, dry silt with organics and fine to coarse grained sand	ML	Silty sand / sandy silt	284	489
			Silty sand	275	480
			Silty sand	269	474
DU-07	Brown, dry silt with organics and very fine-grained sand, some clay	ML	Silty sand	402	607
			Silty sand	310	515
			Silty sand	307	512
DU-09	Brown, slightly moist silt with organics and very fine to coarse grained sand	ML	Sandy silt	242	447
			Silty sand / sandy silt	245	450
			Silty sand / sandy silt	240	445
DU-11	Brown, moist, very fine-grained sand	SP/SM	Sandy silt	239	444
			Silty sand	252	457
			NA	225	430
DU-13	Dark brown, moist, well sorted silt with very fine grained sand	ML	Silty sand	307	512
			Silty sand	298	503
			Silty sand	322	527
DU-17	Dark brown, moist, well sorted silt and organic matter with very fine grained sand	OL	Silty sand	294	499
			Silty sand	297	502
			Silty sand with gravel	288	493
DU-18	Dark brown, moderately sorted silt with very fine grained sand	ML	Silty sand	300	505
			Silty sand / Poorly graded sand with silt	290	495
			Poorly graded sand with silt	299	504
DU-19	Dark brown, moist, moderately sorted silt and organic matter with very fine grained sand	OL	Silty sand	275	480
			Silty sand	292	497
			Silty sand	297	502

Sample Location		Temperature (degrees Celsius)	pH	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Field ORP (mV)	StandardHydrogen Electrode ORP (mV)	Turbidity (NTU)	Salinity
AOC #16 – Area D (former Dumping Area)	DUMP-SW-01	10.8	7.24	0.3014	9.12	208.6	408.6	31	0.22
	DUMP-SW-02	9.9	7.19	0.2246	10.01	213.4	413.4	13.98	0.2
	DUMP-SW-03	12.7	7.13	0.3789	7.45	114	314	17.04	0.24
	DUMP-SW-04	10.8	7.24	0.2329	8.44	184.4	384.4	17.4	0.17
	DUMP-SW-05	11.4	7.18	0.2209	8	221.8	421.8	19.7	0.18
	DUMP-SW-06	9.8	7.22	0.2099	10.42	219.1	419.1	18.43	0.18
	DUMP-SW-07	10.1	7.1	0.2304	9.21	64.8	264.8	30.99	0.15
	DUMP-SW-08	9.8	7.22	0.2035	11.27	205.7	405.7	27.62	0.11
	DUMP-SW-09	11.4	7.11	0.2555	9.73	210	410	19.8	0.19
	DUMP-SW-10	10.9	7.4	0.2413	7.18	207.7	407.7	27.8	0.14
	DUMP-SW-11	9.8	7.24	0.2147	8.98	207.4	407.4	23.19	0.18
	DUMP-SW-12	9.31	7.25	0.2614	7.26	58.9	258.9	44.6	0.18
	DUMP-SW-13	10.1	7.18	0.2386	8.04	215.1	415.1	28.11	0.16
	DUMP-SW-14	10.9	6.99	0.2394	8.14	198.8	398.8	26.5	0.16
	DUMP-SW-15	11.5	7.18	0.1849	7.24	111.91	311.91	88.4	0.12
	DUMP-SW-16	10.2	7.18	0.2398	9.1	222.3	422.3	19.41	0.22
	DUMP-SW-17	10.01	7.69	0.2414	9.11	222.4	422.4	25.01	0.18
	DUMP-SW-18	9.5	7.4	0.2321 0	8.38	236.5	436.5	11.83	0.16
	DUMP-SW-19	10.7	6.65	0.3111	9.12	219	419	10.11	0.25
	DUMP-SW-20	10.3	7.3	0.2655	7.98	215.3	415.3	27.4	0.17
Hudson River shoreline along eastern boundary of AOC #16 – Area D	IHRS-SW-01	10.2	7.73	0.1705	11.01	154.8	354.8	105.11	0.12
	IHRS-SW-02	10.2	7.74	0.1785	11	156	356	104.22	0.12
	IHRS-SW-03	10.3	7.74	0.1773	11	155.8	355.8	104.18	0.12
	IHRS-SW-04	10.3	7.73	0.1804 0	11.04	156.9	356.9	104.2	0.12
	IHRS-SW-05	10.3	7.74	0.1748	11.02	156.9	356.9	104.2	0.12
	IHRS-SW-06	10.2	7.72	0.1757	11.03	154.3	354.3	109.4	0.13
	IHRS-SW-07	9.6	7.69	0.1749	11.08	166.6	366.6	89.45	0.12
	IHRS-SW-08	9.6	7.7	0.1752	11.17	167.2	367.2	107.42	0.12
	IHRS-SW-09	9.9	7.74	0.1748	11.19	168.4	368.4	97.8	0.12
	IHRS-SW-10	9.9	7.74	0.1709	11.24	169.5	369.5	98.9	0.12
	IHRS-SW-11	10.1	7.71	0.1717	11	170.5	370.5	105.8	0.12
	IHRS-SW-12	10.2	7.7	0.1754	11.15	164.3	364.3	109.8	0.12
	IHRS-SW-13	10.3	7.69	0.1718	11.9	162.9	362.9	99.8	0.12
	IHRS-SW-14	10.3	7.72	0.1774	11.74	158.3	358.3	98.4	0.12
	IHRS-SW-15	10.3	7.73	0.1803	11.74	159.7	359.7	107.8	0.12
	IHRS-SW-16	9.8	7.68	0.1794	11.64	166	366	106.4	0.13
	IHRS-SW-17	10.1	7.72	0.1795	11.58	167.9	367.9	109.7	0.13
	IHRS-SW-18	9.9	7.73	0.171	11.19	158.2	358.2	99.8	0.12
	IHRS-SW-19	9.8	7.7	0.1723	11.24	172.3	372.3	99.8	0.12
	IHRS-SW-20	10	7.78	0.1784	11.32	149.1	349.1	102.1	0.13

Sample Location		Temperature (degrees Celsius)	pH	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	StandardHydrogen Electrode ORP (mV)	Turbidity (NTU)	Salinity
Iona Marsh shoreline at outlet of riprap filled drainage swale	RRDS-SW-01	13.2	8.01	0.1941	11.64	228	428	72.45	0.12
	RRDS-SW-02	12.8	7.96	0.1894	11.58	215.6	415.6	76.53	0.12
	RRDS-SW-03	11.7	7.86	0.1833	11.31	203.1	403.1	68.86	0.12
	RRDS-SW-04	13	7.8	0.1877	11.25	198.4	398.4	63.94	0.12
	RRDS-SW-05	12.2	7.97	0.1923	11.36	204.5	404.5	64.97	0.12
	RRDS-SW-06	12.3	7.85	0.1847	11.42	208.4	408.4	68.97	0.12
	RRDS-SW-07	12.8	7.79	0.1893	11.58	213.9	413.9	69.77	0.12
	RRDS-SW-08	12	7.92	0.1812	11.53	205.8	405.8	70.99	0.12
	RRDS-SW-09	11.9	7.8	0.181	11.33	179.8	379.8	67.89	0.12
	RRDS-SW-10	11.8	7.75	0.1823 0	11.5	182.3	382.3	66	0.12
Iona Marsh shoreline at outlet of tidal wetland swale	TWS-SW-01	13.2	7.66	0.3382	10.98	154.8		99.62	0.17
	TWS-SW-02	13.5	7.63	0.2789	9.95	187.9	387.9	99.79	0.19
	TWS-SW-03	13.3	7.68	0.2976	11.01	172.2	372.2	98.54	0.17
	TWS-SW-04	13.4	7.62	0.3048	10.57	179	379	103.99	0.2
	TWS-SW-05	13.5	7.59	0.3397	10.28	168.4	368.4	110.44	0.17
	TWS-SW-06	13.1	7.57	0.3376	9.98	155	355	98.76	0.21
	TWS-SW-07	13.5	7.68	0.3043	11.04	172.8	372.8	107.24	0.2
	TWS-SW-08	13.6	7.61	0.3274	10.46	170.4	370.4	112.31	0.2
	TWS-SW-09	13.2	7.7	0.2687	10.98	179.5	379.5	108.42	0.17
	TWS-SW-10	13.2	7.7	0.2705	11.07	180.6	380.6	105.22	0.17
Con Hook Hudson River Shoreline	CHHRS-SW-01	9.9	7.91	0.1794	11.63	96.4	296.4	57	0.12
	CHHRS-SW-02	10.1	7.68	0.1673	11.36	124.1	324.1	57	0.11
		10.1	7.68	0.1673	11.36	124.1	324.1	57	0.11
	CHHRS-SW-03	9.8	7.67	0.125	11.19	125	325	237.1	0.11
	CHHRS-SW-04	9.8	7.61	0.1342	11.18	134.2	334.2	100.7	0.11
	CHHRS-SW-05	9.6	7.58	0.1505	11.08	150.5	350.5	61.8	0.11
	CHHRS-SW-06	9.8	7.55	0.1481	11.14	148.1	348.1	54.7	0.11
	CHHRS-SW-07	10	7.58	0.1406	11.19	140.6	340.6	61.4	0.11
	CHHRS-SW-08	10.1	7.66	0.1722	11.16	172.2	372.2	46.4	0.11
	CHHRS-SW-09	10.9	7.6	0.1826	11.2	168.5	368.5	54.3	0.11
	CHHRS-SW-10	10.3	7.47	0.1579	11.06	169.1	369.1	198.7	0.11
	CHHRS-SW-11	10.1	7.54	0.1948	11.27	194.8	394.8	52.5	0.11
	CHHRS-SW-12	10.1	7.53	0.1834	11.25	168	368	47.5	0.11
	CHHRS-SW-13	9.9	7.5	0.1937	11.21	167.3	367.3	42.7	0.11
	CHHRS-SW-14	10	7.62	0.1852	11.69	172.1	372.1	50.1	0.11
	CHHRS-SW-15	10.1	7.71	0.2281	11.45	168.3	368.3	49.2	0.11
	CHHRS-SW-16	10.1	7.77	0.2077	11.19	168.1	368.1	62.1	0.11
	CHHRS-SW-17	10.3	7.53	0.2232	11.11	168.9	368.9	52.9	0.11
	CHHRS-SW-18	10.3	7.57	0.2384	11.35	168.7	368.7	53.9	0.11
	CHHRS-SW-19	10.3	7.52	0.2349	11.14	169.1	369.1	53.9	0.11
	CHHRS-SW-20	10.4	7.49	0.2269	11.1	169.3	369.3	60.3	0.11

Sample Location		Temperature (degrees Celsius)	pH	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	StandardHydrogen Electrode ORP (mV)	Turbidity (NTU)	Salinity
Con Hook Marsh Shoreline	CHMS-SW-01	11	7.09	0.2231	9.18	182.7	382.7	30.9	0.15
	CHMS-SW-02	10.7	7.31	0.1794	10.76	193.9	393.9	44	0.12
	CHMS-SW-03	10.5	7.32	0.1878	10.85	174.8	374.8	69.9	0.12
	CHMS-SW-04	10.6	7.27	0.1898	10.49	184.2	384.2	40.3	0.12
	CHMS-SW-05	10.9	7.12	0.2274	10.02	114.2	314.2	98.21	0.16
	CHMS-SW-06	14.7	7	0.634	9.93	113.5	313.5	83.4	0.38
	CHMS-SW-07	14.8	7.18	0.614	10.09	135.9	335.9	155	0.33
	CHMS-SW-08	14.6	7.06	0.633	9.61	135.1	335.1	122.5	0.34
	CHMS-SW-09	14.7	7.09	0.62	10.57	138.2	338.2	275.6	0.38
	CHMS-SW-10	14.6	7.18	0.596	10.5	138.2	338.2	102.2	0.37
	CHMS-SW-11	14.7	7.1	0.578	10.58	126.4	326.4	46.9	0.35
	CHMS-SW-12	14.3	7.11	0.551	10.64	126	326	19.3	0.34
	CHMS-SW-13	13.9	6.92	0.693	10.63	140.8	340.8	18.1	0.43
	CHMS-SW-14	13.4	6.68	0.2098	6.81	85.2	285.2	8.8	0.13
	CHMS-SW-15	13.1	6.52	0.2286	3.68	52.7	252.7	568.4	0.14
	CHMS-SW-16	12.3	6.83	0.2286	2.67	82.4	282.4	102.2	0.12
	CHMS-SW-17	12	7.42	0.2916	10.68	79.3	279.3	134.2	0.11
		12	7.42	0.2916	10.68	79.3	279.3	134.2	0.11
	CHMS-SW-18	12	7.39	0.2991	10.61	179.7	379.7	214.6	0.11
	CHMS-SW-19	11.9	7.51	0.2593	10.7	178.3	378.3	127.2	0.11
	CHMS-SW-20	13.3	7.57	0.2636	9.61	88.7	288.7	639	0.12

Sample Location		Field Description	Field USCS Code	USCS	Field ORP (mV)	StandardHydrogen Electrode ORP (mV)	pH
Hudson River shoreline along eastern boundary of AOC #16 – Area D	IHRS-DU-01	Brown silt with very fine to coarse grained sand	ML	ML	754	959	6.8
				ML	493	698	6.6
				ML	512	717	6.9
Iona Marsh shoreline at outlet of riprap filled drainage swale	RRDS-DU-01	Dark brown silt with organic material and very fine grained sand	OL	ML	322	527	7.3
				ML	342	547	7.1
				ML	310	515	7.1
Iona Marsh shoreline at outlet of tidal wetland swale	TWS-DU-01	Dark brown silt and organic material with very fine grained sand	OL	ML	333	538	7
				ML	296	501	7.4
				ML	312	517	7.2
Con Hook Hudson River Shoreline	CHHRS-SU-01	Dark brown silt with very fine to coarse grained sand	ML	ML	452	657	6.6
	CHHRS-SU-02	Dark brown silt with very fine to coarse grained sand	ML	ML	448	653	6.6
	CHHRS-SU-03	Dark brown silt with very fine to coarse grained sand	ML	ML	576	781	6.8
	CHHRS-SU-04	Dark brown silt with very fine to coarse grained sand	ML	ML	576	781	6.6
	CHHRS-SU-05	Dark brown silt with very fine to coarse grained sand	ML	ML	512	717	6.5
	CHHRS-SU-06	Dark brown silt with very fine to coarse grained sand	ML	ML	550	755	6.6
	CHHRS-SU-07	Dark brown silt with very fine to coarse grained sand	ML	ML	612	817	6.6
	CHHRS-SU-08	Dark brown silt with very fine to coarse grained sand	ML	ML	493	698	6.7
Con Hook Marsh Shoreline	CHMS-SU-1	Dark brown silt and organic material with very fine to coarse grained sand	OL	ML	375	580	6.9
	CHMS-SU-2	Dark brown silt and organic material with very fine to coarse grained sand	OL	ML	422	627	6.8
	CHMS-SU-3	Dark brown silt and organic material with very fine to coarse grained sand	OL	ML	412	617	7
	CHMS-SU-4	Dark brown silt and organic material with very fine to coarse grained sand	OL	ML	426	631	6.8
	CHMS-SU-5	Dark brown silt and organic material with very fine to coarse grained sand	OL	ML	399	604	6.8
	CHMS-SU-6	Dark brown silt and organic material with very fine to coarse grained sand	OL	ML	402	607	6.5
	CHMS-SU-7	Dark brown silt and organic material with very fine to coarse grained sand	OL	ML	405	610	6.8
	CHMS-SU-8	Dark brown silt and organic material with very fine to coarse grained sand	OL	ML	427	632	6.9

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A8
Phase II Photo Log

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PHASE II RI PHOTO LOG

Photographic Documentation
Location: Iona Island, New York

Photograph 01: Hudson River shoreline from sample location IHRS-SW-06 facing east

Photograph 02: Sediment sampling, Hudson River shoreline at location IHRS-SED-01

Photographic Documentation
Location: Iona Island, New York

Photograph 03: Sediment sampling within the Iona Island dump area

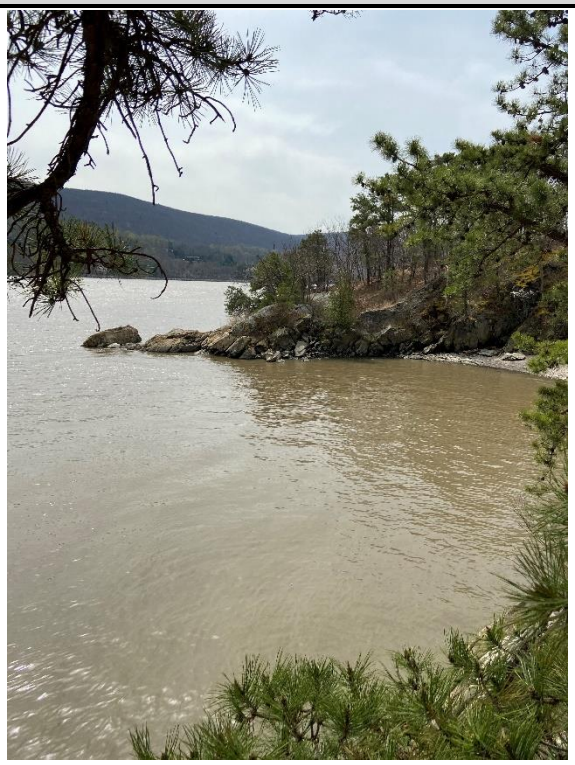
Photograph 04: Surface water quality parameter reading setup

Photographic Documentation
Location: Iona Island, New York

Photograph 05: Con Hook Hudson River Shoreline in the area of sediment sampling area CHHRS-SU-07

Photograph 06: Con Hook Hudson River Shoreline SW-02 sampling location

Photographic Documentation
Location: Iona Island, New York



Photograph 07: Con Hook Hudson River Shoreline SW-09 and SW-10 sampling locations

Photograph 08: Con Hook Marsh in the vicinity of CHMS-SW-14

Photographic Documentation
Location: Iona Island, New York

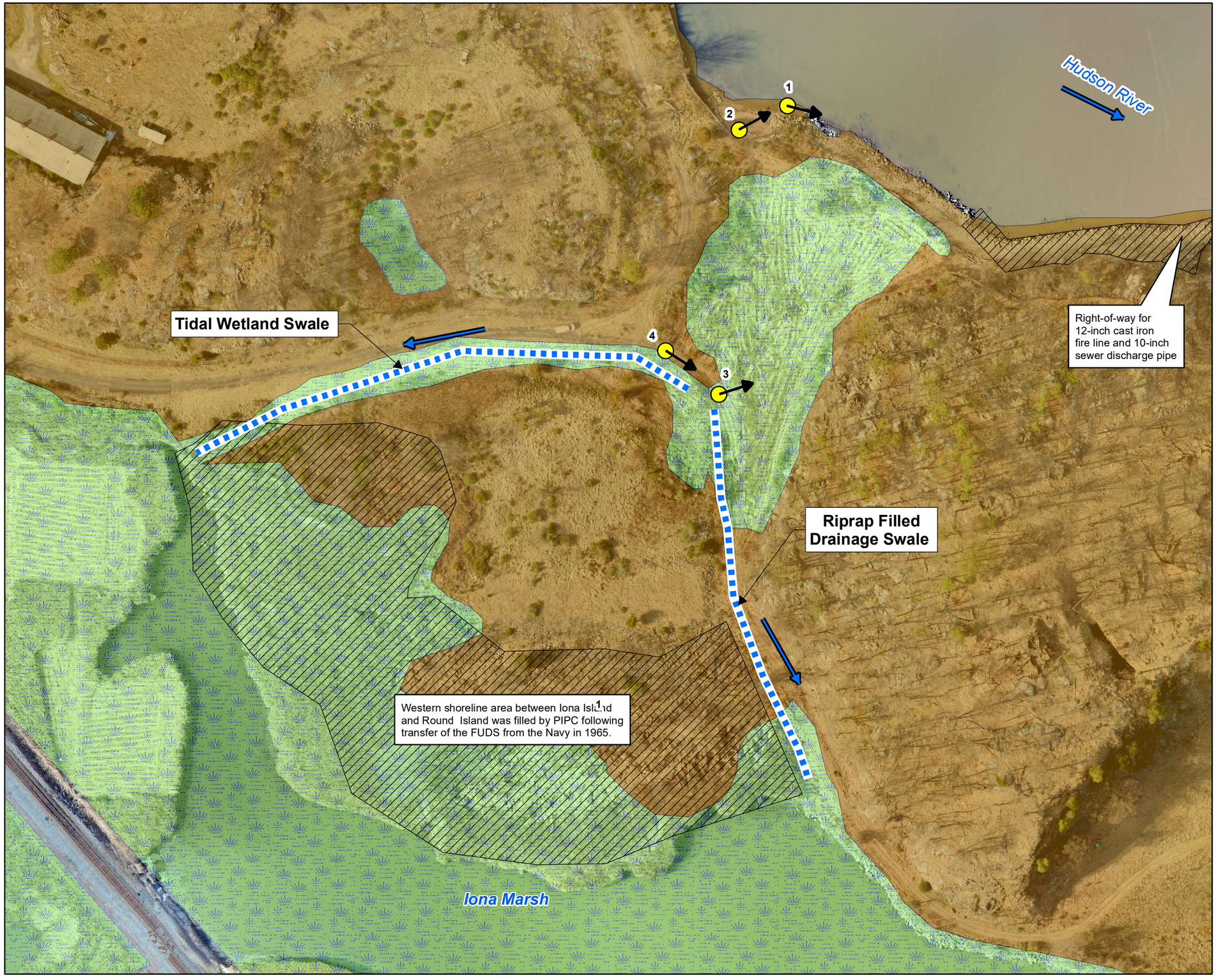
Photograph 09: Con Hook Marsh in the vicinity of CHMS-SW-15

Photograph 10: Sample location CHHRS-SW-01 from Con Hook Marsh SW-01 through SW-04 sampling locations

Photographic Documentation
Location: Iona Island, New York

Photograph 11: Con Hook shoreline sediment from CHHRS-SU-06

Photograph 12: Con Hook shoreline sediment from CHHRS-SU-01



VICINITY MAP

Legend

- AOC #16 – Area D (former Dumping Area)
- Upland
- Marsh/Wetland
- Surface Water Migration Pathway
- Surface Water Flow Direction
- Photo Location
- Photo Location Direction

0 100 200
Feet
1 in = 100 ft

N

FIGURE A-2
Phase II IRI Surface Water/Sediment Onsite Photo Location Map

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial and Topographic Contours: EA Engineering, Science, and Technology. April, 7 2020
Disturbed Ground/Fill Area and AOC Boundaries: USAGC 2018
Upland and Marsh/Wetland: 2020 EA Shoreline Reconnaissance
Map Date: 10/31/2022

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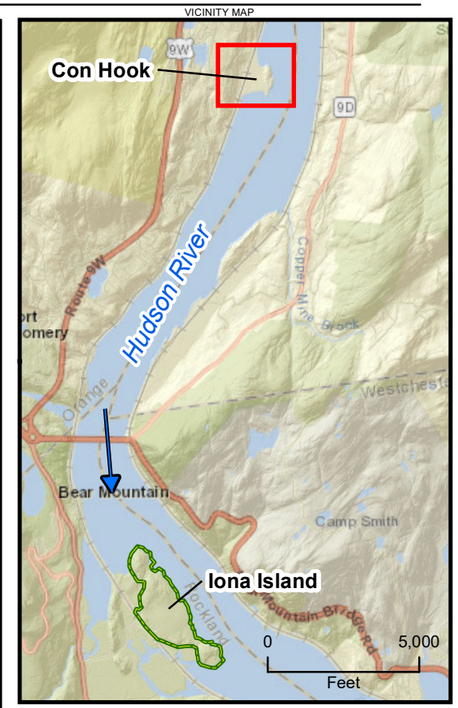

Legend

- Photo Location
- Photo Location Direction
- Surface Water Flow Direction

0 150 300
Feet
1 in = 150 ft

N

FIGURE A-3
Phase II IRI Surface Water/ Sediment Background Photo Location Map

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial: ESRI ArcGIS Online Map Service (ESRI 2009b).
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Map Date: 10/31/2022

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Appendix B

Laboratory Analytical Reports
(Available upon request from USACE)

B1: Phase I Lab Reports
B2: Phase II Lab Reports

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Appendix C

Data Validation Reports

C1: Phase I Data Validation Reports
C2: Phase II Data Validation Reports

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C1
Phase I Data Validation Reports

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US Army Corps of Engineers ®

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling
SDG:	280-134674-1_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Tim Reese
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	EA Engineering Science and Technology, Inc., PBC
Data Review Level:	S2BVEM
Primary Data Reviewer:	Tara Lamond, Data Manager
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	May 26, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	BNASIMD
IINY-DU-20A-SSIS-20200316	280-134674-1	Soil	Field Sample/N	X
IINY-DU-20B-SSIS-20200316	280-134674-2	Soil	Field Duplicate/FD	X
IINY-DU-20C-SSIS-20200316	280-134674-3	Soil	Field Triplicate/FT	X
IINY-DU-22A-SSIS-20200316	280-134674-4	Soil	Field Sample/N	X
IINY-DU-22B-SSIS-20200316	280-134674-5	Soil	Field Duplicate/FD	X
IINY-DU-22C-SSIS-20200316	280-134674-6	Soil	Field Triplicate/FT	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 280-134674-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Field Duplicate RPD
- Field Triplicate RSD
- Lab Blank
- LCS Recovery
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 0 results (0.00%) out of the 108 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
BNASIMD	No additional comments; see Checklist for detail.

May 22, 2020

Reviewed by Tara Lamond, Data Manager, EA Engineering Science and Technology, Inc., PBC

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

May 27, 2020

Reviewed by Samantha Saalfield, Project Chemist, EA Engineering Science and Technology, Inc., PBC

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method BNASIMD, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-22A-SSIS-20200316 (N)/ 280-134674-4	Nitrobenzene-d5	0.000	44 - 125	10 - 125	percent	J/X	I	Diluted Out
IINY-DU-22A-SSIS-20200316 (N)/ 280-134674-4	2-Fluorobiphenyl	0.000	46 - 115	10 - 115	percent	J/X	I	Diluted Out
IINY-DU-22A-SSIS-20200316 (N)/ 280-134674-4	Terphenyl-d14	202.0	58 - 133	10 - 133	percent	J/None	I	Diluted Out
IINY-DU-22B-SSIS-20200316 (FD)/ 280-134674-5	Terphenyl-d14	0.000	58 - 133	10 - 133	percent	J/X	I	Diluted Out

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Qualified Results

No results associated with this sample delivery group required qualification.

Table of All Trace Results

Test Method: BNASIMD Extraction Method: SW3546

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-20A-SSIS-20200316	N	1-Methylnaphthalene	0.00990	0.00760 J	0.00760 J		mg/kg	TR
IINY-DU-20A-SSIS-20200316	N	Acenaphthene	0.00990	0.00630 J	0.00630 J		mg/kg	TR
IINY-DU-20A-SSIS-20200316	N	Fluorene	0.00990	0.00980 J M	0.00980 J		mg/kg	TR
IINY-DU-20C-SSIS-20200316	FT	1-Methylnaphthalene	0.00940	0.00760 J	0.00760 J		mg/kg	TR
IINY-DU-22A-SSIS-20200316	N	Acenaphthylene	0.370	0.260 J D Q	0.260 J		mg/kg	TR

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
I	Surrogate recovery outside project limits.
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: BNASIMD (GC/MS-SIM Analysis by SW8270D)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was instrument tuning completed every 12 hours during sample analysis?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Were Internal Standard retention times and area criteria within method requirements?	•			
Were internal standards spiked for every sample, standard, and QC sample?	•			
Were surrogate recoveries within project acceptance limits?		•		2-Fluorobiphenyl and Nitrobenzene-d5 failed the surrogate recovery criteria low for IINY-DU-22A-SSIS-20200316 (280-134674-4).Terphenyl-d14 failed the surrogate recovery criteria high. Terphenyl-d14 failed the surrogate recovery criteria low forIINY-DU-22B-SSIS-20200316 (280-134674-5). The required dilutions diluted the surrogates out, therefore data were not qualified.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	A LCSD was not provided.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		The MS/MSD is incorrectly associated in the ADR report; should be associated with sample IINY-DU-20B-SSIS-20200316. Qualifiers were reviewed manually. Multiple PAHs were below QC limits. However, the concentration in the sample exceeded four times the spiking amount, therefore no qualifiers were applied.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM- Field Triplicates were collected. The % RSD range for PAHs is 1.42-42.6.
Were QAPP specified laboratory PQLs achieved?	•			

Review Questions

Method: BNASIMD (GC/MS-SIM Analysis by SW8270D)

Review Questions	Yes	No	NA	Comment
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

US Army Corps of Engineers ®

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling
SDG:	280-134675-1_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Tim Reese
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	EA Engineering, Science, and Technology, Inc., PBC.
Data Review Level:	S2BVEM
Primary Data Reviewer:	Tara Lamond, Data Manager
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	May 26, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	BNASIMD	SW8330B
IINY-DU-20A-SBIS1-20200317	280-134675-1	Soil	Field Sample/N	X	
IINY-DU-20B-SBIS1-20200317	280-134675-2	Soil	Field Duplicate/FD	X	
IINY-DU-20C-SBIS1-20200317	280-134675-3	Soil	Field Triplicate/FT	X	
IINY-DU-21A-SBIS1-20200317	280-134675-4	Soil	Field Sample/N	X	
IINY-DU-21A-SSIS-20200317	280-134675-7	Soil	Field Sample/N	X	
IINY-DU-21B-SBIS1-20200317	280-134675-5	Soil	Field Duplicate/FD	X	
IINY-DU-21B-SSIS-20200317	280-134675-8	Soil	Field Duplicate/FD	X	
IINY-DU-21C-SBIS1-20200317	280-134675-6	Soil	Field Triplicate/FT	X	
IINY-DU-21C-SSIS-20200317	280-134675-9	Soil	Field Triplicate/FT	X	
IINY-EXDU-1A-SSIS-20200317	280-134675-13	Soil	Field Sample/N		X
IINY-EXDU-1B-SSIS-20200317	280-134675-14	Soil	Field Duplicate/FD		X
IINY-EXDU-1C-SSIS-20200317	280-134675-15	Soil	Field Triplicate/FT		X
IINY-EXDU-2A-SSIS-20200317	280-134675-16	Soil	Field Sample/N		X
IINY-EXDU-2B-SSIS-20200317	280-134675-17	Soil	Field Duplicate/FD		X
IINY-EXDU-2C-SSIS-20200317	280-134675-18	Soil	Field Triplicate/FT		X

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	BNASIMD	SW8330B
IINY-EXDU-4A-SSIS-20200317	280-134675-10	Soil	Field Sample/N		X
IINY-EXDU-4B-SSIS-20200317	280-134675-11	Soil	Field Duplicate/FD		X
IINY-EXDU-4C-SSIS-20200317	280-134675-12	Soil	Field Triplicate/FT		X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 280-134675-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Field Duplicate RPD
- Field Triplicate RSD
- Lab Blank
- Lab Replicate RPD
- Laboratory Triplicate RSD
- LCS Recovery
- MS Recovery
- MS RPD
- Prep Hold Time
- Reference Material
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 29 results (8.73%) out of the 332 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
BNASIMD	No additional comments; see Checklist for detail.
SW8330B	No additional comments; see Checklist for detail.

May 22, 2020

Reviewed by Tara Lamond, Data Manager, EA Engineering, Science, and Technology, Inc., PBC.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

May 27, 2020

Reviewed by Samantha Saalfield, Project Chemist, EA Engineering, Science, and Technology, Inc., PBC.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method BNASIMD, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-20A-SBIS1-20200317 (SD)/ 280-134675-1MSD	Pyrene	126.8	55 - 117	10 - 117	percent	J/None	M	
IINY-DU-20A-SBIS1-20200317 (SD)/ 280-134675-1MSD	Fluoranthene	130.4	55 - 119	10 - 119	percent	J/None	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-20A-SBIS1-20200317	N	Fluoranthene	0.00900	0.140 J1	0.140 J	+	mg/kg	M
IINY-DU-20A-SBIS1-20200317	N	Pyrene	0.00900	0.140 J1	0.140 J	+	mg/kg	M
IINY-DU-20B-SBIS1-20200317	FD	Fluoranthene	0.00940	0.140	0.140 J	+	mg/kg	M
IINY-DU-20B-SBIS1-20200317	FD	Pyrene	0.00940	0.140	0.140 J	+	mg/kg	M
IINY-DU-20C-SBIS1-20200317	FT	Fluoranthene	0.00940	0.130	0.130 J	+	mg/kg	M
IINY-DU-20C-SBIS1-20200317	FT	Pyrene	0.00940	0.140	0.140 J	+	mg/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW8330B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-EXDU-4A-SSIS-20200317 (MS)/ 280-134675-10MS	3,5-Dinitroaniline	84.20	86 - 118	20 - 118	percent	J/UJ	M	
IINY-EXDU-4A-SSIS-20200317 (MS)/ 280-134675-10MS	2-Amino-4,6-dinitrotoluene	163.2	71 - 123	20 - 123	percent	J/None	M	
IINY-EXDU-4A-SSIS-20200317 (SD)/ 280-134675-10MSD	3,5-Dinitroaniline	83.72	86 - 118	20 - 118	percent	J/UJ	M	
IINY-EXDU-4A-SSIS-20200317 (SD)/ 280-134675-10MSD	2-Amino-4,6-dinitrotoluene	162.8	71 - 123	20 - 123	percent	J/None	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-EXDU-4A-SSIS-20200317	N	3,5-Dinitroaniline	0.0980	0.0200 U J1	0.0200 UJ		mg/kg	M
IINY-EXDU-4B-SSIS-20200317	FD	3,5-Dinitroaniline	0.100	0.0200 U	0.0200 UJ		mg/kg	M
IINY-EXDU-4C-SSIS-20200317	FT	3,5-Dinitroaniline	0.100	0.0200 U	0.0200 UJ		mg/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-20A-SBIS1-20200317	N	Fluoranthene	0.00900	0.140 J1	0.140 J	+	mg/kg	M
IINY-DU-20A-SBIS1-20200317	N	Pyrene	0.00900	0.140 J1	0.140 J	+	mg/kg	M
IINY-DU-20B-SBIS1-20200317	FD	Fluoranthene	0.00940	0.140	0.140 J	+	mg/kg	M
IINY-DU-20B-SBIS1-20200317	FD	Pyrene	0.00940	0.140	0.140 J	+	mg/kg	M
IINY-DU-20C-SBIS1-20200317	FT	Fluoranthene	0.00940	0.130	0.130 J	+	mg/kg	M
IINY-DU-20C-SBIS1-20200317	FT	Pyrene	0.00940	0.140	0.140 J	+	mg/kg	M

Test Method: SW8330B	Extraction Method: METHOD							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-EXDU-4A-SSIS-20200317	N	3,5-Dinitroaniline	0.0980	0.0200 U J1	0.0200 UJ		mg/kg	M
IINY-EXDU-4B-SSIS-20200317	FD	3,5-Dinitroaniline	0.100	0.0200 U	0.0200 UJ		mg/kg	M
IINY-EXDU-4C-SSIS-20200317	FT	3,5-Dinitroaniline	0.100	0.0200 U	0.0200 UJ		mg/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-20A-SBIS1-20200317	N	1-Methylnaphthalene	0.00900	0.00490 J	0.00490 J		mg/kg	TR
IINY-DU-20A-SBIS1-20200317	N	2-Methylnaphthalene	0.00900	0.00780 J	0.00780 J		mg/kg	TR
IINY-DU-20A-SBIS1-20200317	N	Acenaphthene	0.00900	0.00670 J	0.00670 J		mg/kg	TR
IINY-DU-20A-SBIS1-20200317	N	Fluorene	0.00900	0.00870 J	0.00870 J		mg/kg	TR
IINY-DU-20A-SBIS1-20200317	N	Naphthalene	0.00900	0.00720 J	0.00720 J		mg/kg	TR
IINY-DU-20B-SBIS1-20200317	FD	1-Methylnaphthalene	0.00940	0.00500 J	0.00500 J		mg/kg	TR
IINY-DU-20B-SBIS1-20200317	FD	2-Methylnaphthalene	0.00940	0.00690 J	0.00690 J		mg/kg	TR
IINY-DU-20B-SBIS1-20200317	FD	Acenaphthene	0.00940	0.00790 J	0.00790 J		mg/kg	TR
IINY-DU-20B-SBIS1-20200317	FD	Naphthalene	0.00940	0.00700 J	0.00700 J		mg/kg	TR
IINY-DU-20C-SBIS1-20200317	FT	1-Methylnaphthalene	0.00940	0.00490 J	0.00490 J		mg/kg	TR
IINY-DU-20C-SBIS1-20200317	FT	2-Methylnaphthalene	0.00940	0.00800 J	0.00800 J		mg/kg	TR
IINY-DU-20C-SBIS1-20200317	FT	Acenaphthene	0.00940	0.00350 J	0.00350 J		mg/kg	TR
IINY-DU-20C-SBIS1-20200317	FT	Fluorene	0.00940	0.00720 J	0.00720 J		mg/kg	TR
IINY-DU-20C-SBIS1-20200317	FT	Naphthalene	0.00940	0.00830 J	0.00830 J		mg/kg	TR
IINY-DU-21A-SBIS1-20200317	N	1-Methylnaphthalene	0.00910	0.00630 J	0.00630 J		mg/kg	TR
IINY-DU-21A-SBIS1-20200317	N	2-Methylnaphthalene	0.00910	0.00830 J	0.00830 J		mg/kg	TR
IINY-DU-21A-SBIS1-20200317	N	Acenaphthene	0.00910	0.00670 J	0.00670 J		mg/kg	TR
IINY-DU-21A-SBIS1-20200317	N	Fluorene	0.00910	0.00740 J	0.00740 J		mg/kg	TR
IINY-DU-21A-SBIS1-20200317	N	Naphthalene	0.00910	0.00860 J	0.00860 J		mg/kg	TR
IINY-DU-21A-SSIS-20200317	N	1-Methylnaphthalene	0.00970	0.00830 J	0.00830 J		mg/kg	TR
IINY-DU-21B-SBIS1-20200317	FD	1-Methylnaphthalene	0.00910	0.00530 J	0.00530 J		mg/kg	TR
IINY-DU-21B-SBIS1-20200317	FD	2-Methylnaphthalene	0.00910	0.00810 J	0.00810 J		mg/kg	TR
IINY-DU-21B-SBIS1-20200317	FD	Acenaphthene	0.00910	0.00400 J	0.00400 J		mg/kg	TR
IINY-DU-21B-SBIS1-20200317	FD	Fluorene	0.00910	0.00510 J	0.00510 J		mg/kg	TR
IINY-DU-21B-SBIS1-20200317	FD	Naphthalene	0.00910	0.00760 J	0.00760 J		mg/kg	TR
IINY-DU-21B-SSIS-20200317	FD	1-Methylnaphthalene	0.00970	0.00440 J	0.00440 J		mg/kg	TR
IINY-DU-21B-SSIS-20200317	FD	2-Methylnaphthalene	0.00970	0.00670 J	0.00670 J		mg/kg	TR

Table of All Trace Results

Test Method: BNASIMD Extraction Method: SW3546

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-21B-SSIS-20200317	FD	Acenaphthene	0.00970	0.00510 J	0.00510 J		mg/kg	TR
IINY-DU-21B-SSIS-20200317	FD	Fluorene	0.00970	0.00680 J	0.00680 J		mg/kg	TR
IINY-DU-21B-SSIS-20200317	FD	Naphthalene	0.00970	0.00800 J	0.00800 J		mg/kg	TR
IINY-DU-21C-SBIS1-20200317	FT	1-Methylnaphthalene	0.00900	0.00520 J	0.00520 J		mg/kg	TR
IINY-DU-21C-SBIS1-20200317	FT	2-Methylnaphthalene	0.00900	0.00740 J	0.00740 J		mg/kg	TR
IINY-DU-21C-SBIS1-20200317	FT	Acenaphthene	0.00900	0.00380 J	0.00380 J		mg/kg	TR
IINY-DU-21C-SBIS1-20200317	FT	Fluorene	0.00900	0.00460 J	0.00460 J		mg/kg	TR
IINY-DU-21C-SBIS1-20200317	FT	Naphthalene	0.00900	0.00730 J	0.00730 J		mg/kg	TR
IINY-DU-21C-SSIS-20200317	FT	1-Methylnaphthalene	0.00960	0.00410 J	0.00410 J		mg/kg	TR
IINY-DU-21C-SSIS-20200317	FT	2-Methylnaphthalene	0.00960	0.00630 J	0.00630 J		mg/kg	TR
IINY-DU-21C-SSIS-20200317	FT	Acenaphthene	0.00960	0.00490 J	0.00490 J		mg/kg	TR
IINY-DU-21C-SSIS-20200317	FT	Fluorene	0.00960	0.00770 J	0.00770 J		mg/kg	TR
IINY-DU-21C-SSIS-20200317	FT	Naphthalene	0.00960	0.00700 J	0.00700 J		mg/kg	TR

Test Method: SW8330B Extraction Method: METHOD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-EXDU-1A-SSIS-20200317	N	1,3-Dinitrobenzene	0.0970	0.0380 J	0.0380 J		mg/kg	TR
IINY-EXDU-1A-SSIS-20200317	N	2,4-Dinitrotoluene	0.0970	0.0630 J M	0.0630 J		mg/kg	TR
IINY-EXDU-1B-SSIS-20200317	FD	1,3-Dinitrobenzene	0.100	0.0390 J	0.0390 J		mg/kg	TR
IINY-EXDU-1B-SSIS-20200317	FD	2,4-Dinitrotoluene	0.100	0.0600 J M	0.0600 J		mg/kg	TR/P1
IINY-EXDU-1C-SSIS-20200317	FT	1,3,5-Trinitrobenzene	0.100	0.0290 J	0.0290 J		mg/kg	TR/P1
IINY-EXDU-1C-SSIS-20200317	FT	1,3-Dinitrobenzene	0.100	0.0510 J	0.0510 J		mg/kg	TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-EXDU-1A-SSIS-20200317	N	2,4,6-Trinitrotoluene	0.0970	0.280 Q M	0.280	0.280 J	C
IINY-EXDU-1A-SSIS-20200317	N	Tetryl	0.190	0.0970 U Q	0.0970 U	0.0970 UJ	C
IINY-EXDU-1B-SSIS-20200317	FD	2,4,6-Trinitrotoluene	0.100	0.210 Q M	0.210	0.210 J	C
IINY-EXDU-1B-SSIS-20200317	FD	2,4-Dinitrotoluene	0.100	0.0600 J M	0.0600 J	0.0600 J	TR/P1
IINY-EXDU-1B-SSIS-20200317	FD	Tetryl	0.200	0.100 U Q	0.100 U	0.100 UJ	C
IINY-EXDU-1C-SSIS-20200317	FT	1,3,5-Trinitrobenzene	0.100	0.0290 J	0.0290 J	0.0290 J	TR/P1
IINY-EXDU-1C-SSIS-20200317	FT	2,4,6-Trinitrotoluene	0.100	0.370 Q	0.370	0.370 J	C
IINY-EXDU-1C-SSIS-20200317	FT	Tetryl	0.200	0.100 U Q	0.100 U	0.100 UJ	C
IINY-EXDU-2A-SSIS-20200317	N	2,4,6-Trinitrotoluene	0.0990	0.0990 U Q	0.0990 U	0.0990 UJ	C
IINY-EXDU-2A-SSIS-20200317	N	Tetryl	0.200	0.0990 U Q	0.0990 U	0.0990 UJ	C
IINY-EXDU-2B-SSIS-20200317	FD	2,4,6-Trinitrotoluene	0.100	0.100 U Q	0.100 U	0.100 UJ	C
IINY-EXDU-2B-SSIS-20200317	FD	Tetryl	0.200	0.100 U Q	0.100 U	0.100 UJ	C
IINY-EXDU-2C-SSIS-20200317	FT	2,4,6-Trinitrotoluene	0.100	0.100 U Q	0.100 U	0.100 UJ	C
IINY-EXDU-2C-SSIS-20200317	FT	Tetryl	0.200	0.100 U Q	0.100 U	0.100 UJ	C
IINY-EXDU-4A-SSIS-20200317	N	2,4,6-Trinitrotoluene	0.0980	0.0980 U Q	0.0980 U	0.0980 UJ	C
IINY-EXDU-4A-SSIS-20200317	N	Tetryl	0.200	0.0980 U Q	0.0980 U	0.0980 UJ	C
IINY-EXDU-4B-SSIS-20200317	FD	2,4,6-Trinitrotoluene	0.100	0.100 U Q	0.100 U	0.100 UJ	C
IINY-EXDU-4B-SSIS-20200317	FD	Tetryl	0.200	0.100 U Q	0.100 U	0.100 UJ	C
IINY-EXDU-4C-SSIS-20200317	FT	2,4,6-Trinitrotoluene	0.100	0.100 U Q	0.100 U	0.100 UJ	C
IINY-EXDU-4C-SSIS-20200317	FT	Tetryl	0.200	0.100 U Q	0.100 U	0.100 UJ	C

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
C	LCS Recovery
M	MS Recovery
P1	Column RPD
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: BNASIMD (GC/MS-SIM Analysis by SW8270D)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was instrument tuning completed every 12 hours during sample analysis?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Were Internal Standard retention times and area criteria within method requirements?	•			
Were internal standards spiked for every sample, standard, and QC sample?	•			
Were surrogate recoveries within project acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	A LCSD was not provided.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		The MSD was above QC limits for Pyrene and Fluoranthene.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	There are ISM- Field Triplicates were collected. The % RSD ranged from 0-37.7.
Were QAPP specified laboratory PQLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW8330B (Nitroaromatics and Nitramines by HPLC)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was a blank prepared and analyzed with each batch?	•			
Were target analytes in the blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS or LCS/LCSD pair analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?		•		Grinding LCS (LCSSRM) recovered outside of reporting limits for TNT and tetryl on the primary column. As per the method, the entire client sample is ground initially, therefore, it is not possible to re-grind samples. Associated data have been J or UJ qualified.
Was the LCS/LCSD RPD within project acceptance limits?			•	A LCSD was not provided.
Was a project specific MS or MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		3,5-Dinitroaniline recovered below QC limits and 2-Amino-4,6-dinitrotoluene recovered above QC limits in the MS and MSD performed on sample IINY-EXDU-4A-SSIS-20200317. 3,5-Dinitroaniline data for the triplicate ISM samples from this location were J or UJ qualified. Because 2-Amino-4,6-dinitrotoluene was not detected in the project samples and the MS/MSD recovery was above QC limits, data for this analyte were not qualified.
Was the MS/MSD RPD within project acceptance limits?	•			
Was a project-specific duplicate analyzed, and the RPD within QAPP acceptance limits?	•			A lab duplicate was analyzed and all results were non-detect, therefore the RPD was not calculated.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM- Field Triplicates were collected. The % RSD ranged from 17-80.
Were QAPP specified laboratory reporting limits achieved?	•			
Were surrogate recoveries within project acceptance limits?	•			
Were column comparison differences with project acceptance limits?		•		The %RPD between the primary and confirmation column exceeded 40% for the following: 2,4-Dinitrotoluene in IINY-EXDU-1B-SSIS-20200317 (280-134675-14) and 1,3,5-Trinitrobenzene in IINY-EXDU-1C-SSIS-20200317 (280-134675-15). The data have been J qualified.
Was the intial calibration within criteria?	•			
Was a second source check standard analyzed and within all applicable criteria?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			

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Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling
SDG:	280-134677-1_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Tim Reese
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	EA Engineering, Science, and Technology, Inc., PBC.
Data Review Level:	S2BVEM
Primary Data Reviewer:	Tara Lamond, Data Manager
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	May 26, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
IINY-DU-20A-SBIS1-20200317	280-134677-2	Soil	Field Sample/N	X
IINY-DU-20B-SBIS1-20200317	280-134677-3	Soil	Field Duplicate/FD	X
IINY-DU-20C-SBIS1-20200317	280-134677-4	Soil	Field Triplicate/FT	X
IINY-DU-21A-SBIS1-20200317	280-134677-5	Soil	Field Sample/N	X
IINY-DU-21B-SBIS1-20200317	280-134677-6	Soil	Field Duplicate/FD	X
IINY-DU-21C-SBIS1-20200317	280-134677-7	Soil	Field Triplicate/FT	X
FB03172020	280-134677-1	Water	Ambient Blank/AB	X
TB03172020	280-134677-8	Water	Trip Blank/TB	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 280-134677-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Ambient Blank
- Blank - Negative
- Field Duplicate RPD
- Field Triplicate RSD
- Lab Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time
- Trip Blank

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 0 results (0.00%) out of the 48 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	2 of the 6 methanol preserved aliquots received for sample IINY-DU-20A-SBIS1-20200317 (280-134677-2) did not contain any Methanol (Methanol had leaked out or absorbed); therefore they were removed from the calculation of the initial weight and final volume, and only the 4 aliquots that contained methanol were included in the composite analysis.

Tara W Lamond

May 26, 2020

Reviewed by Tara Lamond, Data Manager, EA Engineering, Science, and Technology, Inc., PBC.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

Samantha Saalfield

May 27, 2020

Reviewed by Samantha Saalfield, Project Chemist, EA Engineering, Science, and Technology, Inc., PBC.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

No Outliers were associated with this sample delivery group.

Qualified Results

No results associated with this sample delivery group required qualification.

Trace Results

No results associated with this sample delivery group are considered trace.

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.

B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			2 of the 6 methanol preserved aliquots received for sample IINY-DU-20A-SBIS1-20200317 (280-134677-2) did not contain any Methanol (Methanol had leaked out or absorbed); therefore they were removed from the calculation of the initial weight and final volume, and only the 4 aliquots that contained methanol were included in the composite analysis.
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was instrument tuning completed every 12 hours during sample analysis?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Were Internal Standard retention times and area criteria within method requirements?	•			
Were internal standards spiked for every sample, standard, and QC sample?	•			
Were surrogate recoveries within project acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes in the field blank less than MDL?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			Insufficient sample volume was available to perform the MS/MSD on the field and trip blank samples (aqueous matrix). A LCS/LCSD was used instead.
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM- Field Triplicates were collected. The % RSD was not calculated since all results were ND.
Were QAPP specified laboratory PQLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			

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Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Were DoD QSM corrective actions followed if deviations were noted?			•	
Were any data rejected during the verification process?		•		

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Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling
SDG:	280-134722-1_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Tim Reese
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	EA Engineering, Science, and Technology, Inc., PBC.
Data Review Level:	S2BVEM
Primary Data Reviewer:	Tara Lamond, Data Manager
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	May 26, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	BNASIMD	SW6010C	SW6020A	SW7471B	SW8330B
IINY-DU-1A-SSIS-20200318	280-134722-13	Soil	Field Sample/N	X	X	X	X	
IINY-DU-1B-SSIS-20200318	280-134722-14	Soil	Field Duplicate/FD	X	X	X	X	
IINY-DU-1C-SSIS-20200318	280-134722-15	Soil	Field Triplicate/FT	X	X	X	X	
IINY-DU-3A-SSIS-20200318	280-134722-19	Soil	Field Sample/N	X	X	X	X	
IINY-DU-3B-SSIS-20200318	280-134722-20	Soil	Field Duplicate/FD	X	X	X	X	
IINY-DU-3C-SSIS-20200318	280-134722-21	Soil	Field Triplicate/FT	X	X	X	X	
IINY-DU-4A-SSIS-20200318	280-134722-16	Soil	Field Sample/N	X	X	X	X	
IINY-DU-4B-SSIS-20200318	280-134722-17	Soil	Field Duplicate/FD	X	X	X	X	
IINY-DU-4C-SSIS-20200318	280-134722-18	Soil	Field Triplicate/FT	X	X	X	X	
IINY-EXDU-3A-SSIS-20200318	280-134722-1	Soil	Field Sample/N					X
IINY-EXDU-3B-SSIS-20200318	280-134722-2	Soil	Field Duplicate/FD					X
IINY-EXDU-3C-SSIS-20200318	280-134722-3	Soil	Field Triplicate/FT					X
IINY-EXDU-5A-SSIS-20200318	280-134722-4	Soil	Field Sample/N					X
IINY-EXDU-5B-SSIS-20200318	280-134722-5	Soil	Field Duplicate/FD					X
IINY-EXDU-5C-SSIS-20200318	280-134722-6	Soil	Field Triplicate/FT					X
IINY-EXDU-6A-SSIS-20200318	280-134722-7	Soil	Field Sample/N					X

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	BNASIMD	SW6010C	SW6020A	SW7471B	SW8330B
IINY-EXDU-6B-SSIS-20200318	280-134722-8	Soil	Field Duplicate/FD					X
IINY-EXDU-6C-SSIS-20200318	280-134722-9	Soil	Field Triplicate/FT					X
IINY-EXDU-7A-SSIS-20200318	280-134722-10	Soil	Field Sample/N					X
IINY-EXDU-7B-SSIS-20200318	280-134722-11	Soil	Field Duplicate/FD					X
IINY-EXDU-7C-SSIS-20200318	280-134722-12	Soil	Field Triplicate/FT					X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 280-134722-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Field Duplicate RPD
- Field Triplicate RSD
- Lab Blank
- Lab Replicate RPD
- Laboratory Triplicate RSD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Reference Material
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 191 results (32.37%) out of the 590 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
BNASIMD	No additional comments; see Checklist for detail.
SW6010C	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW7471B	No additional comments; see Checklist for detail.
SW8330B	No additional comments; see Checklist for detail.

May 22, 2020

Reviewed by Tara Lamond, Data Manager, EA Engineering, Science, and Technology, Inc., PBC.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

May 27, 2020

Reviewed by Samantha Saalfield, Project Chemist, EA Engineering, Science, and Technology, Inc., PBC.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method BNASIMD, Prep Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of extraction found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-1A-SSIS-20200318 (N)/ 280-134722-13		21.75	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-1A-SSIS-20200318 (N)/ 280-134722-13	Fluorene	21.75	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-1B-SSIS-20200318 (FD)/ 280-134722-14		21.75	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-1B-SSIS-20200318 (FD)/ 280-134722-14	Fluorene	21.75	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-1C-SSIS-20200318 (FT)/ 280-134722-15		21.75	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-1C-SSIS-20200318 (FT)/ 280-134722-15	Fluorene	21.75	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-3A-SSIS-20200318 (N)/ 280-134722-19		21.72	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-3A-SSIS-20200318 (N)/ 280-134722-19	Fluorene	21.72	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-3B-SSIS-20200318 (FD)/ 280-134722-20		21.72	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-3B-SSIS-20200318 (FD)/ 280-134722-20	Fluorene	21.72	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-3C-SSIS-20200318 (FT)/ 280-134722-21		21.72	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-3C-SSIS-20200318 (FT)/ 280-134722-21	Fluorene	21.72	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-4A-SSIS-20200318 (N)/ 280-134722-16		21.77	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-4A-SSIS-20200318 (N)/ 280-134722-16	Fluorene	21.77	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-4B-SSIS-20200318 (FD)/ 280-134722-17		21.77	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-4B-SSIS-20200318 (FD)/ 280-134722-17	Fluorene	21.77	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-4C-SSIS-20200318 (FT)/ 280-134722-18		21.77	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL

Quality Control Outliers for test method BNASIMD, Prep Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of extraction found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-4C-SSIS-20200318 (FT)/ 280-134722-18	Fluorene	21.77	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-1A-SSIS-20200318	N	1-Methylnaphthalene	0.00890	0.00580 J H	0.00580 J	-	mg/kg	H2/TR
IINY-DU-1A-SSIS-20200318	N	2-Methylnaphthalene	0.00890	0.00980 H	0.00980 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Acenaphthene	0.00890	0.00700 J H	0.00700 J	-	mg/kg	H2/TR
IINY-DU-1A-SSIS-20200318	N	Acenaphthylene	0.00890	0.0410 H	0.0410 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Anthracene	0.00890	0.0320 H	0.0320 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Benzo(a)anthracene	0.00890	0.150 H	0.150 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Benzo(a)pyrene	0.00890	0.170 H	0.170 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Benzo(b)fluoranthene	0.00890	0.270 H	0.270 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Benzo(g,h,i)perylene	0.00890	0.130 H	0.130 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Benzo(k)fluoranthene	0.00890	0.0920 H	0.0920 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Chrysene	0.00890	0.170 H	0.170 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Dibenz(a,h)anthracene	0.00890	0.0350 H	0.0350 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Fluoranthene	0.00890	0.260 H	0.260 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Indeno(1,2,3-c,d)pyrene	0.00890	0.150 H	0.150 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Naphthalene	0.00890	0.0110 H	0.0110 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Phenanthrene	0.00890	0.0840 H	0.0840 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Pyrene	0.00890	0.260 H	0.260 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Fluorene	0.00890	0.00900 H	0.00900 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	1-Methylnaphthalene	0.00900	0.00440 J H	0.00440 J	-	mg/kg	H2/TR
IINY-DU-1B-SSIS-20200318	FD	2-Methylnaphthalene	0.00900	0.00620 J H	0.00620 J	-	mg/kg	H2/TR

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-1B-SSIS-20200318	FD	Acenaphthene	0.00900	0.00680 J H	0.00680 J	-	mg/kg	H2/TR
IINY-DU-1B-SSIS-20200318	FD	Acenaphthylene	0.00900	0.0270 H	0.0270 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Anthracene	0.00900	0.0280 H	0.0280 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Benzo(a)anthracene	0.00900	0.130 H	0.130 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Benzo(a)pyrene	0.00900	0.150 H M	0.150 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Benzo(b)fluoranthene	0.00900	0.230 H	0.230 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Benzo(g,h,i)perylene	0.00900	0.120 H	0.120 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Benzo(k)fluoranthene	0.00900	0.0760 H M	0.0760 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Chrysene	0.00900	0.140 H	0.140 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Dibenz(a,h)anthracene	0.00900	0.0300 H	0.0300 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Fluoranthene	0.00900	0.240 H	0.240 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Indeno(1,2,3-c,d)pyrene	0.00900	0.140 H	0.140 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Naphthalene	0.00900	0.00750 J H	0.00750 J	-	mg/kg	H2/TR
IINY-DU-1B-SSIS-20200318	FD	Phenanthrene	0.00900	0.0900 H	0.0900 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Pyrene	0.00900	0.240 H	0.240 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Fluorene	0.00900	0.00770 J H	0.00770 J	-	mg/kg	H2/TR
IINY-DU-1C-SSIS-20200318	FT	1-Methylnaphthalene	0.00890	0.00360 J H	0.00360 J	-	mg/kg	H2/TR
IINY-DU-1C-SSIS-20200318	FT	2-Methylnaphthalene	0.00890	0.00530 J H	0.00530 J	-	mg/kg	H2/TR
IINY-DU-1C-SSIS-20200318	FT	Acenaphthene	0.00890	0.00540 J H	0.00540 J	-	mg/kg	H2/TR
IINY-DU-1C-SSIS-20200318	FT	Acenaphthylene	0.00890	0.0260 H	0.0260 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Anthracene	0.00890	0.0250 H	0.0250 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Benzo(a)anthracene	0.00890	0.110 H	0.110 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Benzo(a)pyrene	0.00890	0.130 H M	0.130 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Benzo(b)fluoranthene	0.00890	0.200 H	0.200 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Benzo(g,h,i)perylene	0.00890	0.100 H	0.100 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Benzo(k)fluoranthene	0.00890	0.0650 H M	0.0650 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Chrysene	0.00890	0.120 H	0.120 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Dibenz(a,h)anthracene	0.00890	0.0260 H	0.0260 J	-	mg/kg	H2

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-1C-SSIS-20200318	FT	Fluoranthene	0.00890	0.200 H	0.200 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Indeno(1,2,3-c,d)pyrene	0.00890	0.120 H	0.120 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Naphthalene	0.00890	0.00630 J H	0.00630 J	-	mg/kg	H2/TR
IINY-DU-1C-SSIS-20200318	FT	Phenanthrene	0.00890	0.0740 H	0.0740 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Pyrene	0.00890	0.200 H	0.200 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Fluorene	0.00890	0.00800 J H	0.00800 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	1-Methylnaphthalene	0.180	0.0150 J H D	0.0150 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	2-Methylnaphthalene	0.180	0.0170 J H D	0.0170 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	Acenaphthene	0.180	0.0360 J H D	0.0360 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	Acenaphthylene	0.180	0.0600 J H D	0.0600 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	Anthracene	0.180	0.140 J H D	0.140 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	Benzo(a)anthracene	0.180	0.590 H D	0.590 J	-	mg/kg	H2
IINY-DU-3A-SSIS-20200318	N	Benzo(a)pyrene	0.180	0.610 H D	0.610 J	-	mg/kg	H2
IINY-DU-3A-SSIS-20200318	N	Benzo(b)fluoranthene	0.180	0.930 H D	0.930 J	-	mg/kg	H2
IINY-DU-3A-SSIS-20200318	N	Benzo(g,h,i)perylene	0.180	0.430 H D	0.430 J	-	mg/kg	H2
IINY-DU-3A-SSIS-20200318	N	Benzo(k)fluoranthene	0.180	0.270 H D	0.270 J	-	mg/kg	H2
IINY-DU-3A-SSIS-20200318	N	Chrysene	0.180	0.610 H D	0.610 J	-	mg/kg	H2
IINY-DU-3A-SSIS-20200318	N	Dibenz(a,h)anthracene	0.180	0.110 J H D	0.110 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	Fluoranthene	0.180	1.10 H D	1.10 J	-	mg/kg	H2
IINY-DU-3A-SSIS-20200318	N	Fluorene	0.180	0.0440 J H D	0.0440 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	Indeno(1,2,3-c,d)pyrene	0.180	0.460 H D	0.460 J	-	mg/kg	H2
IINY-DU-3A-SSIS-20200318	N	Naphthalene	0.180	0.0230 J H D	0.0230 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	Phenanthrene	0.180	0.530 H D	0.530 J	-	mg/kg	H2
IINY-DU-3A-SSIS-20200318	N	Pyrene	0.180	1.10 H D	1.10 J	-	mg/kg	H2
IINY-DU-3B-SSIS-20200318	FD	Fluorene	0.0890	0.0250 J H D	0.0250 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	1-Methylnaphthalene	0.0890	0.0100 J H D	0.0100 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	2-Methylnaphthalene	0.0890	0.0110 J H D	0.0110 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	Acenaphthene	0.0890	0.0280 J H D	0.0280 J	-	mg/kg	H2/TR

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-3B-SSIS-20200318	FD	Acenaphthylene	0.0890	0.0310 J H D	0.0310 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	Anthracene	0.0890	0.0820 J H D	0.0820 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	Benzo(a)anthracene	0.0890	0.350 H D Q	0.350 J	-	mg/kg	H2
IINY-DU-3B-SSIS-20200318	FD	Benzo(a)pyrene	0.0890	0.350 H D Q	0.350 J	-	mg/kg	H2
IINY-DU-3B-SSIS-20200318	FD	Benzo(b)fluoranthene	0.0890	0.480 H D Q	0.480 J	-	mg/kg	H2
IINY-DU-3B-SSIS-20200318	FD	Benzo(g,h,i)perylene	0.0890	0.260 H D Q	0.260 J	-	mg/kg	H2
IINY-DU-3B-SSIS-20200318	FD	Benzo(k)fluoranthene	0.0890	0.160 H D Q	0.160 J	-	mg/kg	H2
IINY-DU-3B-SSIS-20200318	FD	Chrysene	0.0890	0.350 H D Q	0.350 J	-	mg/kg	H2
IINY-DU-3B-SSIS-20200318	FD	Dibenz(a,h)anthracene	0.0890	0.0640 J H D	0.0640 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	Fluoranthene	0.0890	0.650 H D	0.650 J	-	mg/kg	H2
IINY-DU-3B-SSIS-20200318	FD	Indeno(1,2,3-c,d)pyrene	0.0890	0.270 H D Q	0.270 J	-	mg/kg	H2
IINY-DU-3B-SSIS-20200318	FD	Naphthalene	0.0890	0.0130 J H D	0.0130 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	Phenanthrene	0.0890	0.340 H D	0.340 J	-	mg/kg	H2
IINY-DU-3B-SSIS-20200318	FD	Pyrene	0.0890	0.650 H D	0.650 J	-	mg/kg	H2
IINY-DU-3C-SSIS-20200318	FT	Fluorene	0.0890	0.0150 J H D	0.0150 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	1-Methylnaphthalene	0.0890	0.00710 J H D	0.00710 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	2-Methylnaphthalene	0.0890	0.00880 J H D	0.00880 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	Acenaphthene	0.0890	0.0150 J H D	0.0150 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	Acenaphthylene	0.0890	0.0280 J H D	0.0280 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	Anthracene	0.0890	0.0520 J H D	0.0520 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	Benzo(a)anthracene	0.0890	0.230 H D	0.230 J	-	mg/kg	H2
IINY-DU-3C-SSIS-20200318	FT	Benzo(a)pyrene	0.0890	0.250 H D	0.250 J	-	mg/kg	H2
IINY-DU-3C-SSIS-20200318	FT	Benzo(b)fluoranthene	0.0890	0.370 H D	0.370 J	-	mg/kg	H2
IINY-DU-3C-SSIS-20200318	FT	Benzo(g,h,i)perylene	0.0890	0.180 H D	0.180 J	-	mg/kg	H2
IINY-DU-3C-SSIS-20200318	FT	Benzo(k)fluoranthene	0.0890	0.130 H D	0.130 J	-	mg/kg	H2
IINY-DU-3C-SSIS-20200318	FT	Chrysene	0.0890	0.250 H D	0.250 J	-	mg/kg	H2
IINY-DU-3C-SSIS-20200318	FT	Dibenz(a,h)anthracene	0.0890	0.0550 J H D	0.0550 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	Fluoranthene	0.0890	0.430 H D	0.430 J	-	mg/kg	H2

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-3C-SSIS-20200318	FT	Indeno(1,2,3-c,d)pyrene	0.0890	0.190 H D	0.190 J	-	mg/kg	H2
IINY-DU-3C-SSIS-20200318	FT	Naphthalene	0.0890	0.0120 J H D	0.0120 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	Phenanthrene	0.0890	0.210 H D	0.210 J	-	mg/kg	H2
IINY-DU-3C-SSIS-20200318	FT	Pyrene	0.0890	0.440 H D	0.440 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	1-Methylnaphthalene	0.900	0.0610 J H D	0.0610 J	-	mg/kg	H2/TR
IINY-DU-4A-SSIS-20200318	N	2-Methylnaphthalene	0.900	0.0690 J H D	0.0690 J	-	mg/kg	H2/TR
IINY-DU-4A-SSIS-20200318	N	Acenaphthene	0.900	0.200 J H D	0.200 J	-	mg/kg	H2/TR
IINY-DU-4A-SSIS-20200318	N	Acenaphthylene	0.900	0.230 J H D	0.230 J	-	mg/kg	H2/TR
IINY-DU-4A-SSIS-20200318	N	Anthracene	0.900	0.390 J H D	0.390 J	-	mg/kg	H2/TR
IINY-DU-4A-SSIS-20200318	N	Benzo(a)anthracene	0.900	1.20 H D Q	1.20 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Benzo(a)pyrene	0.900	1.10 H D Q	1.10 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Benzo(b)fluoranthene	0.900	2.90 H D M	2.90 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Benzo(g,h,i)perylene	0.900	0.910 H D Q	0.910 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Benzo(k)fluoranthene	0.900	0.920 H D Q	0.920 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Chrysene	0.900	2.60 H D Q	2.60 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Dibenz(a,h)anthracene	0.900	0.280 J H D	0.280 J	-	mg/kg	H2/TR
IINY-DU-4A-SSIS-20200318	N	Fluoranthene	0.900	7.90 H D Q	7.90 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Indeno(1,2,3-c,d)pyrene	0.900	1.00 H D Q	1.00 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Naphthalene	0.900	0.180 U H Q	0.180 UJ		mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Phenanthrene	0.900	3.80 H D Q	3.80 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Pyrene	0.900	5.70 H D Q	5.70 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Fluorene	0.900	0.270 J H D	0.270 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	1-Methylnaphthalene	0.930	0.190 U H Q	0.190 UJ		mg/kg	H2
IINY-DU-4B-SSIS-20200318	FD	2-Methylnaphthalene	0.930	0.190 U H Q	0.190 UJ		mg/kg	H2
IINY-DU-4B-SSIS-20200318	FD	Acenaphthene	0.930	0.0790 J H D	0.0790 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	Acenaphthylene	0.930	0.250 J H D	0.250 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	Anthracene	0.930	0.370 J H D	0.370 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	Benzo(a)anthracene	0.930	1.30 H D Q	1.30 J	-	mg/kg	H2

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-4B-SSIS-20200318	FD	Benzo(a)pyrene	0.930	1.10 H D Q	1.10 J	-	mg/kg	H2
IINY-DU-4B-SSIS-20200318	FD	Benzo(b)fluoranthene	0.930	2.70 H D Q	2.70 J	-	mg/kg	H2
IINY-DU-4B-SSIS-20200318	FD	Benzo(g,h,i)perylene	0.930	0.860 J H D	0.860 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	Benzo(k)fluoranthene	0.930	0.830 J H D	0.830 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	Chrysene	0.930	1.90 H D Q	1.90 J	-	mg/kg	H2
IINY-DU-4B-SSIS-20200318	FD	Dibenz(a,h)anthracene	0.930	0.300 J H D	0.300 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	Fluoranthene	0.930	4.20 H D Q	4.20 J	-	mg/kg	H2
IINY-DU-4B-SSIS-20200318	FD	Indeno(1,2,3-c,d)pyrene	0.930	1.10 H D Q	1.10 J	-	mg/kg	H2
IINY-DU-4B-SSIS-20200318	FD	Naphthalene	0.930	0.190 U H Q	0.190 UJ		mg/kg	H2
IINY-DU-4B-SSIS-20200318	FD	Phenanthrene	0.930	1.60 H D Q	1.60 J	-	mg/kg	H2
IINY-DU-4B-SSIS-20200318	FD	Pyrene	0.930	3.30 H D Q	3.30 J	-	mg/kg	H2
IINY-DU-4B-SSIS-20200318	FD	Fluorene	0.930	0.110 J H D	0.110 J	-	mg/kg	H2/TR
IINY-DU-4C-SSIS-20200318	FT	1-Methylnaphthalene	0.190	0.0210 J H D	0.0210 J	-	mg/kg	H2/TR
IINY-DU-4C-SSIS-20200318	FT	2-Methylnaphthalene	0.190	0.0390 J H D	0.0390 J	-	mg/kg	H2/TR
IINY-DU-4C-SSIS-20200318	FT	Acenaphthene	0.190	0.0260 J H D	0.0260 J	-	mg/kg	H2/TR
IINY-DU-4C-SSIS-20200318	FT	Acenaphthylene	0.190	0.150 J H D	0.150 J	-	mg/kg	H2/TR
IINY-DU-4C-SSIS-20200318	FT	Anthracene	0.190	0.180 J H D	0.180 J	-	mg/kg	H2/TR
IINY-DU-4C-SSIS-20200318	FT	Benzo(a)anthracene	0.190	0.890 H D	0.890 J	-	mg/kg	H2
IINY-DU-4C-SSIS-20200318	FT	Benzo(a)pyrene	0.190	1.10 H D M	1.10 J	-	mg/kg	H2
IINY-DU-4C-SSIS-20200318	FT	Benzo(b)fluoranthene	0.190	2.10 H D	2.10 J	-	mg/kg	H2
IINY-DU-4C-SSIS-20200318	FT	Benzo(g,h,i)perylene	0.190	0.870 H D	0.870 J	-	mg/kg	H2
IINY-DU-4C-SSIS-20200318	FT	Benzo(k)fluoranthene	0.190	0.660 H D M	0.660 J	-	mg/kg	H2
IINY-DU-4C-SSIS-20200318	FT	Chrysene	0.190	1.00 H D	1.00 J	-	mg/kg	H2
IINY-DU-4C-SSIS-20200318	FT	Dibenz(a,h)anthracene	0.190	0.260 H D	0.260 J	-	mg/kg	H2
IINY-DU-4C-SSIS-20200318	FT	Fluoranthene	0.190	1.30 H D	1.30 J	-	mg/kg	H2
IINY-DU-4C-SSIS-20200318	FT	Indeno(1,2,3-c,d)pyrene	0.190	1.00 H D	1.00 J	-	mg/kg	H2
IINY-DU-4C-SSIS-20200318	FT	Naphthalene	0.190	0.0510 J H D	0.0510 J	-	mg/kg	H2/TR
IINY-DU-4C-SSIS-20200318	FT	Phenanthrene	0.190	0.460 H D	0.460 J	-	mg/kg	H2

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-4C-SSIS-20200318	FT	Pyrene	0.190	1.30 H D	1.30 J	-	mg/kg	H2
IINY-DU-4C-SSIS-20200318	FT	Fluorene	0.190	0.0430 J H D	0.0430 J	-	mg/kg	H2/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method BNASIMD, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-3B-SSIS-20200318 (FD)/ 280-134722-20	Terphenyl-d14	56.00	58 - 133	10 - 133	percent	J/UJ	I	Diluted Out
IINY-DU-4A-SSIS-20200318 (N)/ 280-134722-16	Nitrobenzene-d5	0.000	44 - 125	10 - 125	percent	J/X	I	Diluted Out
IINY-DU-4A-SSIS-20200318 (N)/ 280-134722-16	2-Fluorobiphenyl	0.000	46 - 115	10 - 115	percent	J/X	I	Diluted Out
IINY-DU-4A-SSIS-20200318 (N)/ 280-134722-16	Terphenyl-d14	0.000	58 - 133	10 - 133	percent	J/X	I	Diluted Out
IINY-DU-4B-SSIS-20200318 (FD)/ 280-134722-17	Nitrobenzene-d5	0.000	44 - 125	10 - 125	percent	J/X	I	Diluted Out
IINY-DU-4B-SSIS-20200318 (FD)/ 280-134722-17	2-Fluorobiphenyl	0.000	46 - 115	10 - 115	percent	J/X	I	Diluted Out
IINY-DU-4B-SSIS-20200318 (FD)/ 280-134722-17	Terphenyl-d14	0.000	58 - 133	10 - 133	percent	J/X	I	Diluted Out
IINY-DU-4B-SSIS-20200318 (FD)/ 280-134722-17	Fluoranthene-d10	22.00	55 - 101	10 - 101	percent	J/UJ	I	Diluted Out

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6010C, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-489694/1-A (LB)/ MB 280-489694/1-A	Aluminum	2.410	< 1.6	< 50	mg/kg	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6010C, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-1A-SSIS-20200318 (MS)/ 280-134722-13MS	Iron	140.0	81 - 118	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-1A-SSIS-20200318 (MS)/ 280-134722-13MS	Aluminum	480.0	74 - 119	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-1A-SSIS-20200318 (SD)/ 280-134722-13MSD	Iron	120.0	81 - 118	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-1A-SSIS-20200318 (SD)/ 280-134722-13MSD	Aluminum	400.0	74 - 119	30 - 125	percent	J/None	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6020A, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-489837/1-A (LB)/ MB 280-489837/1-A	Silver	0.009550	< 0.0078	< 0.1	mg/kg	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Lab Blank for SW6020A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-1A-SSIS-20200318	N	Silver	0.0930	0.0660 J	0.0930 U		mg/kg	L
IINY-DU-1B-SSIS-20200318	FD	Silver	0.0990	0.0650 J	0.0990 U		mg/kg	L
IINY-DU-1C-SSIS-20200318	FT	Silver	0.0990	0.0600 J	0.0990 U		mg/kg	L
IINY-DU-3B-SSIS-20200318	FD	Silver	0.0940	0.0750 J	0.0940 U		mg/kg	L
IINY-DU-3C-SSIS-20200318	FT	Silver	0.0990	0.0970 J	0.0990 U		mg/kg	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW8330B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-EXDU-7A-SSIS-20200318 (MS)/ 280-134722-10MS	3,5-Dinitroaniline	85.91	86 - 118	20 - 118	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW8330B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-EXDU-7A-SSIS-20200318 (SD)/ 280-134722-10MSD	4-Nitrotoluene	21.90	< 20	< 20	rpd	J/None	D	
IINY-EXDU-7A-SSIS-20200318 (SD)/ 280-134722-10MSD	3-Nitrotoluene	22.42	< 20	< 20	rpd	J/None	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-1A-SSIS-20200318	N	1-Methylnaphthalene	0.00890	0.00580 J H	0.00580 J	-	mg/kg	H2/TR
IINY-DU-1A-SSIS-20200318	N	2-Methylnaphthalene	0.00890	0.00980 H	0.00980 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Acenaphthene	0.00890	0.00700 J H	0.00700 J	-	mg/kg	H2/TR
IINY-DU-1A-SSIS-20200318	N	Acenaphthylene	0.00890	0.0410 H	0.0410 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Anthracene	0.00890	0.0320 H	0.0320 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Benzo(a)anthracene	0.00890	0.150 H	0.150 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Benzo(a)pyrene	0.00890	0.170 H	0.170 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Benzo(b)fluoranthene	0.00890	0.270 H	0.270 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Benzo(g,h,i)perylene	0.00890	0.130 H	0.130 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Benzo(k)fluoranthene	0.00890	0.0920 H	0.0920 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Chrysene	0.00890	0.170 H	0.170 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Dibenz(a,h)anthracene	0.00890	0.0350 H	0.0350 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Fluoranthene	0.00890	0.260 H	0.260 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Indeno(1,2,3-c,d)pyrene	0.00890	0.150 H	0.150 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Naphthalene	0.00890	0.0110 H	0.0110 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Phenanthrene	0.00890	0.0840 H	0.0840 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Pyrene	0.00890	0.260 H	0.260 J	-	mg/kg	H2
IINY-DU-1A-SSIS-20200318	N	Fluorene	0.00890	0.00900 H	0.00900 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	1-Methylnaphthalene	0.00900	0.00440 J H	0.00440 J	-	mg/kg	H2/TR
IINY-DU-1B-SSIS-20200318	FD	2-Methylnaphthalene	0.00900	0.00620 J H	0.00620 J	-	mg/kg	H2/TR
IINY-DU-1B-SSIS-20200318	FD	Acenaphthene	0.00900	0.00680 J H	0.00680 J	-	mg/kg	H2/TR
IINY-DU-1B-SSIS-20200318	FD	Acenaphthylene	0.00900	0.0270 H	0.0270 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Anthracene	0.00900	0.0280 H	0.0280 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Benzo(a)anthracene	0.00900	0.130 H	0.130 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Benzo(a)pyrene	0.00900	0.150 H M	0.150 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Benzo(b)fluoranthene	0.00900	0.230 H	0.230 J	-	mg/kg	H2

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-1B-SSIS-20200318	FD	Benzo(g,h,i)perylene	0.00900	0.120 H	0.120 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Benzo(k)fluoranthene	0.00900	0.0760 H M	0.0760 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Chrysene	0.00900	0.140 H	0.140 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Dibenz(a,h)anthracene	0.00900	0.0300 H	0.0300 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Fluoranthene	0.00900	0.240 H	0.240 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Indeno(1,2,3-c,d)pyrene	0.00900	0.140 H	0.140 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Naphthalene	0.00900	0.00750 J H	0.00750 J	-	mg/kg	H2/TR
IINY-DU-1B-SSIS-20200318	FD	Phenanthrene	0.00900	0.0900 H	0.0900 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Pyrene	0.00900	0.240 H	0.240 J	-	mg/kg	H2
IINY-DU-1B-SSIS-20200318	FD	Fluorene	0.00900	0.00770 J H	0.00770 J	-	mg/kg	H2/TR
IINY-DU-1C-SSIS-20200318	FT	1-Methylnaphthalene	0.00890	0.00360 J H	0.00360 J	-	mg/kg	H2/TR
IINY-DU-1C-SSIS-20200318	FT	2-Methylnaphthalene	0.00890	0.00530 J H	0.00530 J	-	mg/kg	H2/TR
IINY-DU-1C-SSIS-20200318	FT	Acenaphthene	0.00890	0.00540 J H	0.00540 J	-	mg/kg	H2/TR
IINY-DU-1C-SSIS-20200318	FT	Acenaphthylene	0.00890	0.0260 H	0.0260 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Anthracene	0.00890	0.0250 H	0.0250 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Benzo(a)anthracene	0.00890	0.110 H	0.110 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Benzo(a)pyrene	0.00890	0.130 H M	0.130 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Benzo(b)fluoranthene	0.00890	0.200 H	0.200 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Benzo(g,h,i)perylene	0.00890	0.100 H	0.100 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Benzo(k)fluoranthene	0.00890	0.0650 H M	0.0650 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Chrysene	0.00890	0.120 H	0.120 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Dibenz(a,h)anthracene	0.00890	0.0260 H	0.0260 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Fluoranthene	0.00890	0.200 H	0.200 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Indeno(1,2,3-c,d)pyrene	0.00890	0.120 H	0.120 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Naphthalene	0.00890	0.00630 J H	0.00630 J	-	mg/kg	H2/TR
IINY-DU-1C-SSIS-20200318	FT	Phenanthrene	0.00890	0.0740 H	0.0740 J	-	mg/kg	H2
IINY-DU-1C-SSIS-20200318	FT	Pyrene	0.00890	0.200 H	0.200 J	-	mg/kg	H2

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-1C-SSIS-20200318	FT	Fluorene	0.00890	0.00800 J H	0.00800 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	1-Methylnaphthalene	0.180	0.0150 J H D	0.0150 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	2-Methylnaphthalene	0.180	0.0170 J H D	0.0170 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	Acenaphthene	0.180	0.0360 J H D	0.0360 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	Acenaphthylene	0.180	0.0600 J H D	0.0600 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	Anthracene	0.180	0.140 J H D	0.140 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	Benzo(a)anthracene	0.180	0.590 H D	0.590 J	-	mg/kg	H2
IINY-DU-3A-SSIS-20200318	N	Benzo(a)pyrene	0.180	0.610 H D	0.610 J	-	mg/kg	H2
IINY-DU-3A-SSIS-20200318	N	Benzo(b)fluoranthene	0.180	0.930 H D	0.930 J	-	mg/kg	H2
IINY-DU-3A-SSIS-20200318	N	Benzo(g,h,i)perylene	0.180	0.430 H D	0.430 J	-	mg/kg	H2
IINY-DU-3A-SSIS-20200318	N	Benzo(k)fluoranthene	0.180	0.270 H D	0.270 J	-	mg/kg	H2
IINY-DU-3A-SSIS-20200318	N	Chrysene	0.180	0.610 H D	0.610 J	-	mg/kg	H2
IINY-DU-3A-SSIS-20200318	N	Dibenz(a,h)anthracene	0.180	0.110 J H D	0.110 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	Fluoranthene	0.180	1.10 H D	1.10 J	-	mg/kg	H2
IINY-DU-3A-SSIS-20200318	N	Fluorene	0.180	0.0440 J H D	0.0440 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	Indeno(1,2,3-c,d)pyrene	0.180	0.460 H D	0.460 J	-	mg/kg	H2
IINY-DU-3A-SSIS-20200318	N	Naphthalene	0.180	0.0230 J H D	0.0230 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	Phenanthrene	0.180	0.530 H D	0.530 J	-	mg/kg	H2
IINY-DU-3A-SSIS-20200318	N	Pyrene	0.180	1.10 H D	1.10 J	-	mg/kg	H2
IINY-DU-3B-SSIS-20200318	FD	Fluorene	0.0890	0.0250 J H D	0.0250 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	1-Methylnaphthalene	0.0890	0.0100 J H D	0.0100 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	2-Methylnaphthalene	0.0890	0.0110 J H D	0.0110 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	Acenaphthene	0.0890	0.0280 J H D	0.0280 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	Acenaphthylene	0.0890	0.0310 J H D	0.0310 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	Anthracene	0.0890	0.0820 J H D	0.0820 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	Benzo(a)anthracene	0.0890	0.350 H D Q	0.350 J	-	mg/kg	H2
IINY-DU-3B-SSIS-20200318	FD	Benzo(a)pyrene	0.0890	0.350 H D Q	0.350 J	-	mg/kg	H2

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-3B-SSIS-20200318	FD	Benzo(b)fluoranthene	0.0890	0.480 H D Q	0.480 J	-	mg/kg	H2
IINY-DU-3B-SSIS-20200318	FD	Benzo(g,h,i)perylene	0.0890	0.260 H D Q	0.260 J	-	mg/kg	H2
IINY-DU-3B-SSIS-20200318	FD	Benzo(k)fluoranthene	0.0890	0.160 H D Q	0.160 J	-	mg/kg	H2
IINY-DU-3B-SSIS-20200318	FD	Chrysene	0.0890	0.350 H D Q	0.350 J	-	mg/kg	H2
IINY-DU-3B-SSIS-20200318	FD	Dibenz(a,h)anthracene	0.0890	0.0640 J H D	0.0640 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	Fluoranthene	0.0890	0.650 H D	0.650 J	-	mg/kg	H2
IINY-DU-3B-SSIS-20200318	FD	Indeno(1,2,3-c,d)pyrene	0.0890	0.270 H D Q	0.270 J	-	mg/kg	H2
IINY-DU-3B-SSIS-20200318	FD	Naphthalene	0.0890	0.0130 J H D	0.0130 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	Phenanthrene	0.0890	0.340 H D	0.340 J	-	mg/kg	H2
IINY-DU-3B-SSIS-20200318	FD	Pyrene	0.0890	0.650 H D	0.650 J	-	mg/kg	H2
IINY-DU-3C-SSIS-20200318	FT	Fluorene	0.0890	0.0150 J H D	0.0150 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	1-Methylnaphthalene	0.0890	0.00710 J H D	0.00710 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	2-Methylnaphthalene	0.0890	0.00880 J H D	0.00880 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	Acenaphthene	0.0890	0.0150 J H D	0.0150 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	Acenaphthylene	0.0890	0.0280 J H D	0.0280 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	Anthracene	0.0890	0.0520 J H D	0.0520 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	Benzo(a)anthracene	0.0890	0.230 H D	0.230 J	-	mg/kg	H2
IINY-DU-3C-SSIS-20200318	FT	Benzo(a)pyrene	0.0890	0.250 H D	0.250 J	-	mg/kg	H2
IINY-DU-3C-SSIS-20200318	FT	Benzo(b)fluoranthene	0.0890	0.370 H D	0.370 J	-	mg/kg	H2
IINY-DU-3C-SSIS-20200318	FT	Benzo(g,h,i)perylene	0.0890	0.180 H D	0.180 J	-	mg/kg	H2
IINY-DU-3C-SSIS-20200318	FT	Benzo(k)fluoranthene	0.0890	0.130 H D	0.130 J	-	mg/kg	H2
IINY-DU-3C-SSIS-20200318	FT	Chrysene	0.0890	0.250 H D	0.250 J	-	mg/kg	H2
IINY-DU-3C-SSIS-20200318	FT	Dibenz(a,h)anthracene	0.0890	0.0550 J H D	0.0550 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	Fluoranthene	0.0890	0.430 H D	0.430 J	-	mg/kg	H2
IINY-DU-3C-SSIS-20200318	FT	Indeno(1,2,3-c,d)pyrene	0.0890	0.190 H D	0.190 J	-	mg/kg	H2
IINY-DU-3C-SSIS-20200318	FT	Naphthalene	0.0890	0.0120 J H D	0.0120 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	Phenanthrene	0.0890	0.210 H D	0.210 J	-	mg/kg	H2

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-3C-SSIS-20200318	FT	Pyrene	0.0890	0.440 H D	0.440 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	1-Methylnaphthalene	0.900	0.0610 J H D	0.0610 J	-	mg/kg	H2/TR
IINY-DU-4A-SSIS-20200318	N	2-Methylnaphthalene	0.900	0.0690 J H D	0.0690 J	-	mg/kg	H2/TR
IINY-DU-4A-SSIS-20200318	N	Acenaphthene	0.900	0.200 J H D	0.200 J	-	mg/kg	H2/TR
IINY-DU-4A-SSIS-20200318	N	Acenaphthylene	0.900	0.230 J H D	0.230 J	-	mg/kg	H2/TR
IINY-DU-4A-SSIS-20200318	N	Anthracene	0.900	0.390 J H D	0.390 J	-	mg/kg	H2/TR
IINY-DU-4A-SSIS-20200318	N	Benzo(a)anthracene	0.900	1.20 H D Q	1.20 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Benzo(a)pyrene	0.900	1.10 H D Q	1.10 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Benzo(b)fluoranthene	0.900	2.90 H D M	2.90 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Benzo(g,h,i)perylene	0.900	0.910 H D Q	0.910 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Benzo(k)fluoranthene	0.900	0.920 H D Q	0.920 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Chrysene	0.900	2.60 H D Q	2.60 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Dibenz(a,h)anthracene	0.900	0.280 J H D	0.280 J	-	mg/kg	H2/TR
IINY-DU-4A-SSIS-20200318	N	Fluoranthene	0.900	7.90 H D Q	7.90 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Indeno(1,2,3-c,d)pyrene	0.900	1.00 H D Q	1.00 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Naphthalene	0.900	0.180 U H Q	0.180 UJ		mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Phenanthrene	0.900	3.80 H D Q	3.80 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Pyrene	0.900	5.70 H D Q	5.70 J	-	mg/kg	H2
IINY-DU-4A-SSIS-20200318	N	Fluorene	0.900	0.270 J H D	0.270 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	1-Methylnaphthalene	0.930	0.190 U H Q	0.190 UJ		mg/kg	H2
IINY-DU-4B-SSIS-20200318	FD	2-Methylnaphthalene	0.930	0.190 U H Q	0.190 UJ		mg/kg	H2
IINY-DU-4B-SSIS-20200318	FD	Acenaphthene	0.930	0.0790 J H D	0.0790 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	Acenaphthylene	0.930	0.250 J H D	0.250 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	Anthracene	0.930	0.370 J H D	0.370 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	Benzo(a)anthracene	0.930	1.30 H D Q	1.30 J	-	mg/kg	H2
IINY-DU-4B-SSIS-20200318	FD	Benzo(a)pyrene	0.930	1.10 H D Q	1.10 J	-	mg/kg	H2
IINY-DU-4B-SSIS-20200318	FD	Benzo(b)fluoranthene	0.930	2.70 H D Q	2.70 J	-	mg/kg	H2

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-4B-SSIS-20200318	FD	Benzo(g,h,i)perylene	0.930	0.860 J H D	0.860 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	Benzo(k)fluoranthene	0.930	0.830 J H D	0.830 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	Chrysene	0.930	1.90 H D Q	1.90 J	-	mg/kg	H2
IINY-DU-4B-SSIS-20200318	FD	Dibenz(a,h)anthracene	0.930	0.300 J H D	0.300 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	Fluoranthene	0.930	4.20 H D Q	4.20 J	-	mg/kg	H2
IINY-DU-4B-SSIS-20200318	FD	Indeno(1,2,3-c,d)pyrene	0.930	1.10 H D Q	1.10 J	-	mg/kg	H2
IINY-DU-4B-SSIS-20200318	FD	Naphthalene	0.930	0.190 U H Q	0.190 UJ		mg/kg	H2
IINY-DU-4B-SSIS-20200318	FD	Phenanthrene	0.930	1.60 H D Q	1.60 J	-	mg/kg	H2
IINY-DU-4B-SSIS-20200318	FD	Pyrene	0.930	3.30 H D Q	3.30 J	-	mg/kg	H2
IINY-DU-4B-SSIS-20200318	FD	Fluorene	0.930	0.110 J H D	0.110 J	-	mg/kg	H2/TR
IINY-DU-4C-SSIS-20200318	FT	1-Methylnaphthalene	0.190	0.0210 J H D	0.0210 J	-	mg/kg	H2/TR
IINY-DU-4C-SSIS-20200318	FT	2-Methylnaphthalene	0.190	0.0390 J H D	0.0390 J	-	mg/kg	H2/TR
IINY-DU-4C-SSIS-20200318	FT	Acenaphthene	0.190	0.0260 J H D	0.0260 J	-	mg/kg	H2/TR
IINY-DU-4C-SSIS-20200318	FT	Acenaphthylene	0.190	0.150 J H D	0.150 J	-	mg/kg	H2/TR
IINY-DU-4C-SSIS-20200318	FT	Anthracene	0.190	0.180 J H D	0.180 J	-	mg/kg	H2/TR
IINY-DU-4C-SSIS-20200318	FT	Benzo(a)anthracene	0.190	0.890 H D	0.890 J	-	mg/kg	H2
IINY-DU-4C-SSIS-20200318	FT	Benzo(a)pyrene	0.190	1.10 H D M	1.10 J	-	mg/kg	H2
IINY-DU-4C-SSIS-20200318	FT	Benzo(b)fluoranthene	0.190	2.10 H D	2.10 J	-	mg/kg	H2
IINY-DU-4C-SSIS-20200318	FT	Benzo(g,h,i)perylene	0.190	0.870 H D	0.870 J	-	mg/kg	H2
IINY-DU-4C-SSIS-20200318	FT	Benzo(k)fluoranthene	0.190	0.660 H D M	0.660 J	-	mg/kg	H2
IINY-DU-4C-SSIS-20200318	FT	Chrysene	0.190	1.00 H D	1.00 J	-	mg/kg	H2
IINY-DU-4C-SSIS-20200318	FT	Dibenz(a,h)anthracene	0.190	0.260 H D	0.260 J	-	mg/kg	H2
IINY-DU-4C-SSIS-20200318	FT	Fluoranthene	0.190	1.30 H D	1.30 J	-	mg/kg	H2
IINY-DU-4C-SSIS-20200318	FT	Indeno(1,2,3-c,d)pyrene	0.190	1.00 H D	1.00 J	-	mg/kg	H2
IINY-DU-4C-SSIS-20200318	FT	Naphthalene	0.190	0.0510 J H D	0.0510 J	-	mg/kg	H2/TR
IINY-DU-4C-SSIS-20200318	FT	Phenanthrene	0.190	0.460 H D	0.460 J	-	mg/kg	H2
IINY-DU-4C-SSIS-20200318	FT	Pyrene	0.190	1.30 H D	1.30 J	-	mg/kg	H2

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-4C-SSIS-20200318	FT	Fluorene	0.190	0.0430 J H D	0.0430 J	-	mg/kg	H2/TR

Test Method: SW6020A	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-1A-SSIS-20200318	N	Silver	0.0930	0.0660 J	0.0930 U		mg/kg	L
IINY-DU-1B-SSIS-20200318	FD	Silver	0.0990	0.0650 J	0.0990 U		mg/kg	L
IINY-DU-1C-SSIS-20200318	FT	Silver	0.0990	0.0600 J	0.0990 U		mg/kg	L
IINY-DU-3B-SSIS-20200318	FD	Silver	0.0940	0.0750 J	0.0940 U		mg/kg	L
IINY-DU-3C-SSIS-20200318	FT	Silver	0.0990	0.0970 J	0.0990 U		mg/kg	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-1A-SSIS-20200318	N	1-Methylnaphthalene	0.00890	0.00580 J H	0.00580 J	-	mg/kg	H2/TR
IINY-DU-1A-SSIS-20200318	N	Acenaphthene	0.00890	0.00700 J H	0.00700 J	-	mg/kg	H2/TR
IINY-DU-1B-SSIS-20200318	FD	1-Methylnaphthalene	0.00900	0.00440 J H	0.00440 J	-	mg/kg	H2/TR
IINY-DU-1B-SSIS-20200318	FD	2-Methylnaphthalene	0.00900	0.00620 J H	0.00620 J	-	mg/kg	H2/TR
IINY-DU-1B-SSIS-20200318	FD	Acenaphthene	0.00900	0.00680 J H	0.00680 J	-	mg/kg	H2/TR
IINY-DU-1B-SSIS-20200318	FD	Fluorene	0.00900	0.00770 J H	0.00770 J	-	mg/kg	H2/TR
IINY-DU-1B-SSIS-20200318	FD	Naphthalene	0.00900	0.00750 J H	0.00750 J	-	mg/kg	H2/TR
IINY-DU-1C-SSIS-20200318	FT	1-Methylnaphthalene	0.00890	0.00360 J H	0.00360 J	-	mg/kg	H2/TR
IINY-DU-1C-SSIS-20200318	FT	2-Methylnaphthalene	0.00890	0.00530 J H	0.00530 J	-	mg/kg	H2/TR
IINY-DU-1C-SSIS-20200318	FT	Acenaphthene	0.00890	0.00540 J H	0.00540 J	-	mg/kg	H2/TR
IINY-DU-1C-SSIS-20200318	FT	Fluorene	0.00890	0.00800 J H	0.00800 J	-	mg/kg	H2/TR
IINY-DU-1C-SSIS-20200318	FT	Naphthalene	0.00890	0.00630 J H	0.00630 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	1-Methylnaphthalene	0.180	0.0150 J H D	0.0150 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	2-Methylnaphthalene	0.180	0.0170 J H D	0.0170 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	Acenaphthene	0.180	0.0360 J H D	0.0360 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	Acenaphthylene	0.180	0.0600 J H D	0.0600 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	Anthracene	0.180	0.140 J H D	0.140 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	Dibenz(a,h)anthracene	0.180	0.110 J H D	0.110 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	Fluorene	0.180	0.0440 J H D	0.0440 J	-	mg/kg	H2/TR
IINY-DU-3A-SSIS-20200318	N	Naphthalene	0.180	0.0230 J H D	0.0230 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	1-Methylnaphthalene	0.0890	0.0100 J H D	0.0100 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	2-Methylnaphthalene	0.0890	0.0110 J H D	0.0110 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	Acenaphthene	0.0890	0.0280 J H D	0.0280 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	Acenaphthylene	0.0890	0.0310 J H D	0.0310 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	Anthracene	0.0890	0.0820 J H D	0.0820 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	Dibenz(a,h)anthracene	0.0890	0.0640 J H D	0.0640 J	-	mg/kg	H2/TR
IINY-DU-3B-SSIS-20200318	FD	Fluorene	0.0890	0.0250 J H D	0.0250 J	-	mg/kg	H2/TR

Table of All Trace Results

Test Method: BNASIMD Extraction Method: SW3546

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-3B-SSIS-20200318	FD	Naphthalene	0.0890	0.0130 J H D	0.0130 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	1-Methylnaphthalene	0.0890	0.00710 J H D	0.00710 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	2-Methylnaphthalene	0.0890	0.00880 J H D	0.00880 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	Acenaphthene	0.0890	0.0150 J H D	0.0150 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	Acenaphthylene	0.0890	0.0280 J H D	0.0280 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	Anthracene	0.0890	0.0520 J H D	0.0520 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	Dibenz(a,h)anthracene	0.0890	0.0550 J H D	0.0550 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	Fluorene	0.0890	0.0150 J H D	0.0150 J	-	mg/kg	H2/TR
IINY-DU-3C-SSIS-20200318	FT	Naphthalene	0.0890	0.0120 J H D	0.0120 J	-	mg/kg	H2/TR
IINY-DU-4A-SSIS-20200318	N	1-Methylnaphthalene	0.900	0.0610 J H D	0.0610 J	-	mg/kg	H2/TR
IINY-DU-4A-SSIS-20200318	N	2-Methylnaphthalene	0.900	0.0690 J H D	0.0690 J	-	mg/kg	H2/TR
IINY-DU-4A-SSIS-20200318	N	Acenaphthene	0.900	0.200 J H D	0.200 J	-	mg/kg	H2/TR
IINY-DU-4A-SSIS-20200318	N	Acenaphthylene	0.900	0.230 J H D	0.230 J	-	mg/kg	H2/TR
IINY-DU-4A-SSIS-20200318	N	Anthracene	0.900	0.390 J H D	0.390 J	-	mg/kg	H2/TR
IINY-DU-4A-SSIS-20200318	N	Dibenz(a,h)anthracene	0.900	0.280 J H D	0.280 J	-	mg/kg	H2/TR
IINY-DU-4A-SSIS-20200318	N	Fluorene	0.900	0.270 J H D	0.270 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	Acenaphthene	0.930	0.0790 J H D	0.0790 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	Acenaphthylene	0.930	0.250 J H D	0.250 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	Anthracene	0.930	0.370 J H D	0.370 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	Benzo(g,h,i)perylene	0.930	0.860 J H D	0.860 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	Benzo(k)fluoranthene	0.930	0.830 J H D	0.830 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	Dibenz(a,h)anthracene	0.930	0.300 J H D	0.300 J	-	mg/kg	H2/TR
IINY-DU-4B-SSIS-20200318	FD	Fluorene	0.930	0.110 J H D	0.110 J	-	mg/kg	H2/TR
IINY-DU-4C-SSIS-20200318	FT	1-Methylnaphthalene	0.190	0.0210 J H D	0.0210 J	-	mg/kg	H2/TR
IINY-DU-4C-SSIS-20200318	FT	2-Methylnaphthalene	0.190	0.0390 J H D	0.0390 J	-	mg/kg	H2/TR
IINY-DU-4C-SSIS-20200318	FT	Acenaphthene	0.190	0.0260 J H D	0.0260 J	-	mg/kg	H2/TR
IINY-DU-4C-SSIS-20200318	FT	Acenaphthylene	0.190	0.150 J H D	0.150 J	-	mg/kg	H2/TR

Table of All Trace Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-4C-SSIS-20200318	FT	Anthracene	0.190	0.180 J H D	0.180 J	-	mg/kg	H2/TR
IINY-DU-4C-SSIS-20200318	FT	Fluorene	0.190	0.0430 J H D	0.0430 J	-	mg/kg	H2/TR
IINY-DU-4C-SSIS-20200318	FT	Naphthalene	0.190	0.0510 J H D	0.0510 J	-	mg/kg	H2/TR

Test Method: SW6010C	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-1A-SSIS-20200318	N	Sodium	500	95.0 J	95.0 J		mg/kg	TR
IINY-DU-1B-SSIS-20200318	FD	Sodium	490	100 J	100 J		mg/kg	TR
IINY-DU-1C-SSIS-20200318	FT	Sodium	460	110 J	110 J		mg/kg	TR
IINY-DU-3A-SSIS-20200318	N	Sodium	490	68.0 J	68.0 J		mg/kg	TR
IINY-DU-3B-SSIS-20200318	FD	Sodium	490	88.0 J	88.0 J		mg/kg	TR
IINY-DU-3C-SSIS-20200318	FT	Sodium	480	110 J	110 J		mg/kg	TR
IINY-DU-4A-SSIS-20200318	N	Sodium	490	230 J	230 J		mg/kg	TR
IINY-DU-4B-SSIS-20200318	FD	Sodium	500	230 J	230 J		mg/kg	TR
IINY-DU-4C-SSIS-20200318	FT	Sodium	490	170 J	170 J		mg/kg	TR

Test Method: SW6020A	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-1A-SSIS-20200318	N	Selenium	0.480	0.440 J	0.440 J		mg/kg	TR
IINY-DU-1A-SSIS-20200318	N	Zinc	120	92.0 J D	92.0 J		mg/kg	TR
IINY-DU-1B-SSIS-20200318	FD	Selenium	0.480	0.320 J	0.320 J		mg/kg	TR
IINY-DU-1B-SSIS-20200318	FD	Zinc	120	76.0 J D	76.0 J		mg/kg	TR
IINY-DU-1C-SSIS-20200318	FT	Arsenic	28.0	8.90 J D	8.90 J		mg/kg	TR
IINY-DU-1C-SSIS-20200318	FT	Selenium	0.470	0.310 J	0.310 J		mg/kg	TR
IINY-DU-1C-SSIS-20200318	FT	Zinc	120	67.0 J D	67.0 J		mg/kg	TR
IINY-DU-3A-SSIS-20200318	N	Selenium	0.460	0.450 J	0.450 J		mg/kg	TR
IINY-DU-3A-SSIS-20200318	N	Zinc	120	98.0 J D	98.0 J		mg/kg	TR
IINY-DU-3B-SSIS-20200318	FD	Selenium	0.480	0.410 J	0.410 J		mg/kg	TR
IINY-DU-3C-SSIS-20200318	FT	Selenium	0.470	0.390 J	0.390 J		mg/kg	TR

Table of All Trace Results

Test Method: SW6020A	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-3C-SSIS-20200318	FT	Zinc	120	99.0 J D	99.0 J		mg/kg	TR
IINY-DU-4A-SSIS-20200318	N	Selenium	0.460	0.380 J	0.380 J		mg/kg	TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-EXDU-3A-SSIS-20200318	N	2,4,6-Trinitrotoluene	0.0930	0.0930 U Q	0.0930 U	0.0930 UJ	C
IINY-EXDU-3A-SSIS-20200318	N	Tetryl	0.190	0.0930 U Q	0.0930 U	0.0930 UJ	C
IINY-EXDU-3B-SSIS-20200318	FD	2,4,6-Trinitrotoluene	0.0970	0.0970 U Q	0.0970 U	0.0970 UJ	C
IINY-EXDU-3B-SSIS-20200318	FD	Tetryl	0.190	0.0970 U Q	0.0970 U	0.0970 UJ	C
IINY-EXDU-3C-SSIS-20200318	FT	2,4,6-Trinitrotoluene	0.0960	0.0960 U Q	0.0960 U	0.0960 UJ	C
IINY-EXDU-3C-SSIS-20200318	FT	Tetryl	0.190	0.0960 U Q	0.0960 U	0.0960 UJ	C
IINY-EXDU-5A-SSIS-20200318	N	2,4,6-Trinitrotoluene	0.0970	0.0970 U Q	0.0970 U	0.0970 UJ	C
IINY-EXDU-5A-SSIS-20200318	N	Tetryl	0.190	0.0970 U Q	0.0970 U	0.0970 UJ	C
IINY-EXDU-5B-SSIS-20200318	FD	2,4,6-Trinitrotoluene	0.0930	0.0930 U Q	0.0930 U	0.0930 UJ	C
IINY-EXDU-5B-SSIS-20200318	FD	Tetryl	0.190	0.0930 U Q	0.0930 U	0.0930 UJ	C
IINY-EXDU-5C-SSIS-20200318	FT	2,4,6-Trinitrotoluene	0.0920	0.0920 U Q	0.0920 U	0.0920 UJ	C
IINY-EXDU-5C-SSIS-20200318	FT	Tetryl	0.180	0.0920 U Q	0.0920 U	0.0920 UJ	C
IINY-EXDU-6A-SSIS-20200318	N	2,4,6-Trinitrotoluene	0.0940	0.0940 U Q	0.0940 U	0.0940 UJ	C
IINY-EXDU-6A-SSIS-20200318	N	Tetryl	0.190	0.0940 U Q M	0.0940 U	0.0940 UJ	C
IINY-EXDU-6B-SSIS-20200318	FD	2,4,6-Trinitrotoluene	0.0960	0.0960 U Q	0.0960 U	0.0960 UJ	C
IINY-EXDU-6B-SSIS-20200318	FD	Tetryl	0.190	0.0960 U Q	0.0960 U	0.0960 UJ	C
IINY-EXDU-6C-SSIS-20200318	FT	2,4,6-Trinitrotoluene	0.0990	0.0990 U Q	0.0990 U	0.0990 UJ	C
IINY-EXDU-6C-SSIS-20200318	FT	Tetryl	0.200	0.0990 U Q	0.0990 U	0.0990 UJ	C
IINY-EXDU-7A-SSIS-20200318	N	2,4,6-Trinitrotoluene	0.0940	0.0940 U Q	0.0940 U	0.0940 UJ	C
IINY-EXDU-7A-SSIS-20200318	N	3,5-Dinitroaniline	0.0940	0.0190 U	0.0190 UJ	0.0190 U	
IINY-EXDU-7A-SSIS-20200318	N	Tetryl	0.190	0.0940 U Q	0.0940 U	0.0940 UJ	C
IINY-EXDU-7B-SSIS-20200318	FD	2,4,6-Trinitrotoluene	0.0990	0.0990 U Q	0.0990 U	0.0990 UJ	C
IINY-EXDU-7B-SSIS-20200318	FD	3,5-Dinitroaniline	0.0990	0.0200 U	0.0200 UJ	0.0200 U	
IINY-EXDU-7B-SSIS-20200318	FD	Tetryl	0.200	0.0990 U Q	0.0990 U	0.0990 UJ	C
IINY-EXDU-7C-SSIS-20200318	FT	2,4,6-Trinitrotoluene	0.0930	0.0930 U Q	0.0930 U	0.0930 UJ	C
IINY-EXDU-7C-SSIS-20200318	FT	3,5-Dinitroaniline	0.0930	0.0190 U	0.0190 UJ	0.0190 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-EXDU-7C-SSIS-20200318	FT	Tetryl	0.190	0.0930 U Q	0.0930 U	0.0930 UJ	C

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
C	LCS Recovery
D	MS RPD
H2	Prep Hold Time
I	Surrogate recovery outside project limits.
L	Lab Blank
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: BNASIMD (GC/MS-SIM Analysis by SW8270D)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?		•		The following samples were prepared outside of preparation holding time due to ISM preparation: IINY-DU-1A-SSIS-20200318(280-134722-13), IINY-DU-1B-SSIS-20200318 (280 134722-14), IINY-DU-1C-SSIS-20200318 (280-134722-15), IINY-DU-4A-SSIS-20200318 (280-134722-16), IINY-DU-4B-SSIS-20200318 (280-134722-17), IINY-DU-4C-SSIS-20200318 (280-134722-18), IINY-DU-3A-SSIS-20200318 (280-134722-19), IINY-DU-3B-SSIS-20200318 (280 134722-20) and IINY-DU-3C-SSIS-20200318 (280-134722-21). This is for preparation batch 280-491250. Associated data were J or UJ qualified.
Were all requested target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was instrument tuning completed every 12 hours during sample analysis?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Were Internal Standard retention times and area criteria within method requirements?	•			
Were internal standards spiked for every sample, standard, and QC sample?	•			
Were surrogate recoveries within project acceptance limits?		•		Surrogates diluted out of samples IINY-DU-3B-SSIS-20200318, IINY-DU-4A-SSIS-20200318 and IINY-DU-4B-SSIS-20200318, which were analyzed at 10-100x dilution. The data were not qualified.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?		•		Insufficient sample volume was aliquoted to perform a MS/MSD. An LCSD was added to the batch.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	

Review Questions

Method: BNASIMD (GC/MS-SIM Analysis by SW8270D)

Review Questions	Yes	No	NA	Comment
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM-Field Triplicates were collected. The % RSD ranged from 0-53.
Were QAPP specified laboratory PQLs achieved?	•			Yes, but dilutions had to be performed which raised the limits.
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Did the ICSA have any non-target interferents above the MDL?		•		
Were the ICSA/ICSAB recoveries within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Aluminum was detected less than 1/2 of the LOQ. Project sample results were more than the LOQ and 10x the blank concentration, and no data were qualified.
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Aluminum and Iron failed recovery criteria high in the MS and MSD. However the concentration in the unspiked sample exceeded four times the spiking amount, therefore data were not qualified.
Was the MS/MSD RPD within project acceptance limits?	•			
Were the post spike recoveries within project acceptance limits?		•		Recoveries were high for Aluminum and Iron, however the concentration in the unspiked sample exceeded 4x the spiking amount.
Were the serial dilution RPD values within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM, Field Triplicates were collected. The % RSD for TAL Metals ranged from 0-44.
Were QAPP specified laboratory PQLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the system properly tuned based on method criteria?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?		•		Multiple metals in the CCVL were outside criteria.
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Did the ICSA have any non-target interferents above the MDL?		•		
Were the ICSA/ICSAB recoveries within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Silver was detected in the method blank. The concentration was less than the 1/2 the LOQ. Silver results less than the LOQ were U qualified.
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?		•		Insufficient sample volume was aliquoted to perform a MS/MSD. An LCSD was added to the batch.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM- Field Triplicates were collected. The % RSD for TAL Metals ranged from 0-44.
Were the post spike recoveries within project acceptance limits?			•	PDS for the batch was run on a sample from SDG 134777.
Were the serial dilution RPD values within project acceptance limits?			•	Serial dilution for the batch was run on a sample from SDG 134777.
Were QAPP specified laboratory PQLs achieved?	•			Required dilutions raised limits.
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW7471B (Mercury in Soil (Manual Cold-Vapor Technique))

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?		•		Insufficient sample volume was aliquoted to perform a MS/MSD. An LCSD was added to the batch.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM- Field Triplicates were collected. The % RSD ranged from 4-19.
Were QAPP specified laboratory PQLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW8330B (Nitroaromatics and Nitramines by HPLC)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was a blank prepared and analyzed with each batch?	•			
Were target analytes in the blank less than MDL?	•			
Were target analytes in the field blank less than MDL?	•			
Was an LCS or LCS/LCSD pair analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?		•		Grinding LCS (LCSSRM) recovered outside of reporting limits for TNT and Tetryl on the primary column. As per the method, the entire client sample is ground initially, therefore, it is not possible to re-grind samples. Associated data were J or UJ qualified.
Was the LCS/LCSD RPD within project acceptance limits?			•	
Was a project specific MS or MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			The recovery for 3,5-Dinitroaniline was 85.91 percent. The recovery limits are 86-118 percent. The qualifier was removed.
Was the MS/MSD RPD within project acceptance limits?		•		3-Nitrotoluene and 4-Nitrotoluene had an RPD of 22. These compounds were not detected in parent sample IINY-EXDU-7A-SSIS-20200318, therefore no data were qualified.
Was a project-specific duplicate analyzed, and the RPD within QAPP acceptance limits?	•			A lab duplicate was analyzed and all results were non-detect, therefore RPDs were not calculated.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM- Field Triplicates were collected. The % RSD was not calculated since all sample results were ND.
Were QAPP specified laboratory reporting limits achieved?	•			
Were surrogate recoveries within project acceptance limits?	•			
Were column comparison differences with project acceptance limits?	•			
Was the intial calibration within criteria?	•			
Was a second source check standard analyzed and within all applicable criteria?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			

US Army Corps of Engineers ®

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling
SDG:	280-134777-1_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Tim Reese
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	EA Engineering, Science, and Technology, Inc., PBC
Data Review Level:	S2BVEM
Primary Data Reviewer:	Tara Lamond, Data Manager
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	June 12, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	BNASIMD	SW6010C	SW6020A	SW7471B
IINY-DU-10A-SSIS-20200319	280-134777-10	Soil	Field Sample/N		X	X	
IINY-DU-10B-SSIS-20200319	280-134777-11	Soil	Field Duplicate/FD		X	X	
IINY-DU-10C-SSIS-20200319	280-134777-12	Soil	Field Triplicate/FT		X	X	
IINY-DU-2A-SSIS-20200319	280-134777-1	Soil	Field Sample/N	X	X	X	X
IINY-DU-2B-SSIS-20200319	280-134777-2	Soil	Field Duplicate/FD	X	X	X	X
IINY-DU-2C-SSIS-20200319	280-134777-3	Soil	Field Triplicate/FT	X	X	X	X
IINY-DU-5A-SSIS-20200319	280-134777-4	Soil	Field Sample/N	X	X	X	X
IINY-DU-5B-SSIS-20200319	280-134777-5	Soil	Field Duplicate/FD	X	X	X	X
IINY-DU-5C-SSIS-20200319	280-134777-6	Soil	Field Triplicate/FT	X	X	X	X
IINY-DU-6A-SSIS-20200319	280-134777-16	Soil	Field Sample/N		X	X	
IINY-DU-6B-SSIS-20200319	280-134777-17	Soil	Field Duplicate/FD		X	X	
IINY-DU-6C-SSIS-20200319	280-134777-18	Soil	Field Triplicate/FT		X	X	
IINY-DU-7A-SSIS-20200319	280-134777-13	Soil	Field Sample/N		X	X	
IINY-DU-7B-SSIS-20200319	280-134777-14	Soil	Field Duplicate/FD		X	X	
IINY-DU-7C-SSIS-20200319	280-134777-15	Soil	Field Triplicate/FT		X	X	
IINY-DU-9A-SSIS-20200319	280-134777-7	Soil	Field Sample/N	X	X	X	X
IINY-DU-9B-SSIS-20200319	280-134777-8	Soil	Field Duplicate/FD	X	X	X	X
IINY-DU-9C-SSIS-20200319	280-134777-9	Soil	Field Triplicate/FT	X	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 280-134777-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Field Duplicate RPD
- Field Triplicate RSD
- Lab Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 58 results (10.23%) out of the 567 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

This SDG was revised in order to report the 1x Analysis of Cadmium instead of the 50x dilution for IINY-DU-10C-SSIS-20200319 (280-134777-12), IINY-DU-6A-SSIS-20200319 (280-134777-16), IINY-DU-6B-SSIS-20200319 (280-134777-17) and IINY-DU-6C-SSIS-20200319 (280-134777-18). The laboratory indicated that it was acceptable to report the 1x analysis for these samples.

Analytical Method	Data Reviewer Comment
BNASIMD	No additional comments; see Checklist for detail.
SW6010C	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW7471B	No additional comments; see Checklist for detail.

Tara W Lamond

June 12, 2020

Reviewed by Tara Lamond, Data Manager, EA Engineering, Science, and Technology, Inc., PBC

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

Samantha Saalfield

June 12, 2020

Reviewed by Samantha Saalfield, Project Chemist, EA Engineering, Science, and Technology, Inc., PBC

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method BNASIMD, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-490509/1-A (LB)/ MB 280-490509/1-A	Chrysene	0.002020	< 0.002	< 0.01	mg/kg	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method BNASIMD, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-9C-SSIS-20200319 (MS)/ 280-134777-9MS	Fluoranthene	142.6	55 - 119	10 - 119	percent	J/None	M	Spike amount Insignificant
IINY-DU-9C-SSIS-20200319 (MS)/ 280-134777-9MS	Benzo (g,h,i)perylene	143.9	49 - 127	10 - 127	percent	J/None	M	
IINY-DU-9C-SSIS-20200319 (MS)/ 280-134777-9MS	Pyrene	163.2	55 - 117	10 - 117	percent	J/None	M	Spike amount Insignificant
IINY-DU-9C-SSIS-20200319 (SD)/ 280-134777-9MSD	Chrysene	125.0	57 - 118	10 - 118	percent	J/None	M	
IINY-DU-9C-SSIS-20200319 (SD)/ 280-134777-9MSD	Phenanthrene	132.1	49 - 113	10 - 113	percent	J/None	M	
IINY-DU-9C-SSIS-20200319 (SD)/ 280-134777-9MSD	Benzo (a)anthracene	148.2	54 - 122	10 - 122	percent	J/None	M	
IINY-DU-9C-SSIS-20200319 (SD)/ 280-134777-9MSD	Benzo (b)fluoranthene	158.9	53 - 128	10 - 128	percent	J/None	M	Spike amount Insignificant
IINY-DU-9C-SSIS-20200319 (SD)/ 280-134777-9MSD	Pyrene	232.1	55 - 117	10 - 117	percent	J/None	M	Spike amount Insignificant
IINY-DU-9C-SSIS-20200319 (SD)/ 280-134777-9MSD	Fluoranthene	237.0	55 - 119	10 - 119	percent	J/None	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-9A-SSIS-20200319	N	Benzo(g,h,i)perylene	0.00960	0.150	0.150 J	+	mg/kg	M
IINY-DU-9A-SSIS-20200319	N	Benzo(a)anthracene	0.00960	0.190	0.190 J	+	mg/kg	M
IINY-DU-9A-SSIS-20200319	N	Chrysene	0.00960	0.210	0.210 J	+	mg/kg	M
IINY-DU-9A-SSIS-20200319	N	Phenanthrene	0.00960	0.160	0.160 J	+	mg/kg	M
IINY-DU-9B-SSIS-20200319	FD	Benzo(g,h,i)perylene	0.00930	0.100	0.100 J	+	mg/kg	M
IINY-DU-9B-SSIS-20200319	FD	Benzo(a)anthracene	0.00930	0.130	0.130 J	+	mg/kg	M
IINY-DU-9B-SSIS-20200319	FD	Chrysene	0.00930	0.150	0.150 J	+	mg/kg	M

Qualified Results associated with the MS Recovery for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-9B-SSIS-20200319	FD	Phenanthrene	0.00930	0.0950	0.0950 J	+	mg/kg	M
IINY-DU-9C-SSIS-20200319	FT	Benzo(g,h,i)perylene	0.00950	0.110 Q J1	0.110 J		mg/kg	M/I
IINY-DU-9C-SSIS-20200319	FT	Benzo(a)anthracene	0.00950	0.150 Q J1	0.150 J		mg/kg	M/I
IINY-DU-9C-SSIS-20200319	FT	Chrysene	0.00950	0.170 Q J1	0.170 J		mg/kg	M/I
IINY-DU-9C-SSIS-20200319	FT	Phenanthrene	0.00950	0.120 J1	0.120 J		mg/kg	M/I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method BNASIMD, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-2A-SSIS-20200319 (N)/ 280-134777-1	Nitrobenzene-d5	0.000	44 - 125	10 - 125	percent	J/X	I	Diluted Out
IINY-DU-2A-SSIS-20200319 (N)/ 280-134777-1	Terphenyl-d14	0.000	58 - 133	10 - 133	percent	J/X	I	Diluted Out
IINY-DU-2B-SSIS-20200319 (FD)/ 280-134777-2	Nitrobenzene-d5	0.000	44 - 125	10 - 125	percent	J/X	I	Diluted Out
IINY-DU-2B-SSIS-20200319 (FD)/ 280-134777-2	2-Fluorobiphenyl	0.000	46 - 115	10 - 115	percent	J/X	I	Diluted Out
IINY-DU-2B-SSIS-20200319 (FD)/ 280-134777-2	Terphenyl-d14	0.000	58 - 133	10 - 133	percent	J/X	I	Diluted Out
IINY-DU-2C-SSIS-20200319 (FT)/ 280-134777-3	Nitrobenzene-d5	0.000	44 - 125	10 - 125	percent	J/X	I	Diluted Out
IINY-DU-2C-SSIS-20200319 (FT)/ 280-134777-3	Terphenyl-d14	0.000	58 - 133	10 - 133	percent	J/X	I	Diluted Out
IINY-DU-2C-SSIS-20200319 (FT)/ 280-134777-3	Fluoranthene-d10	44.00	55 - 101	10 - 101	percent	J/UJ	I	Diluted Out
IINY-DU-9C-SSIS-20200319 (FT)/ 280-134777-9	Fluoranthene-d10	52.00	55 - 101	10 - 101	percent	J/UJ	I	
IINY-DU-9C-SSIS-20200319 (FT)/ 280-134777-9	Terphenyl-d14	55.00	58 - 133	10 - 133	percent	J/UJ	I	
IINY-DU-9C-SSIS-20200319 (FT)/ 280-134777-9	Terphenyl-d14	51.00	58 - 133	10 - 133	percent	J/UJ	I	

Quality Control Outliers for test method BNASIMD, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-9C-SSIS-20200319 (FT)/ 280-134777-9	Fluoranthene-d10	52.00	55 - 101	10 - 101	percent	J/UJ	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-9C-SSIS-20200319	FT	1-Methylnaphthalene	0.00950	0.00570 J	0.00570 J	-	mg/kg	I/TR
IINY-DU-9C-SSIS-20200319	FT	2-Methylnaphthalene	0.00950	0.00780 J	0.00780 J	-	mg/kg	I/TR
IINY-DU-9C-SSIS-20200319	FT	Acenaphthene	0.00950	0.0110	0.0110 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Acenaphthylene	0.00950	0.0260	0.0260 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Anthracene	0.00950	0.0350	0.0350 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Benzo(a)anthracene	0.00950	0.150 Q J1	0.150 J		mg/kg	M/I
IINY-DU-9C-SSIS-20200319	FT	Benzo(a)pyrene	0.00950	0.170 Q	0.170 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Benzo(b)fluoranthene	0.00950	0.260 Q J1	0.260 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Benzo(g,h,i)perylene	0.00950	0.110 Q J1	0.110 J		mg/kg	M/I
IINY-DU-9C-SSIS-20200319	FT	Benzo(k)fluoranthene	0.00950	0.0860 Q	0.0860 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Chrysene	0.00950	0.170 Q J1	0.170 J		mg/kg	M/I
IINY-DU-9C-SSIS-20200319	FT	Dibenz(a,h)anthracene	0.00950	0.0280 Q	0.0280 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Fluoranthene	0.0380	0.340 D	0.340 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Fluorene	0.00950	0.0130	0.0130 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Indeno(1,2,3-c,d)pyrene	0.00950	0.140 Q J1	0.140 J	-	mg/kg	M/I
IINY-DU-9C-SSIS-20200319	FT	Naphthalene	0.00950	0.00970	0.00970 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Phenanthrene	0.00950	0.120 J1	0.120 J		mg/kg	M/I
IINY-DU-9C-SSIS-20200319	FT	Pyrene	0.00950	0.300 J1	0.300 J	-	mg/kg	I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6010C, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-9C-SSIS-20200319 (MS)/ 280-134777-9MS	Iron	-280.0	81 - 118	30 - 125	percent	J/X	M	Spike amount Insignificant
IINY-DU-9C-SSIS-20200319 (MS)/ 280-134777-9MS	Calcium	10.43	81 - 116	30 - 125	percent	J/X	M	
IINY-DU-9C-SSIS-20200319 (MS)/ 280-134777-9MS	Aluminum	140.0	74 - 119	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-9C-SSIS-20200319 (MS)/ 280-134777-9MS	Magnesium	25.32	78 - 115	30 - 125	percent	J/X	M	
IINY-DU-9C-SSIS-20200319 (MS)/ 280-134777-9MS	Sodium	65.24	83 - 118	30 - 125	percent	J/UJ	M	
IINY-DU-9C-SSIS-20200319 (MS)/ 280-134777-9MS	Potassium	75.97	81 - 116	30 - 125	percent	J/UJ	M	
IINY-DU-9C-SSIS-20200319 (SD)/ 280-134777-9MSD	Iron	-360.0	81 - 118	30 - 125	percent	J/X	M	Spike amount Insignificant
IINY-DU-9C-SSIS-20200319 (SD)/ 280-134777-9MSD	Calcium	23.75	81 - 116	30 - 125	percent	J/X	M	
IINY-DU-9C-SSIS-20200319 (SD)/ 280-134777-9MSD	Magnesium	39.51	78 - 115	30 - 125	percent	J/UJ	M	
IINY-DU-9C-SSIS-20200319 (SD)/ 280-134777-9MSD	Aluminum	60.00	74 - 119	30 - 125	percent	J/UJ	M	Spike amount Insignificant
IINY-DU-9C-SSIS-20200319 (SD)/ 280-134777-9MSD	Sodium	77.37	83 - 118	30 - 125	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW6010C

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-9A-SSIS-20200319	N	Calcium	95.0	7600	7600 J	-	mg/kg	M
IINY-DU-9A-SSIS-20200319	N	Magnesium	28.0	6100	6100 J	-	mg/kg	M
IINY-DU-9A-SSIS-20200319	N	Potassium	280	1200	1200 J	-	mg/kg	M
IINY-DU-9A-SSIS-20200319	N	Sodium	470	170 J	170 J	-	mg/kg	M/TR

Qualified Results associated with the MS Recovery for SW6010C

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-9B-SSIS-20200319	FD	Calcium	93.0	5800	5800 J	-	mg/kg	M
IINY-DU-9B-SSIS-20200319	FD	Magnesium	28.0	5100	5100 J	-	mg/kg	M
IINY-DU-9B-SSIS-20200319	FD	Potassium	280	1300	1300 J	-	mg/kg	M
IINY-DU-9B-SSIS-20200319	FD	Sodium	470	160 J	160 J	-	mg/kg	M/TR
IINY-DU-9C-SSIS-20200319	FT	Calcium	97.0	8700 J1	8700 J	-	mg/kg	M/A
IINY-DU-9C-SSIS-20200319	FT	Magnesium	29.0	6800 J1	6800 J	-	mg/kg	M/A
IINY-DU-9C-SSIS-20200319	FT	Potassium	290	1300 J1	1300 J	-	mg/kg	M
IINY-DU-9C-SSIS-20200319	FT	Sodium	490	160 J J1	160 J	-	mg/kg	M/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6020A, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-489837/1-A (LB)/ MB 280-489837/1-A	Silver	0.009550	< 0.0078	< 0.1	mg/kg	U/None	L	
MB 280-491057/1-A (LB)/ MB 280-491057/1-A	Lead	0.02580	< 0.018	< 0.4	mg/kg	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Lab Blank for SW6020A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-10A-SSIS-20200319	N	Silver	0.0940	0.0580 J	0.0940 U		mg/kg	L
IINY-DU-10B-SSIS-20200319	FD	Silver	0.0940	0.0610 J	0.0940 U		mg/kg	L
IINY-DU-2A-SSIS-20200319	N	Silver	0.0970	0.0640 J	0.0970 U		mg/kg	L
IINY-DU-2B-SSIS-20200319	FD	Silver	0.0970	0.0700 J	0.0970 U		mg/kg	L
IINY-DU-2C-SSIS-20200319	FT	Silver	0.100	0.0740 J	0.100 U		mg/kg	L
IINY-DU-5A-SSIS-20200319	N	Silver	0.0990	0.0620 J	0.0990 U		mg/kg	L
IINY-DU-5B-SSIS-20200319	FD	Silver	0.0950	0.0600 J	0.0950 U		mg/kg	L
IINY-DU-5C-SSIS-20200319	FT	Silver	0.0980	0.0620 J	0.0980 U		mg/kg	L

Qualified Results associated with the Lab Blank for SW6020A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-9A-SSIS-20200319	N	Silver	0.0950	0.0730 J	0.0950 U		mg/kg	L
IINY-DU-9B-SSIS-20200319	FD	Silver	0.0950	0.0570 J	0.0950 U		mg/kg	L
IINY-DU-9C-SSIS-20200319	FT	Silver	0.0940	0.0640 J	0.0940 U		mg/kg	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6020A, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-9C-SSIS-20200319 (MS)/ 280-134777-9MS	Barium	125.3	86 - 116	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-9C-SSIS-20200319 (MS)/ 280-134777-9MS	Lead	134.3	84 - 118	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-9C-SSIS-20200319 (MS)/ 280-134777-9MS	Manganese	460.0	85 - 116	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-9C-SSIS-20200319 (SD)/ 280-134777-9MSD	Barium	153.3	86 - 116	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-9C-SSIS-20200319 (SD)/ 280-134777-9MSD	Lead	179.3	84 - 118	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-9C-SSIS-20200319 (SD)/ 280-134777-9MSD	Manganese	311.1	85 - 116	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-9C-SSIS-20200319 (SD)/ 280-134777-9MSD	Vanadium	117.4	82 - 116	30 - 125	percent	J/None	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW6020A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-9A-SSIS-20200319	N	Vanadium	0.480	25.0 Q	25.0 J	+	mg/kg	M
IINY-DU-9B-SSIS-20200319	FD	Vanadium	0.460	25.0 Q	25.0 J	+	mg/kg	M
IINY-DU-9C-SSIS-20200319	FT	Vanadium	0.500	25.0 J1 Q	25.0 J	+	mg/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-9A-SSIS-20200319	N	Benzo(g,h,i)perylene	0.00960	0.150	0.150 J	+	mg/kg	M
IINY-DU-9A-SSIS-20200319	N	Benzo(a)anthracene	0.00960	0.190	0.190 J	+	mg/kg	M
IINY-DU-9A-SSIS-20200319	N	Chrysene	0.00960	0.210	0.210 J	+	mg/kg	M
IINY-DU-9A-SSIS-20200319	N	Phenanthrene	0.00960	0.160	0.160 J	+	mg/kg	M
IINY-DU-9B-SSIS-20200319	FD	Benzo(g,h,i)perylene	0.00930	0.100	0.100 J	+	mg/kg	M
IINY-DU-9B-SSIS-20200319	FD	Benzo(a)anthracene	0.00930	0.130	0.130 J	+	mg/kg	M
IINY-DU-9B-SSIS-20200319	FD	Chrysene	0.00930	0.150	0.150 J	+	mg/kg	M
IINY-DU-9B-SSIS-20200319	FD	Phenanthrene	0.00930	0.0950	0.0950 J	+	mg/kg	M
IINY-DU-9C-SSIS-20200319	FT	1-Methylnaphthalene	0.00950	0.00570 J	0.00570 J	-	mg/kg	I/TR
IINY-DU-9C-SSIS-20200319	FT	2-Methylnaphthalene	0.00950	0.00780 J	0.00780 J	-	mg/kg	I/TR
IINY-DU-9C-SSIS-20200319	FT	Acenaphthene	0.00950	0.0110	0.0110 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Acenaphthylene	0.00950	0.0260	0.0260 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Anthracene	0.00950	0.0350	0.0350 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Benzo(a)pyrene	0.00950	0.170 Q	0.170 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Benzo(b)fluoranthene	0.00950	0.260 Q J1	0.260 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Benzo(k)fluoranthene	0.00950	0.0860 Q	0.0860 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Dibenz(a,h)anthracene	0.00950	0.0280 Q	0.0280 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Fluoranthene	0.0380	0.340 D	0.340 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Fluorene	0.00950	0.0130	0.0130 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Indeno(1,2,3-c,d)pyrene	0.00950	0.140 Q J1	0.140 J	-	mg/kg	M/I
IINY-DU-9C-SSIS-20200319	FT	Naphthalene	0.00950	0.00970	0.00970 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Pyrene	0.00950	0.300 J1	0.300 J	-	mg/kg	I
IINY-DU-9C-SSIS-20200319	FT	Benzo(g,h,i)perylene	0.00950	0.110 Q J1	0.110 J		mg/kg	M/I
IINY-DU-9C-SSIS-20200319	FT	Benzo(a)anthracene	0.00950	0.150 Q J1	0.150 J		mg/kg	M/I
IINY-DU-9C-SSIS-20200319	FT	Chrysene	0.00950	0.170 Q J1	0.170 J		mg/kg	M/I
IINY-DU-9C-SSIS-20200319	FT	Phenanthrene	0.00950	0.120 J1	0.120 J		mg/kg	M/I

Table of All Qualified Results

Test Method: SW6010C	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-9A-SSIS-20200319	N	Calcium	95.0	7600	7600 J	-	mg/kg	M
IINY-DU-9A-SSIS-20200319	N	Magnesium	28.0	6100	6100 J	-	mg/kg	M
IINY-DU-9A-SSIS-20200319	N	Potassium	280	1200	1200 J	-	mg/kg	M
IINY-DU-9A-SSIS-20200319	N	Sodium	470	170 J	170 J	-	mg/kg	M/TR
IINY-DU-9B-SSIS-20200319	FD	Calcium	93.0	5800	5800 J	-	mg/kg	M
IINY-DU-9B-SSIS-20200319	FD	Magnesium	28.0	5100	5100 J	-	mg/kg	M
IINY-DU-9B-SSIS-20200319	FD	Potassium	280	1300	1300 J	-	mg/kg	M
IINY-DU-9B-SSIS-20200319	FD	Sodium	470	160 J	160 J	-	mg/kg	M/TR
IINY-DU-9C-SSIS-20200319	FT	Calcium	97.0	8700 J1	8700 J	-	mg/kg	M/A
IINY-DU-9C-SSIS-20200319	FT	Magnesium	29.0	6800 J1	6800 J	-	mg/kg	M/A
IINY-DU-9C-SSIS-20200319	FT	Potassium	290	1300 J1	1300 J	-	mg/kg	M
IINY-DU-9C-SSIS-20200319	FT	Sodium	490	160 J J1	160 J	-	mg/kg	M/TR

Test Method: SW6020A	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-10A-SSIS-20200319	N	Silver	0.0940	0.0580 J	0.0940 U		mg/kg	L
IINY-DU-10B-SSIS-20200319	FD	Silver	0.0940	0.0610 J	0.0940 U		mg/kg	L
IINY-DU-2A-SSIS-20200319	N	Silver	0.0970	0.0640 J	0.0970 U		mg/kg	L
IINY-DU-2B-SSIS-20200319	FD	Silver	0.0970	0.0700 J	0.0970 U		mg/kg	L
IINY-DU-2C-SSIS-20200319	FT	Silver	0.100	0.0740 J	0.100 U		mg/kg	L
IINY-DU-5A-SSIS-20200319	N	Silver	0.0990	0.0620 J	0.0990 U		mg/kg	L
IINY-DU-5B-SSIS-20200319	FD	Silver	0.0950	0.0600 J	0.0950 U		mg/kg	L
IINY-DU-5C-SSIS-20200319	FT	Silver	0.0980	0.0620 J	0.0980 U		mg/kg	L
IINY-DU-9A-SSIS-20200319	N	Vanadium	0.480	25.0 Q	25.0 J	+	mg/kg	M
IINY-DU-9A-SSIS-20200319	N	Silver	0.0950	0.0730 J	0.0950 U		mg/kg	L
IINY-DU-9B-SSIS-20200319	FD	Vanadium	0.460	25.0 Q	25.0 J	+	mg/kg	M
IINY-DU-9B-SSIS-20200319	FD	Silver	0.0950	0.0570 J	0.0950 U		mg/kg	L
IINY-DU-9C-SSIS-20200319	FT	Vanadium	0.500	25.0 J1 Q	25.0 J	+	mg/kg	M

Table of All Qualified Results

Test Method: SW6020A	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-9C-SSIS-20200319	FT	Silver	0.0940	0.0640 J	0.0940 U		mg/kg	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-2B-SSIS-20200319	FD	Anthracene	0.370	0.340 J D Q	0.340 J		mg/kg	TR
IINY-DU-2C-SSIS-20200319	FT	Anthracene	0.400	0.360 J D	0.360 J		mg/kg	TR
IINY-DU-5A-SSIS-20200319	N	1-Methylnaphthalene	0.00920	0.00560 J	0.00560 J		mg/kg	TR
IINY-DU-5A-SSIS-20200319	N	2-Methylnaphthalene	0.00920	0.00820 J	0.00820 J		mg/kg	TR
IINY-DU-5C-SSIS-20200319	FT	1-Methylnaphthalene	0.00950	0.00690 J	0.00690 J		mg/kg	TR
IINY-DU-5C-SSIS-20200319	FT	2-Methylnaphthalene	0.00950	0.00920 J	0.00920 J		mg/kg	TR
IINY-DU-9A-SSIS-20200319	N	1-Methylnaphthalene	0.00960	0.00750 J	0.00750 J		mg/kg	TR
IINY-DU-9B-SSIS-20200319	FD	1-Methylnaphthalene	0.00930	0.00570 J	0.00570 J		mg/kg	TR
IINY-DU-9B-SSIS-20200319	FD	2-Methylnaphthalene	0.00930	0.00820 J	0.00820 J		mg/kg	TR
IINY-DU-9B-SSIS-20200319	FD	Acenaphthene	0.00930	0.00780 J	0.00780 J		mg/kg	TR
IINY-DU-9C-SSIS-20200319	FT	1-Methylnaphthalene	0.00950	0.00570 J	0.00570 J	-	mg/kg	I/TR
IINY-DU-9C-SSIS-20200319	FT	2-Methylnaphthalene	0.00950	0.00780 J	0.00780 J	-	mg/kg	I/TR

Test Method: SW6010C	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-10A-SSIS-20200319	N	Potassium	1500	1400 J D	1400 J		mg/kg	TR
IINY-DU-10B-SSIS-20200319	FD	Sodium	490	83.0 J	83.0 J		mg/kg	TR
IINY-DU-10C-SSIS-20200319	FT	Sodium	490	88.0 J	88.0 J		mg/kg	TR
IINY-DU-2A-SSIS-20200319	N	Sodium	490	75.0 J	75.0 J		mg/kg	TR
IINY-DU-2B-SSIS-20200319	FD	Sodium	470	75.0 J	75.0 J		mg/kg	TR
IINY-DU-2C-SSIS-20200319	FT	Sodium	490	71.0 J	71.0 J		mg/kg	TR
IINY-DU-5A-SSIS-20200319	N	Sodium	490	64.0 J	64.0 J		mg/kg	TR
IINY-DU-5B-SSIS-20200319	FD	Sodium	500	57.0 J	57.0 J		mg/kg	TR
IINY-DU-5C-SSIS-20200319	FT	Sodium	470	64.0 J	64.0 J		mg/kg	TR
IINY-DU-6A-SSIS-20200319	N	Sodium	490	89.0 J	89.0 J		mg/kg	TR
IINY-DU-6B-SSIS-20200319	FD	Sodium	490	86.0 J	86.0 J		mg/kg	TR
IINY-DU-6C-SSIS-20200319	FT	Sodium	480	79.0 J	79.0 J		mg/kg	TR
IINY-DU-7A-SSIS-20200319	N	Sodium	500	95.0 J	95.0 J		mg/kg	TR

Table of All Trace Results

Test Method: SW6010C	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-7B-SSIS-20200319	FD	Sodium	490	85.0 J	85.0 J		mg/kg	TR
IINY-DU-7C-SSIS-20200319	FT	Sodium	490	92.0 J	92.0 J		mg/kg	TR
IINY-DU-9A-SSIS-20200319	N	Sodium	470	170 J	170 J	-	mg/kg	M/TR
IINY-DU-9B-SSIS-20200319	FD	Sodium	470	160 J	160 J	-	mg/kg	M/TR
IINY-DU-9C-SSIS-20200319	FT	Sodium	490	160 J J1	160 J	-	mg/kg	M/TR

Test Method: SW6020A	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-10A-SSIS-20200319	N	Selenium	0.490	0.270 J	0.270 J		mg/kg	TR
IINY-DU-10B-SSIS-20200319	FD	Selenium	0.460	0.260 J	0.260 J		mg/kg	TR
IINY-DU-10C-SSIS-20200319	FT	Selenium	0.480	0.300 J	0.300 J		mg/kg	TR
IINY-DU-10C-SSIS-20200319	FT	Silver	0.0940	0.0590 J	0.0590 J		mg/kg	TR
IINY-DU-2A-SSIS-20200319	N	Selenium	0.480	0.310 J	0.310 J		mg/kg	TR
IINY-DU-2B-SSIS-20200319	FD	Selenium	0.500	0.330 J	0.330 J		mg/kg	TR
IINY-DU-2C-SSIS-20200319	FT	Selenium	0.500	0.320 J	0.320 J		mg/kg	TR
IINY-DU-5A-SSIS-20200319	N	Selenium	0.490	0.270 J	0.270 J		mg/kg	TR
IINY-DU-5B-SSIS-20200319	FD	Selenium	0.460	0.280 J	0.280 J		mg/kg	TR
IINY-DU-5C-SSIS-20200319	FT	Selenium	0.460	0.310 J	0.310 J		mg/kg	TR
IINY-DU-6A-SSIS-20200319	N	Selenium	0.500	0.400 J	0.400 J		mg/kg	TR
IINY-DU-6B-SSIS-20200319	FD	Selenium	0.490	0.360 J	0.360 J		mg/kg	TR
IINY-DU-6B-SSIS-20200319	FD	Silver	0.0960	0.0650 J	0.0650 J		mg/kg	TR
IINY-DU-6C-SSIS-20200319	FT	Selenium	0.490	0.290 J	0.290 J		mg/kg	TR
IINY-DU-6C-SSIS-20200319	FT	Silver	0.0950	0.0660 J	0.0660 J		mg/kg	TR
IINY-DU-7A-SSIS-20200319	N	Cadmium	4.80	0.590 J D	0.590 J		mg/kg	TR
IINY-DU-7A-SSIS-20200319	N	Selenium	0.480	0.380 J	0.380 J		mg/kg	TR
IINY-DU-7A-SSIS-20200319	N	Silver	0.0970	0.0900 J	0.0900 J		mg/kg	TR
IINY-DU-7B-SSIS-20200319	FD	Cadmium	4.90	0.480 J D	0.480 J		mg/kg	TR
IINY-DU-7B-SSIS-20200319	FD	Selenium	0.490	0.350 J	0.350 J		mg/kg	TR

Table of All Trace Results

Test Method: SW6020A Extraction Method: SW3050B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-7C-SSIS-20200319	FT	Cadmium	4.80	0.620 J D	0.620 J		mg/kg	TR
IINY-DU-7C-SSIS-20200319	FT	Selenium	0.480	0.430 J	0.430 J		mg/kg	TR
IINY-DU-9A-SSIS-20200319	N	Selenium	0.480	0.280 J	0.280 J		mg/kg	TR
IINY-DU-9B-SSIS-20200319	FD	Selenium	0.460	0.280 J	0.280 J		mg/kg	TR
IINY-DU-9C-SSIS-20200319	FT	Selenium	0.500	0.310 J	0.310 J		mg/kg	TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-9A-SSIS-20200319	N	Indeno(1,2,3-c,d)pyrene	0.00960	0.180	0.180	0.180 J	M
IINY-DU-9B-SSIS-20200319	FD	Indeno(1,2,3-c,d)pyrene	0.00930	0.120	0.120	0.120 J	M
IINY-DU-9C-SSIS-20200319	FT	Indeno(1,2,3-c,d)pyrene	0.00950	0.140 Q J1	0.140 J	0.140 J	M/I

Modified Qualifiers for test method SW6010C

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-10A-SSIS-20200319	N	Magnesium	30.0	10000 J1	10000	10000 J	A
IINY-DU-10A-SSIS-20200319	N	Sodium	2500	500 U J1	500 U	500 UJ	M2
IINY-DU-5A-SSIS-20200319	N	Calcium	97.0	3000 J1	3000	3000 J	M2
IINY-DU-9C-SSIS-20200319	FT	Calcium	97.0	8700 J1	8700 J	8700 J	M/A
IINY-DU-9C-SSIS-20200319	FT	Iron	78.0	17000 J1	17000	17000 J	A
IINY-DU-9C-SSIS-20200319	FT	Magnesium	29.0	6800 J1	6800 J	6800 J	M/A

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
A	Serial dilution
I	Surrogate recovery outside project limits.
L	Lab Blank
M	MS Recovery
M2	Post Spike
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: BNASIMD (GC/MS-SIM Analysis by SW8270D)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was instrument tuning completed every 12 hours during sample analysis?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Were Internal Standard retention times and area criteria within method requirements?	•			
Were internal standards spiked for every sample, standard, and QC sample?	•			
Were surrogate recoveries within project acceptance limits?		•		Several surrogates recovered low due to the required dilutions in samples IINY-DU-2A-SSIS-20200319, IINY-DU-2B-SSIS-20200319 (280-134777-2), and IINY-DU-2C-SSIS-20200319 (280-134777-3). Fluoranthene-d10 and Terphenyl-d14 failed the surrogate recovery criteria low for IINY-DU-9C-SSIS-20200319 (280-134777-9). Evidence of matrix interference due to high target analytes ispresent; therefore, reextraction and/or re-analysis was not performed. Data for sample IINY-DU-9C-SSIS-20200319 were J qualified.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Chrysene was detected in method blank at less than 1/2 the LOQ. Associated results were more than the LOQ and 10x the blank detection, and no data were qualified.
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	An LCSD was not provided.
Was a MS/MSD pair prepared with each batch?	•			

Review Questions

Method: BNASIMD (GC/MS-SIM Analysis by SW8270D)				
Review Questions	Yes	No	NA	Comment
Were MS/MSD recoveries within project acceptance limits?		•		The MS/MSD is incorrectly associated in the ADR report; should be associated with sample IINY-DU-9C-SSIS-20200319. Qualifiers were manually reviewed. Benzo(a)anthracene, Benzo (b)fluoranthene, Benzo(g,h,i)perylene, Chrysene, Fluoranthene, Indeno(1,2,3-c,d)pyrene, Phenanthrene and Pyrene recovered above QC limits. However Benzo (b)fluoranthene, Fluoranthene, and Pyrene had concentrations in the unspiked sampling exceeding four times the spiking amount. Detected results for benzo(a)anthracene, benzo (g,h,i)perylene, chrysene, indeno(1,2,3-c,d)pyrene, and phenanthrene in the triplicate samples from location IINY-DU-09 were J qualified.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM- Field Triplicates were collected. The % RSD ranged from 4-51.7.
Were QAPP specified laboratory PQLs achieved?	•			Sample dilutions raised LOQs.
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Did the ICSA have any non-target interferents above the MDL?		•		
Were the ICSA/ICSAB recoveries within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		The MS/MSD is incorrectly associated in the ADR report; should be associated with sample IINY-DU-9C-SSIS-20200319. Aluminum, Calcium, Iron, Magnesium, Potassium, and Sodium recovered outside QC limits. However, aluminum and iron were present in the parent sample at concentrations more than 4x the spike. Calcium, magnesium, potassium, and sodium results for the triplicate samples from location IINY-DU-09 were J qualified.
Was the MS/MSD RPD within project acceptance limits?	•			
Were the post spike recoveries within project acceptance limits?		•		Aluminum, Calcium, Iron and Magnesium wereoutside recovery limits for samples IINY-DU-5ASSIS-20200319 and IINY-DU-9C-SSIS-20200319. Aluminum, Calcium, Iron, Magnesium, and Sodium were outside recovery limits for sample IINY-DU-10-SSIS-20200319.In all cases except calcium in sample IINY-DU-5A-SSIS-20200319 and sodium in sample IINYDU-10A-SSIS-20200319, the analytes were present in the parent sample at concentrations more than 4x the spike. Calcium and sodium results, respectively, for these two samples were J qualified.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)

Review Questions	Yes	No	NA	Comment
Were the serial dilution RPD values within project acceptance limits?		•		Calcium, Iron, and Magnesium had a %D outside QC limits in sample IINY-DU-9C-SSIS-20200319. Magnesium had a %D outside QC limits in sample IINY-DU-10A-SSIS-20200319. Results are J qualified for these metals in the respective samples.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM-Field Triplicates were collected. The % RSD for TAL Metals ranged from 0-73.
Were QAPP specified laboratory PQLs achieved?	•			Required dilutions raised limits. The reporting limits have been adjusted accordingly. Additionally, the internal standard was outside criteria at 1X for 1xIINY-DU-10A-SSIS-20200319 (280 134777-10), (280-134777-A-10-G PDS ^5) and (280-134777-A-10-G SD ^25).
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the system properly tuned based on method criteria?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?		•		Several CCVLs recovered outside criteria.
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Did the ICSA have any non-target interferents above the MDL?		•		
Were the ICSA/ICSAB recoveries within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Lead and Silver were detected above the MDL but less than 1/2 the LOQ. Silver results less than the LOQ and less than 10x the blank detection were U qualified. Lead results were greater than the LOQ and 10x the blank so no data were qualified.
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Barium, Lead, Manganese, and Vanadium recovered above QC limits. However Barium, Lead, and Manganese had concentrations in the unspiked sample exceeding 4x the spiking amount. Vanadium results for the triplicate samples from location IINY-DU-09 were J qualified.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM-Field Triplicates were collected. The % RSD for TAL Metals ranged from 0-73.
Were the post spike recoveries within project acceptance limits?		•		Recoveries were outside QC limits for Manganese and Zinc in sample IINY-DU-9CSSIS-20200319. The parent sample concentrations of these analytes were more than 4x the spike.
Were the serial dilution RPD values within project acceptance limits?	•			

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)

Review Questions	Yes	No	NA	Comment
Were QAPP specified laboratory PQLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW7471B (Mercury in Soil (Manual Cold-Vapor Technique))

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			Insufficient sample volume was available to perform a MS/MSD on analysis batch 490631. An LCSD was added to the batch instead. The MS/MSD is incorrectly identified in analysis batch 491084, qualifiers were reviewed manually.
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM-Field Triplicates were collected. The % RSD ranged from 6-43.
Were QAPP specified laboratory PQLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

US Army Corps of Engineers ®

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling
SDG:	280-134849-1_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science Technology, Inc., Hunt Valley, MD
Project Manager:	Tim Reese
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	EA Engineering, Science, and Technology, Inc., PBC
Data Review Level:	S2BVEM
Primary Data Reviewer:	Tara Lamond, Data Manager
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	May 26, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW6010C	SW6020A	SW7471B	SW8082A
IINY-DU-14A-SSIS-20200320	280-134849-1	Soil	Field Sample/N	X	X	X	
IINY-DU-14B-SSIS-20200320	280-134849-2	Soil	Field Duplicate/FD	X	X	X	
IINY-DU-14C-SSIS-20200320	280-134849-3	Soil	Field Triplicate/FT	X	X	X	
IINY-DU-23A-SSIS-20200320	280-134849-4	Soil	Field Sample/N				X
IINY-DU-23B-SSIS-20200320	280-134849-5	Soil	Field Duplicate/FD				X
IINY-DU-23C-SSIS-20200320	280-134849-6	Soil	Field Triplicate/FT				X
IINY-DU-25A-SSIS-20200320	280-134849-7	Soil	Field Sample/N				X
IINY-DU-25B-SSIS-20200320	280-134849-8	Soil	Field Duplicate/FD				X
IINY-DU-25C-SSIS-20200320	280-134849-9	Soil	Field Triplicate/FT				X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science Technology, Inc., Hunt Valley, MD; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 280-134849-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

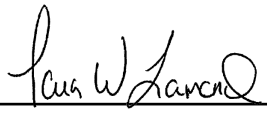
- Blank - Negative
- Field Duplicate RPD
- Field Triplicate RSD
- Lab Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 14 results (10.85%) out of the 129 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

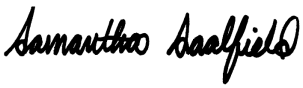
Analytical Method	Data Reviewer Comment
SW6010C	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW7471B	No additional comments; see Checklist for detail.
SW8082A	No additional comments; see Checklist for detail.



May 22, 2020

Reviewed by Tara Lamond, Data Manager, EA Engineering, Science, and Technology, Inc., PBC

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



May 27, 2020

Reviewed by Samantha Saalfield, Project Chemist, EA Engineering, Science, and Technology, Inc., PBC

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW6010C, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-14C-SSIS-20200320 (MS)/ 280-134849-3MS	Magnesium	126.1	78 - 115	30 - 125	percent	J/None	M	
IINY-DU-14C-SSIS-20200320 (MS)/ 280-134849-3MS	Calcium	127.8	81 - 116	30 - 125	percent	J/None	M	
IINY-DU-14C-SSIS-20200320 (MS)/ 280-134849-3MS	Iron	520.0	81 - 118	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-14C-SSIS-20200320 (MS)/ 280-134849-3MS	Aluminum	760.0	74 - 119	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-14C-SSIS-20200320 (MS)/ 280-134849-3MS	Sodium	82.15	83 - 118	30 - 125	percent	J/UJ	M	
IINY-DU-14C-SSIS-20200320 (SD)/ 280-134849-3MSD	Calcium	128.0	81 - 116	30 - 125	percent	J/None	M	
IINY-DU-14C-SSIS-20200320 (SD)/ 280-134849-3MSD	Magnesium	130.8	78 - 115	30 - 125	percent	J/None	M	
IINY-DU-14C-SSIS-20200320 (SD)/ 280-134849-3MSD	Iron	520.0	81 - 118	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-14C-SSIS-20200320 (SD)/ 280-134849-3MSD	Aluminum	740.0	74 - 119	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-14C-SSIS-20200320 (SD)/ 280-134849-3MSD	Sodium	82.78	83 - 118	30 - 125	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW6010C

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-14A-SSIS-20200320	N	Calcium	93.0	9500	9500 J	+	mg/kg	M
IINY-DU-14A-SSIS-20200320	N	Magnesium	28.0	7100	7100 J	+	mg/kg	M
IINY-DU-14A-SSIS-20200320	N	Sodium	460	72.0 J	72.0 J	-	mg/kg	M/TR
IINY-DU-14B-SSIS-20200320	FD	Calcium	96.0	8900	8900 J	+	mg/kg	M
IINY-DU-14B-SSIS-20200320	FD	Magnesium	29.0	6800	6800 J	+	mg/kg	M

Qualified Results associated with the MS Recovery for SW6010C

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-14B-SSIS-20200320	FD	Sodium	480	70.0 J	70.0 J	-	mg/kg	M/TR
IINY-DU-14C-SSIS-20200320	FT	Calcium	94.0	6800 J1	6800 J	+	mg/kg	M/A
IINY-DU-14C-SSIS-20200320	FT	Magnesium	28.0	5500 J1	5500 J	+	mg/kg	M
IINY-DU-14C-SSIS-20200320	FT	Sodium	470	73.0 J J1	73.0 J	-	mg/kg	M/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6020A, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-491057/1-A (LB)/ MB 280-491057/1-A	Lead	0.02580	< 0.018	< 0.4	mg/kg	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Table of All Qualified Results

Test Method: SW6010C	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-14A-SSIS-20200320	N	Calcium	93.0	9500	9500 J	+	mg/kg	M
IINY-DU-14A-SSIS-20200320	N	Magnesium	28.0	7100	7100 J	+	mg/kg	M
IINY-DU-14A-SSIS-20200320	N	Sodium	460	72.0 J	72.0 J	-	mg/kg	M/TR
IINY-DU-14B-SSIS-20200320	FD	Calcium	96.0	8900	8900 J	+	mg/kg	M
IINY-DU-14B-SSIS-20200320	FD	Magnesium	29.0	6800	6800 J	+	mg/kg	M
IINY-DU-14B-SSIS-20200320	FD	Sodium	480	70.0 J	70.0 J	-	mg/kg	M/TR
IINY-DU-14C-SSIS-20200320	FT	Calcium	94.0	6800 J1	6800 J	+	mg/kg	M/A
IINY-DU-14C-SSIS-20200320	FT	Magnesium	28.0	5500 J1	5500 J	+	mg/kg	M
IINY-DU-14C-SSIS-20200320	FT	Sodium	470	73.0 J J1	73.0 J	-	mg/kg	M/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW6010C	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-14A-SSIS-20200320	N	Sodium	460	72.0 J	72.0 J	-	mg/kg	M/TR
IINY-DU-14B-SSIS-20200320	FD	Sodium	480	70.0 J	70.0 J	-	mg/kg	M/TR
IINY-DU-14C-SSIS-20200320	FT	Sodium	470	73.0 J J1	73.0 J	-	mg/kg	M/TR

Test Method: SW6020A	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-14A-SSIS-20200320	N	Selenium	0.480	0.380 J	0.380 J		mg/kg	TR
IINY-DU-14A-SSIS-20200320	N	Silver	0.0930	0.0800 J	0.0800 J		mg/kg	TR
IINY-DU-14B-SSIS-20200320	FD	Selenium	0.500	0.380 J	0.380 J		mg/kg	TR
IINY-DU-14B-SSIS-20200320	FD	Silver	0.0950	0.0630 J	0.0630 J		mg/kg	TR
IINY-DU-14C-SSIS-20200320	FT	Selenium	0.480	0.400 J	0.400 J		mg/kg	TR
IINY-DU-14C-SSIS-20200320	FT	Silver	0.0950	0.0870 J	0.0870 J		mg/kg	TR

Test Method: SW8082A	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-23A-SSIS-20200320	N	PCB, Total	0.0640	0.0340 J	0.0340 J		mg/kg	TR
IINY-DU-23A-SSIS-20200320	N	PCB-1260 (Aroclor 1260)	0.0640	0.0340 J M	0.0340 J		mg/kg	TR/P1
IINY-DU-23B-SSIS-20200320	FD	PCB, Total	0.0640	0.0250 J	0.0250 J		mg/kg	TR
IINY-DU-23B-SSIS-20200320	FD	PCB-1260 (Aroclor 1260)	0.0640	0.0250 J M	0.0250 J		mg/kg	TR/P1
IINY-DU-23C-SSIS-20200320	FT	PCB, Total	0.0650	0.0190 J	0.0190 J		mg/kg	TR
IINY-DU-23C-SSIS-20200320	FT	PCB-1260 (Aroclor 1260)	0.0650	0.0190 J M	0.0190 J		mg/kg	TR/P1
IINY-DU-25A-SSIS-20200320	N	PCB, Total	0.0640	0.0110 J	0.0110 J		mg/kg	TR
IINY-DU-25A-SSIS-20200320	N	PCB-1260 (Aroclor 1260)	0.0640	0.0110 J M	0.0110 J		mg/kg	TR/P1
IINY-DU-25B-SSIS-20200320	FD	PCB, Total	0.0630	0.0160 J	0.0160 J		mg/kg	TR
IINY-DU-25B-SSIS-20200320	FD	PCB-1260 (Aroclor 1260)	0.0630	0.0160 J	0.0160 J		mg/kg	TR
IINY-DU-25C-SSIS-20200320	FT	PCB, Total	0.0630	0.0120 J	0.0120 J		mg/kg	TR
IINY-DU-25C-SSIS-20200320	FT	PCB-1260 (Aroclor 1260)	0.0630	0.0120 J M	0.0120 J		mg/kg	TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW6010C

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-14C-SSIS-20200320	FT	Calcium	94.0	6800 J1	6800 J	6800 J	M/A
IINY-DU-14C-SSIS-20200320	FT	Iron	75.0	16000 J1	16000	16000 J	A

Modified Qualifiers for test method SW8082A

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-23A-SSIS-20200320	N	PCB-1260 (Aroclor 1260)	0.0640	0.0340 J M	0.0340 J	0.0340 J	TR/P1
IINY-DU-23B-SSIS-20200320	FD	PCB-1260 (Aroclor 1260)	0.0640	0.0250 J M	0.0250 J	0.0250 J	TR/P1
IINY-DU-23C-SSIS-20200320	FT	PCB-1260 (Aroclor 1260)	0.0650	0.0190 J M	0.0190 J	0.0190 J	TR/P1
IINY-DU-25A-SSIS-20200320	N	PCB-1260 (Aroclor 1260)	0.0640	0.0110 J M	0.0110 J	0.0110 J	TR/P1

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
A	Serial dilution
L	Lab Blank
M	MS Recovery
P1	Column RPD
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Did the ICSA have any non-target interferents above the MDL?		•		
Were the ICSA/ICSAB recoveries within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		The MS/MSD is incorrectly associated in the ADR report; should be associated with sample IINY-DU-14C-SSIS-20200320. Qualifiers were manually reviewed. Aluminum, calcium, iron, and magnesium recoveries were above QC limits in the MS and MSD. Sodium recovered slightly below QC limits in the MS and MSD. For aluminum and iron, the concentrations in the unspiked sample exceeded 4x the spiking amount. Calcium, magnesium, and sodium results for the triplicate samples from location IINY-DU-14 were J qualified.
Was the MS/MSD RPD within project acceptance limits?	•			
Were the post spike recoveries within project acceptance limits?		•		Aluminum, calcium, iron, and magnesium recoveries were outside QC limits in sample IINY-DU-14C-SSIS-20200320. For all four analytes, the concentrations in the unspiked sample exceeded 4x the spiking amount.
Were the serial dilution RPD values within project acceptance limits?		•		The %D was outside QC limits for Calcium and Iron Results for sample IINY-DU-14C-SSIS-20200320 were J qualified.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM- Field Triplicates were collected. The % RSD range for TAL Metals is 0-16.1.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)

Review Questions	Yes	No	NA	Comment
Were QAPP specified laboratory PQLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the system properly tuned based on method criteria?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Did the ICSA have any non-target interferents above the MDL?		•		
Were the ICSA/ICSAB recoveries within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Lead was detected at a concentration less than 1/2 the LOQ. Project sample results were more than the LOQ and 10x the blank result, and no data were qualified.
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			A MS/MSD was performed for antimony and silver only.
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM- Field Triplicates were collected. The % RSD range for TAL Metals is 0-16.1.
Were the post spike recoveries within project acceptance limits?	•			
Were the serial dilution RPD values within project acceptance limits?	•			RPDs were not calculated because results were below LOQ.
Were QAPP specified laboratory PQLs achieved?	•			Limits were raised due to required dilutions.
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW7471B (Mercury in Soil (Manual Cold-Vapor Technique))				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			A MS/MSD was not prepared due to insufficient volume. A LCS/LCSD was provided instead.
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM- Field Triplicates were collected. The % RSD was 9.
Were QAPP specified laboratory PQLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW8082A (Polychlorinated Biphenyls (PCB))

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Were surrogate recoveries within project acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	A LCSD was not provided.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
Were column comparison differences with project acceptance limits?		•		The RPDs for Aroclor-1260 for samples IINY-DU-23A-SSIS-20200320, IINY-DU-23B-SSIS-20200320, IINY-DU-23C-SSIS-20200320, and IINY-DU-25A-SSIS-20200320 were above QC limits. The data were J qualified.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM- Field Triplicates were collected. The % RSD ranged from 20.4-29.
Were QAPP specified laboratory PQLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

US Army Corps of Engineers ®

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling
SDG:	280-135113-1_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Tim Reese
Contract Laboratory(ies):	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	EA Engineering, Science, and Technology Inc., PBC
Data Review Level:	S2BVEM
Primary Data Reviewer:	Tara Lamond, Data Manager
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	May 26, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	BNASIMD	SW6010C	SW6020A	SW7471B
IINY-DU-11A-SSIS-20200330	280-135113-1	Soil	Field Sample/N	X	X	X	X
IINY-DU-11B-SSIS-20200330	280-135113-2	Soil	Field Duplicate/FD	X	X	X	X
IINY-DU-11C-SSIS-20200330	280-135113-3	Soil	Field Triplicate/FT	X	X	X	X
IINY-DU-12A-SSIS-20200330	280-135113-4	Soil	Field Sample/N	X	X	X	X
IINY-DU-12B-SSIS-20200330	280-135113-5	Soil	Field Duplicate/FD	X	X	X	X
IINY-DU-12C-SSIS-20200330	280-135113-6	Soil	Field Triplicate/FT	X	X	X	X
IINY-DU-13A-SSIS-20200330	280-135113-7	Soil	Field Sample/N	X	X	X	X
IINY-DU-13B-SSIS-20200330	280-135113-8	Soil	Field Duplicate/FD	X	X	X	X
IINY-DU-13C-SSIS-20200330	280-135113-9	Soil	Field Triplicate/FT	X	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-135113-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

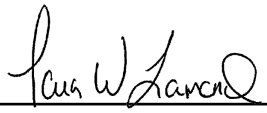
- Blank - Negative
- Field Duplicate RPD
- Field Triplicate RSD
- Lab Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 172 results (46.61%) out of the 369 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

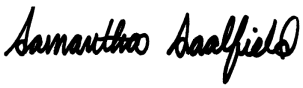
Analytical Method	Data Reviewer Comment
BNASIMD	No additional comments; see Checklist for detail.
SW6010C	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW7471B	No additional comments; see Checklist for detail.



May 22, 2020

Reviewed by Tara Lamond, Data Manager, EA Engineering, Science, and Technology Inc., PBC

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



May 27, 2020

Reviewed by Samantha Saalfield, Project Chemist, EA Engineering, Science, and Technology Inc., PBC

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method BNASIMD, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-11A-SSIS-20200330 (MS)/ 280-135113-1MS	Fluoranthene	-133.3	55 - 119	10 - 119	percent	J/X	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (MS)/ 280-135113-1MS	Phenanthrene	-31.03	49 - 113	10 - 113	percent	J/X	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (MS)/ 280-135113-1MS	Benzo (a)anthracene	122.4	54 - 122	10 - 122	percent	J/None	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (MS)/ 280-135113-1MS	Benzo (k)fluoranthene	136.2	56 - 123	10 - 123	percent	J/None	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (MS)/ 280-135113-1MS	Benzo (b)fluoranthene	150.0	53 - 128	10 - 128	percent	J/None	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (MS)/ 280-135113-1MS	Benzo(a)pyrene	160.3	50 - 125	10 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (MS)/ 280-135113-1MS	Chrysene	166.7	57 - 118	10 - 118	percent	J/None	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (MS)/ 280-135113-1MS	Benzo (g,h,i)perylene	210.3	49 - 127	10 - 127	percent	J/None	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (MS)/ 280-135113-1MS	Indeno(1,2,3-c,d)pyrene	225.9	49 - 130	10 - 130	percent	J/None	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (MS)/ 280-135113-1MS	Pyrene	33.33	55 - 117	10 - 117	percent	J/UJ	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (SD)/ 280-135113-1MSD	Fluoranthene	-133.3	55 - 119	10 - 119	percent	J/X	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (SD)/ 280-135113-1MSD	Phenanthrene	-86.21	49 - 113	10 - 113	percent	J/X	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (SD)/ 280-135113-1MSD	Pyrene	16.67	55 - 117	10 - 117	percent	J/UJ	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (SD)/ 280-135113-1MSD	Benzo (b)fluoranthene	50.00	53 - 128	10 - 128	percent	J/UJ	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method BNASIMD, Prep Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of extraction found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-11A-SSIS-20200330 (N)/ 280-135113-1		16.01	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-11A-SSIS-20200330 (N)/ 280-135113-1	Fluorene	16.01	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-11B-SSIS-20200330 (FD)/ 280-135113-2		16.01	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-11B-SSIS-20200330 (FD)/ 280-135113-2	Fluorene	16.01	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-11C-SSIS-20200330 (FT)/ 280-135113-3		16.01	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-11C-SSIS-20200330 (FT)/ 280-135113-3	Fluorene	16.01	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-12A-SSIS-20200330 (N)/ 280-135113-4		15.96	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-12A-SSIS-20200330 (N)/ 280-135113-4	Fluorene	15.96	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-12B-SSIS-20200330 (FD)/ 280-135113-5		15.96	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-12B-SSIS-20200330 (FD)/ 280-135113-5	Fluorene	15.96	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-12C-SSIS-20200330 (FT)/ 280-135113-6		15.96	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-12C-SSIS-20200330 (FT)/ 280-135113-6	Fluorene	15.96	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-13A-SSIS-20200330 (N)/ 280-135113-7		15.91	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-13A-SSIS-20200330 (N)/ 280-135113-7	Fluorene	15.91	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-13B-SSIS-20200330 (FD)/ 280-135113-8		15.91	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-13B-SSIS-20200330 (FD)/ 280-135113-8	Fluorene	15.91	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-13C-SSIS-20200330 (FT)/ 280-135113-9		15.91	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL

Quality Control Outliers for test method BNASIMD, Prep Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of extraction found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-13C-SSIS-20200330 (FT)/ 280-135113-9	Fluorene	15.91	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-11A-SSIS-20200330	N	1-Methylnaphthalene	0.190	0.0280 J H D	0.0280 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	2-Methylnaphthalene	0.190	0.0430 J H D	0.0430 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	Acenaphthene	0.190	0.0200 J H D	0.0200 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	Acenaphthylene	0.190	0.170 J H D	0.170 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	Anthracene	0.190	0.130 J H D	0.130 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	Benzo(a)anthracene	0.190	0.670 H D	0.670 J	-	mg/kg	H2
IINY-DU-11A-SSIS-20200330	N	Benzo(a)pyrene	0.190	0.870 H D J1	0.870 J	-	mg/kg	H2
IINY-DU-11A-SSIS-20200330	N	Benzo(b)fluoranthene	0.190	1.20 H D J1	1.20 J	-	mg/kg	H2
IINY-DU-11A-SSIS-20200330	N	Benzo(g,h,i)perylene	0.190	0.820 H D J1	0.820 J	-	mg/kg	H2
IINY-DU-11A-SSIS-20200330	N	Benzo(k)fluoranthene	0.190	0.430 H D J1	0.430 J	-	mg/kg	H2
IINY-DU-11A-SSIS-20200330	N	Chrysene	0.190	0.960 H D J1	0.960 J	-	mg/kg	H2
IINY-DU-11A-SSIS-20200330	N	Dibenz(a,h)anthracene	0.190	0.180 J H D	0.180 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	Fluoranthene	0.190	1.10 H D J1	1.10 J	-	mg/kg	H2
IINY-DU-11A-SSIS-20200330	N	Indeno(1,2,3-c,d)pyrene	0.190	0.780 H D J1	0.780 J	-	mg/kg	H2
IINY-DU-11A-SSIS-20200330	N	Naphthalene	0.190	0.0980 J H D	0.0980 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	Phenanthrene	0.190	0.420 H D J1	0.420 J	-	mg/kg	H2
IINY-DU-11A-SSIS-20200330	N	Pyrene	0.190	1.20 H D J1	1.20 J	-	mg/kg	H2
IINY-DU-11A-SSIS-20200330	N	Fluorene	0.190	0.0430 J H D	0.0430 J	-	mg/kg	H2/TR
IINY-DU-11B-SSIS-20200330	FD	1-Methylnaphthalene	0.180	0.0270 J H D	0.0270 J	-	mg/kg	H2/TR
IINY-DU-11B-SSIS-20200330	FD	2-Methylnaphthalene	0.180	0.0440 J H D	0.0440 J	-	mg/kg	H2/TR

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-11B-SSIS-20200330	FD	Acenaphthene	0.180	0.0290 J H D	0.0290 J	-	mg/kg	H2/TR
IINY-DU-11B-SSIS-20200330	FD	Acenaphthylene	0.180	0.230 H D	0.230 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Anthracene	0.180	0.150 J H D	0.150 J	-	mg/kg	H2/TR
IINY-DU-11B-SSIS-20200330	FD	Benzo(a)anthracene	0.180	0.970 H D	0.970 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Benzo(a)pyrene	0.180	1.20 H D	1.20 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Benzo(b)fluoranthene	0.180	1.60 H D	1.60 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Benzo(g,h,i)perylene	0.180	1.20 H D	1.20 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Benzo(k)fluoranthene	0.180	0.570 H D	0.570 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Chrysene	0.180	1.30 H D	1.30 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Dibenz(a,h)anthracene	0.180	0.230 H D	0.230 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Fluoranthene	0.180	1.30 H D	1.30 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Indeno(1,2,3-c,d)pyrene	0.180	1.10 H D	1.10 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Naphthalene	0.180	0.0920 J H D	0.0920 J	-	mg/kg	H2/TR
IINY-DU-11B-SSIS-20200330	FD	Phenanthrene	0.180	0.420 H D	0.420 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Pyrene	0.180	1.60 H D	1.60 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Fluorene	0.180	0.0610 J H D	0.0610 J	-	mg/kg	H2/TR
IINY-DU-11C-SSIS-20200330	FT	1-Methylnaphthalene	0.0920	0.0230 J H D	0.0230 J	-	mg/kg	H2/TR
IINY-DU-11C-SSIS-20200330	FT	2-Methylnaphthalene	0.0920	0.0360 J H D	0.0360 J	-	mg/kg	H2/TR
IINY-DU-11C-SSIS-20200330	FT	Acenaphthene	0.0920	0.0150 J H D	0.0150 J	-	mg/kg	H2/TR
IINY-DU-11C-SSIS-20200330	FT	Acenaphthylene	0.0920	0.160 H D	0.160 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Anthracene	0.0920	0.0970 H D	0.0970 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Benzo(a)anthracene	0.0920	0.520 H D	0.520 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Benzo(a)pyrene	0.0920	0.750 H D	0.750 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Benzo(b)fluoranthene	0.0920	1.10 H D	1.10 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Benzo(g,h,i)perylene	0.0920	0.780 H D	0.780 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Benzo(k)fluoranthene	0.0920	0.360 H D	0.360 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Chrysene	0.0920	0.750 H D	0.750 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Dibenz(a,h)anthracene	0.0920	0.160 H D	0.160 J	-	mg/kg	H2

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-11C-SSIS-20200330	FT	Fluoranthene	0.0920	0.710 H D	0.710 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Indeno(1,2,3-c,d)pyrene	0.0920	0.740 H D	0.740 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Naphthalene	0.0920	0.0680 J H D	0.0680 J	-	mg/kg	H2/TR
IINY-DU-11C-SSIS-20200330	FT	Phenanthrene	0.0920	0.220 H D	0.220 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Pyrene	0.0920	0.870 H D	0.870 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Fluorene	0.0920	0.0280 J H D	0.0280 J	-	mg/kg	H2/TR
IINY-DU-12A-SSIS-20200330	N	1-Methylnaphthalene	0.370	0.0730 J H D	0.0730 J	-	mg/kg	H2/TR
IINY-DU-12A-SSIS-20200330	N	2-Methylnaphthalene	0.370	0.0980 J H D	0.0980 J	-	mg/kg	H2/TR
IINY-DU-12A-SSIS-20200330	N	Acenaphthene	0.370	0.540 H D	0.540 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Acenaphthylene	0.370	0.0880 J H D	0.0880 J	-	mg/kg	H2/TR
IINY-DU-12A-SSIS-20200330	N	Anthracene	0.370	0.860 H D	0.860 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Benzo(a)anthracene	0.370	2.20 H D	2.20 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Benzo(a)pyrene	0.370	1.80 H D	1.80 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Benzo(b)fluoranthene	0.370	2.80 H D	2.80 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Benzo(g,h,i)perylene	0.370	1.40 H D	1.40 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Benzo(k)fluoranthene	0.370	1.10 H D	1.10 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Chrysene	0.370	2.40 H D	2.40 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Dibenz(a,h)anthracene	0.370	0.380 H D	0.380 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Fluoranthene	0.370	4.20 H D	4.20 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Indeno(1,2,3-c,d)pyrene	0.370	1.50 H D	1.50 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Naphthalene	0.370	0.250 J H D	0.250 J	-	mg/kg	H2/TR
IINY-DU-12A-SSIS-20200330	N	Phenanthrene	0.370	3.20 H D	3.20 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Pyrene	0.370	3.50 H D	3.50 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Fluorene	0.370	0.440 H D	0.440 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	1-Methylnaphthalene	0.380	0.0440 J H D	0.0440 J	-	mg/kg	H2/TR
IINY-DU-12B-SSIS-20200330	FD	2-Methylnaphthalene	0.380	0.0550 J H D	0.0550 J	-	mg/kg	H2/TR
IINY-DU-12B-SSIS-20200330	FD	Acenaphthene	0.380	0.360 J H D	0.360 J	-	mg/kg	H2/TR
IINY-DU-12B-SSIS-20200330	FD	Acenaphthylene	0.380	0.0290 J H D	0.0290 J	-	mg/kg	H2/TR

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-12B-SSIS-20200330	FD	Anthracene	0.380	0.590 H D Q	0.590 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Benzo(a)anthracene	0.380	1.50 H D Q	1.50 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Benzo(a)pyrene	0.380	1.20 H D Q	1.20 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Benzo(b)fluoranthene	0.380	1.60 H D Q	1.60 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Benzo(g,h,i)perylene	0.380	0.690 H D Q	0.690 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Benzo(k)fluoranthene	0.380	0.620 H D Q	0.620 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Chrysene	0.380	1.50 H D Q	1.50 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Dibenz(a,h)anthracene	0.380	0.200 J H D	0.200 J	-	mg/kg	H2/TR
IINY-DU-12B-SSIS-20200330	FD	Fluoranthene	0.380	3.10 H D Q	3.10 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Indeno(1,2,3-c,d)pyrene	0.380	0.760 H D Q	0.760 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Naphthalene	0.380	0.120 J H D	0.120 J	-	mg/kg	H2/TR
IINY-DU-12B-SSIS-20200330	FD	Phenanthrene	0.380	2.30 H D Q	2.30 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Pyrene	0.380	2.50 H D Q	2.50 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Fluorene	0.380	0.280 J H D	0.280 J	-	mg/kg	H2/TR
IINY-DU-12C-SSIS-20200330	FT	1-Methylnaphthalene	0.370	0.0530 J H D	0.0530 J	-	mg/kg	H2/TR
IINY-DU-12C-SSIS-20200330	FT	2-Methylnaphthalene	0.370	0.0530 J H D	0.0530 J	-	mg/kg	H2/TR
IINY-DU-12C-SSIS-20200330	FT	Acenaphthene	0.370	0.390 H D	0.390 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Acenaphthylene	0.370	0.0620 J H D	0.0620 J	-	mg/kg	H2/TR
IINY-DU-12C-SSIS-20200330	FT	Anthracene	0.370	0.750 H D	0.750 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Benzo(a)anthracene	0.370	2.10 H D	2.10 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Benzo(a)pyrene	0.370	1.80 H D	1.80 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Benzo(b)fluoranthene	0.370	2.60 H D	2.60 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Benzo(g,h,i)perylene	0.370	1.30 H D	1.30 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Benzo(k)fluoranthene	0.370	0.970 H D	0.970 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Chrysene	0.370	2.20 H D	2.20 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Dibenz(a,h)anthracene	0.370	0.370 H D	0.370 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Fluoranthene	0.370	4.30 H D	4.30 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Indeno(1,2,3-c,d)pyrene	0.370	1.40 H D	1.40 J	-	mg/kg	H2

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-12C-SSIS-20200330	FT	Naphthalene	0.370	0.0860 J H D	0.0860 J	-	mg/kg	H2/TR
IINY-DU-12C-SSIS-20200330	FT	Phenanthrene	0.370	2.70 H D	2.70 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Pyrene	0.370	3.60 H D	3.60 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Fluorene	0.370	0.320 J H D	0.320 J	-	mg/kg	H2/TR
IINY-DU-13A-SSIS-20200330	N	1-Methylnaphthalene	1.90	0.380 J H D	0.380 J	-	mg/kg	H2/TR
IINY-DU-13A-SSIS-20200330	N	2-Methylnaphthalene	1.90	0.430 J H D	0.430 J	-	mg/kg	H2/TR
IINY-DU-13A-SSIS-20200330	N	Acenaphthene	1.90	4.50 H D Q	4.50 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Acenaphthylene	1.90	0.210 U H M	0.210 UJ		mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Anthracene	1.90	6.60 H D Q	6.60 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Benzo(a)anthracene	1.90	16.0 H D Q	16.0 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Benzo(a)pyrene	1.90	12.0 H D Q	12.0 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Benzo(b)fluoranthene	1.90	17.0 H D Q	17.0 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Benzo(g,h,i)perylene	1.90	7.20 H D Q	7.20 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Benzo(k)fluoranthene	1.90	6.40 H D Q	6.40 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Chrysene	1.90	16.0 H D Q	16.0 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Dibenz(a,h)anthracene	1.90	2.30 H D Q	2.30 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Fluoranthene	1.90	34.0 H D Q	34.0 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Fluorene	1.90	3.20 H D Q	3.20 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Indeno(1,2,3-c,d)pyrene	1.90	7.90 H D Q	7.90 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Naphthalene	1.90	0.950 J H D	0.950 J	-	mg/kg	H2/TR
IINY-DU-13A-SSIS-20200330	N	Phenanthrene	1.90	26.0 H D Q	26.0 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Pyrene	1.90	27.0 H D Q	27.0 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Fluorene	1.80	3.90 H D Q	3.90 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	1-Methylnaphthalene	1.80	0.450 J H D	0.450 J	-	mg/kg	H2/TR
IINY-DU-13B-SSIS-20200330	FD	2-Methylnaphthalene	1.80	0.500 J H D	0.500 J	-	mg/kg	H2/TR
IINY-DU-13B-SSIS-20200330	FD	Acenaphthene	1.80	4.70 H D Q	4.70 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Acenaphthylene	1.80	1.30 J H D	1.30 J	-	mg/kg	H2/TR
IINY-DU-13B-SSIS-20200330	FD	Anthracene	1.80	8.00 H D Q	8.00 J	-	mg/kg	H2

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-13B-SSIS-20200330	FD	Benzo(a)anthracene	1.80	17.0 H D Q	17.0 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Benzo(a)pyrene	1.80	13.0 H D Q	13.0 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Benzo(b)fluoranthene	1.80	17.0 H D Q	17.0 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Benzo(g,h,i)perylene	1.80	7.90 H D Q	7.90 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Benzo(k)fluoranthene	1.80	7.40 H D Q	7.40 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Chrysene	1.80	16.0 H D Q	16.0 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Dibenz(a,h)anthracene	1.80	2.40 H D Q	2.40 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Fluoranthene	1.80	38.0 H D Q	38.0 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Indeno(1,2,3-c,d)pyrene	1.80	9.20 H D Q	9.20 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Naphthalene	1.80	1.10 J H D	1.10 J	-	mg/kg	H2/TR
IINY-DU-13B-SSIS-20200330	FD	Phenanthrene	1.80	27.0 H D Q	27.0 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Pyrene	1.80	30.0 H D Q	30.0 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Fluorene	1.90	2.00 H D Q	2.00 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	1-Methylnaphthalene	1.90	0.260 J H D	0.260 J	-	mg/kg	H2/TR
IINY-DU-13C-SSIS-20200330	FT	2-Methylnaphthalene	1.90	0.310 J H D	0.310 J	-	mg/kg	H2/TR
IINY-DU-13C-SSIS-20200330	FT	Acenaphthene	1.90	2.60 H D Q	2.60 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Acenaphthylene	1.90	0.200 U H M	0.200 UJ		mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Anthracene	1.90	3.90 H D Q	3.90 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Benzo(a)anthracene	1.90	9.40 H D Q	9.40 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Benzo(a)pyrene	1.90	7.10 H D Q	7.10 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Benzo(b)fluoranthene	1.90	9.70 H D Q	9.70 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Benzo(g,h,i)perylene	1.90	4.20 H D Q	4.20 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Benzo(k)fluoranthene	1.90	3.80 H D Q	3.80 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Chrysene	1.90	9.30 H D Q	9.30 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Dibenz(a,h)anthracene	1.90	1.20 J H D	1.20 J	-	mg/kg	H2/TR
IINY-DU-13C-SSIS-20200330	FT	Fluoranthene	1.90	21.0 H D Q	21.0 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Indeno(1,2,3-c,d)pyrene	1.90	4.90 H D Q	4.90 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Naphthalene	1.90	0.750 J H D	0.750 J	-	mg/kg	H2/TR

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-13C-SSIS-20200330	FT	Phenanthrene	1.90	15.0 H D Q	15.0 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Pyrene	1.90	17.0 H D Q	17.0 J	-	mg/kg	H2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method BNASIMD, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-12A-SSIS-20200330 (N)/ 280-135113-4	Nitrobenzene-d5	0.000	44 - 125	10 - 125	percent	J/X	I	Diluted Out
IINY-DU-12B-SSIS-20200330 (FD)/ 280-135113-5	Nitrobenzene-d5	0.000	44 - 125	10 - 125	percent	J/X	I	Diluted Out
IINY-DU-12B-SSIS-20200330 (FD)/ 280-135113-5	2-Fluorobiphenyl	0.000	46 - 115	10 - 115	percent	J/X	I	Diluted Out
IINY-DU-12B-SSIS-20200330 (FD)/ 280-135113-5	Terphenyl-d14	0.000	58 - 133	10 - 133	percent	J/X	I	Diluted Out
IINY-DU-12C-SSIS-20200330 (FT)/ 280-135113-6	Nitrobenzene-d5	0.000	44 - 125	10 - 125	percent	J/X	I	Diluted Out
IINY-DU-13A-SSIS-20200330 (N)/ 280-135113-7	Nitrobenzene-d5	0.000	44 - 125	10 - 125	percent	J/X	I	Diluted Out
IINY-DU-13A-SSIS-20200330 (N)/ 280-135113-7	2-Methylnaphthalene-d10	128.0	41 - 100	10 - 100	percent	J/None	I	Diluted Out
IINY-DU-13A-SSIS-20200330 (N)/ 280-135113-7	2-Fluorobiphenyl	129.0	46 - 115	10 - 115	percent	J/None	I	Diluted Out
IINY-DU-13A-SSIS-20200330 (N)/ 280-135113-7	Fluoranthene-d10	163.0	55 - 101	10 - 101	percent	J/None	I	Diluted Out
IINY-DU-13A-SSIS-20200330 (N)/ 280-135113-7	Terphenyl-d14	199.0	58 - 133	10 - 133	percent	J/None	I	Diluted Out
IINY-DU-13B-SSIS-20200330 (FD)/ 280-135113-8	Nitrobenzene-d5	0.000	44 - 125	10 - 125	percent	J/X	I	Diluted Out
IINY-DU-13B-SSIS-20200330 (FD)/ 280-135113-8	2-Fluorobiphenyl	0.000	46 - 115	10 - 115	percent	J/X	I	Diluted Out
IINY-DU-13B-SSIS-20200330 (FD)/ 280-135113-8	Terphenyl-d14	0.000	58 - 133	10 - 133	percent	J/X	I	Diluted Out
IINY-DU-13B-SSIS-20200330 (FD)/ 280-135113-8	Fluoranthene-d10	103.0	55 - 101	10 - 101	percent	J/None	I	Diluted Out
IINY-DU-13C-SSIS-20200330 (FT)/ 280-135113-9	Nitrobenzene-d5	0.000	44 - 125	10 - 125	percent	J/X	I	Diluted Out

Quality Control Outliers for test method BNASIMD, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-13C-SSIS-20200330 (FT)/ 280-135113-9	2-Fluorobiphenyl	0.000	46 - 115	10 - 115	percent	J/X	I	Diluted Out
IINY-DU-13C-SSIS-20200330 (FT)/ 280-135113-9	Terphenyl-d14	0.000	58 - 133	10 - 133	percent	J/X	I	Diluted Out
IINY-DU-13C-SSIS-20200330 (FT)/ 280-135113-9	Fluoranthene-d10	116.0	55 - 101	10 - 101	percent	J/None	I	Diluted Out

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6010C, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-490958/1-A (LB)/ MB 280-490958/1-A	Iron	18.50	< 8.3	< 80	mg/kg	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6010C, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-11A-SSIS-20200330 (MS)/ 280-135113-1MS	Magnesium	136.0	78 - 115	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (MS)/ 280-135113-1MS	Iron	460.0	81 - 118	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (MS)/ 280-135113-1MS	Aluminum	600.0	74 - 119	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (MS)/ 280-135113-1MS	Calcium	152.0	81 - 116	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (SD)/ 280-135113-1MSD	Iron	360.0	81 - 118	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (SD)/ 280-135113-1MSD	Aluminum	540.0	74 - 119	30 - 125	percent	J/None	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6020A, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-11A-SSIS-20200330 (MS)/ 280-135113-1MS	Vanadium	129.3	82 - 116	30 - 125	percent	J/None	M	
IINY-DU-11A-SSIS-20200330 (MS)/ 280-135113-1MS	Zinc	141.4	82 - 119	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (MS)/ 280-135113-1MS	Barium	144.4	86 - 116	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (MS)/ 280-135113-1MS	Lead	50.00	84 - 118	30 - 125	percent	J/UJ	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (MS)/ 280-135113-1MS	Manganese	-20.00	85 - 116	30 - 125	percent	J/X	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (SD)/ 280-135113-1MSD	Chromium	128.3	83 - 119	30 - 125	percent	J/None	M	
IINY-DU-11A-SSIS-20200330 (SD)/ 280-135113-1MSD	Vanadium	134.3	82 - 116	30 - 125	percent	J/None	M	
IINY-DU-11A-SSIS-20200330 (SD)/ 280-135113-1MSD	Zinc	161.6	82 - 119	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (SD)/ 280-135113-1MSD	Barium	163.6	86 - 116	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (SD)/ 280-135113-1MSD	Lead	80.00	84 - 118	30 - 125	percent	J/UJ	M	Spike amount Insignificant
IINY-DU-11A-SSIS-20200330 (SD)/ 280-135113-1MSD	Manganese	50.00	85 - 116	30 - 125	percent	J/UJ	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW6020A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-11A-SSIS-20200330	N	Vanadium	0.500	22.0 J1	22.0 J	+	mg/kg	M
IINY-DU-11A-SSIS-20200330	N	Chromium	0.600	15.0 J1	15.0 J	+	mg/kg	M
IINY-DU-11B-SSIS-20200330	FD	Vanadium	0.470	24.0	24.0 J	+	mg/kg	M
IINY-DU-11B-SSIS-20200330	FD	Chromium	0.560	15.0	15.0 J	+	mg/kg	M

Qualified Results associated with the MS Recovery for SW6020A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-11C-SSIS-20200330	FT	Vanadium	0.480	23.0	23.0 J	+	mg/kg	M
IINY-DU-11C-SSIS-20200330	FT	Chromium	0.570	15.0	15.0 J	+	mg/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW7471B, Total, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-11A-SSIS-20200330 (SD)/ 280-135113-1MSD	Mercury	72.62	80 - 124	30 - 125	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW7471B, Total

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-11A-SSIS-20200330	N	Mercury	0.0170	0.250 J1	0.250 J	-	mg/kg	M
IINY-DU-11B-SSIS-20200330	FD	Mercury	0.0160	0.150	0.150 J	-	mg/kg	M
IINY-DU-11C-SSIS-20200330	FT	Mercury	0.0170	0.150	0.150 J	-	mg/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW7471B, Total, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-11A-SSIS-20200330 (SD)/ 280-135113-1MSD	Mercury	20.17	< 20	< 20	rpd	J/UJ	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-11A-SSIS-20200330	N	1-Methylnaphthalene	0.190	0.0280 J H D	0.0280 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	2-Methylnaphthalene	0.190	0.0430 J H D	0.0430 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	Acenaphthene	0.190	0.0200 J H D	0.0200 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	Acenaphthylene	0.190	0.170 J H D	0.170 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	Anthracene	0.190	0.130 J H D	0.130 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	Benzo(a)anthracene	0.190	0.670 H D	0.670 J	-	mg/kg	H2
IINY-DU-11A-SSIS-20200330	N	Benzo(a)pyrene	0.190	0.870 H D J1	0.870 J	-	mg/kg	H2
IINY-DU-11A-SSIS-20200330	N	Benzo(b)fluoranthene	0.190	1.20 H D J1	1.20 J	-	mg/kg	H2
IINY-DU-11A-SSIS-20200330	N	Benzo(g,h,i)perylene	0.190	0.820 H D J1	0.820 J	-	mg/kg	H2
IINY-DU-11A-SSIS-20200330	N	Benzo(k)fluoranthene	0.190	0.430 H D J1	0.430 J	-	mg/kg	H2
IINY-DU-11A-SSIS-20200330	N	Chrysene	0.190	0.960 H D J1	0.960 J	-	mg/kg	H2
IINY-DU-11A-SSIS-20200330	N	Dibenz(a,h)anthracene	0.190	0.180 J H D	0.180 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	Fluoranthene	0.190	1.10 H D J1	1.10 J	-	mg/kg	H2
IINY-DU-11A-SSIS-20200330	N	Indeno(1,2,3-c,d)pyrene	0.190	0.780 H D J1	0.780 J	-	mg/kg	H2
IINY-DU-11A-SSIS-20200330	N	Naphthalene	0.190	0.0980 J H D	0.0980 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	Phenanthrene	0.190	0.420 H D J1	0.420 J	-	mg/kg	H2
IINY-DU-11A-SSIS-20200330	N	Pyrene	0.190	1.20 H D J1	1.20 J	-	mg/kg	H2
IINY-DU-11A-SSIS-20200330	N	Fluorene	0.190	0.0430 J H D	0.0430 J	-	mg/kg	H2/TR
IINY-DU-11B-SSIS-20200330	FD	1-Methylnaphthalene	0.180	0.0270 J H D	0.0270 J	-	mg/kg	H2/TR
IINY-DU-11B-SSIS-20200330	FD	2-Methylnaphthalene	0.180	0.0440 J H D	0.0440 J	-	mg/kg	H2/TR
IINY-DU-11B-SSIS-20200330	FD	Acenaphthene	0.180	0.0290 J H D	0.0290 J	-	mg/kg	H2/TR
IINY-DU-11B-SSIS-20200330	FD	Acenaphthylene	0.180	0.230 H D	0.230 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Anthracene	0.180	0.150 J H D	0.150 J	-	mg/kg	H2/TR
IINY-DU-11B-SSIS-20200330	FD	Benzo(a)anthracene	0.180	0.970 H D	0.970 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Benzo(a)pyrene	0.180	1.20 H D	1.20 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Benzo(b)fluoranthene	0.180	1.60 H D	1.60 J	-	mg/kg	H2

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-11B-SSIS-20200330	FD	Benzo(g,h,i)perylene	0.180	1.20 H D	1.20 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Benzo(k)fluoranthene	0.180	0.570 H D	0.570 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Chrysene	0.180	1.30 H D	1.30 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Dibenz(a,h)anthracene	0.180	0.230 H D	0.230 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Fluoranthene	0.180	1.30 H D	1.30 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Indeno(1,2,3-c,d)pyrene	0.180	1.10 H D	1.10 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Naphthalene	0.180	0.0920 J H D	0.0920 J	-	mg/kg	H2/TR
IINY-DU-11B-SSIS-20200330	FD	Phenanthrene	0.180	0.420 H D	0.420 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Pyrene	0.180	1.60 H D	1.60 J	-	mg/kg	H2
IINY-DU-11B-SSIS-20200330	FD	Fluorene	0.180	0.0610 J H D	0.0610 J	-	mg/kg	H2/TR
IINY-DU-11C-SSIS-20200330	FT	1-Methylnaphthalene	0.0920	0.0230 J H D	0.0230 J	-	mg/kg	H2/TR
IINY-DU-11C-SSIS-20200330	FT	2-Methylnaphthalene	0.0920	0.0360 J H D	0.0360 J	-	mg/kg	H2/TR
IINY-DU-11C-SSIS-20200330	FT	Acenaphthene	0.0920	0.0150 J H D	0.0150 J	-	mg/kg	H2/TR
IINY-DU-11C-SSIS-20200330	FT	Acenaphthylene	0.0920	0.160 H D	0.160 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Anthracene	0.0920	0.0970 H D	0.0970 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Benzo(a)anthracene	0.0920	0.520 H D	0.520 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Benzo(a)pyrene	0.0920	0.750 H D	0.750 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Benzo(b)fluoranthene	0.0920	1.10 H D	1.10 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Benzo(g,h,i)perylene	0.0920	0.780 H D	0.780 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Benzo(k)fluoranthene	0.0920	0.360 H D	0.360 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Chrysene	0.0920	0.750 H D	0.750 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Dibenz(a,h)anthracene	0.0920	0.160 H D	0.160 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Fluoranthene	0.0920	0.710 H D	0.710 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Indeno(1,2,3-c,d)pyrene	0.0920	0.740 H D	0.740 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Naphthalene	0.0920	0.0680 J H D	0.0680 J	-	mg/kg	H2/TR
IINY-DU-11C-SSIS-20200330	FT	Phenanthrene	0.0920	0.220 H D	0.220 J	-	mg/kg	H2
IINY-DU-11C-SSIS-20200330	FT	Pyrene	0.0920	0.870 H D	0.870 J	-	mg/kg	H2

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-11C-SSIS-20200330	FT	Fluorene	0.0920	0.0280 J H D	0.0280 J	-	mg/kg	H2/TR
IINY-DU-12A-SSIS-20200330	N	1-Methylnaphthalene	0.370	0.0730 J H D	0.0730 J	-	mg/kg	H2/TR
IINY-DU-12A-SSIS-20200330	N	2-Methylnaphthalene	0.370	0.0980 J H D	0.0980 J	-	mg/kg	H2/TR
IINY-DU-12A-SSIS-20200330	N	Acenaphthene	0.370	0.540 H D	0.540 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Acenaphthylene	0.370	0.0880 J H D	0.0880 J	-	mg/kg	H2/TR
IINY-DU-12A-SSIS-20200330	N	Anthracene	0.370	0.860 H D	0.860 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Benzo(a)anthracene	0.370	2.20 H D	2.20 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Benzo(a)pyrene	0.370	1.80 H D	1.80 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Benzo(b)fluoranthene	0.370	2.80 H D	2.80 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Benzo(g,h,i)perylene	0.370	1.40 H D	1.40 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Benzo(k)fluoranthene	0.370	1.10 H D	1.10 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Chrysene	0.370	2.40 H D	2.40 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Dibenz(a,h)anthracene	0.370	0.380 H D	0.380 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Fluoranthene	0.370	4.20 H D	4.20 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Indeno(1,2,3-c,d)pyrene	0.370	1.50 H D	1.50 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Naphthalene	0.370	0.250 J H D	0.250 J	-	mg/kg	H2/TR
IINY-DU-12A-SSIS-20200330	N	Phenanthrene	0.370	3.20 H D	3.20 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Pyrene	0.370	3.50 H D	3.50 J	-	mg/kg	H2
IINY-DU-12A-SSIS-20200330	N	Fluorene	0.370	0.440 H D	0.440 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	1-Methylnaphthalene	0.380	0.0440 J H D	0.0440 J	-	mg/kg	H2/TR
IINY-DU-12B-SSIS-20200330	FD	2-Methylnaphthalene	0.380	0.0550 J H D	0.0550 J	-	mg/kg	H2/TR
IINY-DU-12B-SSIS-20200330	FD	Acenaphthene	0.380	0.360 J H D	0.360 J	-	mg/kg	H2/TR
IINY-DU-12B-SSIS-20200330	FD	Acenaphthylene	0.380	0.0290 J H D	0.0290 J	-	mg/kg	H2/TR
IINY-DU-12B-SSIS-20200330	FD	Anthracene	0.380	0.590 H D Q	0.590 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Benzo(a)anthracene	0.380	1.50 H D Q	1.50 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Benzo(a)pyrene	0.380	1.20 H D Q	1.20 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Benzo(b)fluoranthene	0.380	1.60 H D Q	1.60 J	-	mg/kg	H2

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-12B-SSIS-20200330	FD	Benzo(g,h,i)perylene	0.380	0.690 H D Q	0.690 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Benzo(k)fluoranthene	0.380	0.620 H D Q	0.620 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Chrysene	0.380	1.50 H D Q	1.50 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Dibenz(a,h)anthracene	0.380	0.200 J H D	0.200 J	-	mg/kg	H2/TR
IINY-DU-12B-SSIS-20200330	FD	Fluoranthene	0.380	3.10 H D Q	3.10 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Indeno(1,2,3-c,d)pyrene	0.380	0.760 H D Q	0.760 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Naphthalene	0.380	0.120 J H D	0.120 J	-	mg/kg	H2/TR
IINY-DU-12B-SSIS-20200330	FD	Phenanthrene	0.380	2.30 H D Q	2.30 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Pyrene	0.380	2.50 H D Q	2.50 J	-	mg/kg	H2
IINY-DU-12B-SSIS-20200330	FD	Fluorene	0.380	0.280 J H D	0.280 J	-	mg/kg	H2/TR
IINY-DU-12C-SSIS-20200330	FT	1-Methylnaphthalene	0.370	0.0530 J H D	0.0530 J	-	mg/kg	H2/TR
IINY-DU-12C-SSIS-20200330	FT	2-Methylnaphthalene	0.370	0.0530 J H D	0.0530 J	-	mg/kg	H2/TR
IINY-DU-12C-SSIS-20200330	FT	Acenaphthene	0.370	0.390 H D	0.390 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Acenaphthylene	0.370	0.0620 J H D	0.0620 J	-	mg/kg	H2/TR
IINY-DU-12C-SSIS-20200330	FT	Anthracene	0.370	0.750 H D	0.750 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Benzo(a)anthracene	0.370	2.10 H D	2.10 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Benzo(a)pyrene	0.370	1.80 H D	1.80 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Benzo(b)fluoranthene	0.370	2.60 H D	2.60 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Benzo(g,h,i)perylene	0.370	1.30 H D	1.30 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Benzo(k)fluoranthene	0.370	0.970 H D	0.970 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Chrysene	0.370	2.20 H D	2.20 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Dibenz(a,h)anthracene	0.370	0.370 H D	0.370 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Fluoranthene	0.370	4.30 H D	4.30 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Indeno(1,2,3-c,d)pyrene	0.370	1.40 H D	1.40 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Naphthalene	0.370	0.0860 J H D	0.0860 J	-	mg/kg	H2/TR
IINY-DU-12C-SSIS-20200330	FT	Phenanthrene	0.370	2.70 H D	2.70 J	-	mg/kg	H2
IINY-DU-12C-SSIS-20200330	FT	Pyrene	0.370	3.60 H D	3.60 J	-	mg/kg	H2

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-12C-SSIS-20200330	FT	Fluorene	0.370	0.320 J H D	0.320 J	-	mg/kg	H2/TR
IINY-DU-13A-SSIS-20200330	N	1-Methylnaphthalene	1.90	0.380 J H D	0.380 J	-	mg/kg	H2/TR
IINY-DU-13A-SSIS-20200330	N	2-Methylnaphthalene	1.90	0.430 J H D	0.430 J	-	mg/kg	H2/TR
IINY-DU-13A-SSIS-20200330	N	Acenaphthene	1.90	4.50 H D Q	4.50 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Acenaphthylene	1.90	0.210 U H M	0.210 UJ		mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Anthracene	1.90	6.60 H D Q	6.60 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Benzo(a)anthracene	1.90	16.0 H D Q	16.0 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Benzo(a)pyrene	1.90	12.0 H D Q	12.0 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Benzo(b)fluoranthene	1.90	17.0 H D Q	17.0 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Benzo(g,h,i)perylene	1.90	7.20 H D Q	7.20 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Benzo(k)fluoranthene	1.90	6.40 H D Q	6.40 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Chrysene	1.90	16.0 H D Q	16.0 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Dibenz(a,h)anthracene	1.90	2.30 H D Q	2.30 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Fluoranthene	1.90	34.0 H D Q	34.0 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Fluorene	1.90	3.20 H D Q	3.20 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Indeno(1,2,3-c,d)pyrene	1.90	7.90 H D Q	7.90 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Naphthalene	1.90	0.950 J H D	0.950 J	-	mg/kg	H2/TR
IINY-DU-13A-SSIS-20200330	N	Phenanthrene	1.90	26.0 H D Q	26.0 J	-	mg/kg	H2
IINY-DU-13A-SSIS-20200330	N	Pyrene	1.90	27.0 H D Q	27.0 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Fluorene	1.80	3.90 H D Q	3.90 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	1-Methylnaphthalene	1.80	0.450 J H D	0.450 J	-	mg/kg	H2/TR
IINY-DU-13B-SSIS-20200330	FD	2-Methylnaphthalene	1.80	0.500 J H D	0.500 J	-	mg/kg	H2/TR
IINY-DU-13B-SSIS-20200330	FD	Acenaphthene	1.80	4.70 H D Q	4.70 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Acenaphthylene	1.80	1.30 J H D	1.30 J	-	mg/kg	H2/TR
IINY-DU-13B-SSIS-20200330	FD	Anthracene	1.80	8.00 H D Q	8.00 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Benzo(a)anthracene	1.80	17.0 H D Q	17.0 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Benzo(a)pyrene	1.80	13.0 H D Q	13.0 J	-	mg/kg	H2

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-13B-SSIS-20200330	FD	Benzo(b)fluoranthene	1.80	17.0 H D Q	17.0 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Benzo(g,h,i)perylene	1.80	7.90 H D Q	7.90 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Benzo(k)fluoranthene	1.80	7.40 H D Q	7.40 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Chrysene	1.80	16.0 H D Q	16.0 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Dibenz(a,h)anthracene	1.80	2.40 H D Q	2.40 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Fluoranthene	1.80	38.0 H D Q	38.0 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Indeno(1,2,3-c,d)pyrene	1.80	9.20 H D Q	9.20 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Naphthalene	1.80	1.10 J H D	1.10 J	-	mg/kg	H2/TR
IINY-DU-13B-SSIS-20200330	FD	Phenanthrene	1.80	27.0 H D Q	27.0 J	-	mg/kg	H2
IINY-DU-13B-SSIS-20200330	FD	Pyrene	1.80	30.0 H D Q	30.0 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Fluorene	1.90	2.00 H D Q	2.00 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	1-Methylnaphthalene	1.90	0.260 J H D	0.260 J	-	mg/kg	H2/TR
IINY-DU-13C-SSIS-20200330	FT	2-Methylnaphthalene	1.90	0.310 J H D	0.310 J	-	mg/kg	H2/TR
IINY-DU-13C-SSIS-20200330	FT	Acenaphthene	1.90	2.60 H D Q	2.60 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Acenaphthylene	1.90	0.200 U H M	0.200 UJ		mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Anthracene	1.90	3.90 H D Q	3.90 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Benzo(a)anthracene	1.90	9.40 H D Q	9.40 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Benzo(a)pyrene	1.90	7.10 H D Q	7.10 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Benzo(b)fluoranthene	1.90	9.70 H D Q	9.70 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Benzo(g,h,i)perylene	1.90	4.20 H D Q	4.20 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Benzo(k)fluoranthene	1.90	3.80 H D Q	3.80 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Chrysene	1.90	9.30 H D Q	9.30 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Dibenz(a,h)anthracene	1.90	1.20 J H D	1.20 J	-	mg/kg	H2/TR
IINY-DU-13C-SSIS-20200330	FT	Fluoranthene	1.90	21.0 H D Q	21.0 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Indeno(1,2,3-c,d)pyrene	1.90	4.90 H D Q	4.90 J	-	mg/kg	H2
IINY-DU-13C-SSIS-20200330	FT	Naphthalene	1.90	0.750 J H D	0.750 J	-	mg/kg	H2/TR
IINY-DU-13C-SSIS-20200330	FT	Phenanthrene	1.90	15.0 H D Q	15.0 J	-	mg/kg	H2

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-13C-SSIS-20200330	FT	Pyrene	1.90	17.0 H D Q	17.0 J	-	mg/kg	H2

Test Method: SW6020A	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-11A-SSIS-20200330	N	Vanadium	0.500	22.0 J1	22.0 J	+	mg/kg	M
IINY-DU-11A-SSIS-20200330	N	Chromium	0.600	15.0 J1	15.0 J	+	mg/kg	M
IINY-DU-11B-SSIS-20200330	FD	Vanadium	0.470	24.0	24.0 J	+	mg/kg	M
IINY-DU-11B-SSIS-20200330	FD	Chromium	0.560	15.0	15.0 J	+	mg/kg	M
IINY-DU-11C-SSIS-20200330	FT	Vanadium	0.480	23.0	23.0 J	+	mg/kg	M
IINY-DU-11C-SSIS-20200330	FT	Chromium	0.570	15.0	15.0 J	+	mg/kg	M

Test Method: SW7471B	Extraction Method: , Total							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-11A-SSIS-20200330	N	Mercury	0.0170	0.250 J1	0.250 J	-	mg/kg	M
IINY-DU-11B-SSIS-20200330	FD	Mercury	0.0160	0.150	0.150 J	-	mg/kg	M
IINY-DU-11C-SSIS-20200330	FT	Mercury	0.0170	0.150	0.150 J	-	mg/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-11A-SSIS-20200330	N	1-Methylnaphthalene	0.190	0.0280 J H D	0.0280 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	2-Methylnaphthalene	0.190	0.0430 J H D	0.0430 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	Acenaphthene	0.190	0.0200 J H D	0.0200 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	Acenaphthylene	0.190	0.170 J H D	0.170 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	Anthracene	0.190	0.130 J H D	0.130 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	Dibenz(a,h)anthracene	0.190	0.180 J H D	0.180 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	Fluorene	0.190	0.0430 J H D	0.0430 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	N	Naphthalene	0.190	0.0980 J H D	0.0980 J	-	mg/kg	H2/TR
IINY-DU-11A-SSIS-20200330	MS	1-Methylnaphthalene	0.190	0.0789 J H D	0.0789 J		mg/kg	TR
IINY-DU-11A-SSIS-20200330	MS	2-Methylnaphthalene	0.190	0.0922 J H D	0.0922 J		mg/kg	TR
IINY-DU-11A-SSIS-20200330	MS	Acenaphthene	0.190	0.0765 J H D	0.0765 J		mg/kg	TR
IINY-DU-11A-SSIS-20200330	MS	Anthracene	0.190	0.182 J H D	0.182 J		mg/kg	TR
IINY-DU-11A-SSIS-20200330	MS	Fluorene	0.190	0.0949 J H D	0.0949 J		mg/kg	TR
IINY-DU-11A-SSIS-20200330	MS	Naphthalene	0.190	0.146 J H D	0.146 J		mg/kg	TR
IINY-DU-11A-SSIS-20200330	SD	1-Methylnaphthalene	0.190	0.0745 J H D	0.0745 J		mg/kg	TR
IINY-DU-11A-SSIS-20200330	SD	2-Methylnaphthalene	0.190	0.0893 J H D	0.0893 J		mg/kg	TR
IINY-DU-11A-SSIS-20200330	SD	Acenaphthene	0.190	0.0685 J H D	0.0685 J		mg/kg	TR
IINY-DU-11A-SSIS-20200330	SD	Anthracene	0.190	0.170 J H D	0.170 J		mg/kg	TR
IINY-DU-11A-SSIS-20200330	SD	Fluorene	0.190	0.0911 J H D	0.0911 J		mg/kg	TR
IINY-DU-11A-SSIS-20200330	SD	Naphthalene	0.190	0.136 J H D	0.136 J		mg/kg	TR
IINY-DU-11B-SSIS-20200330	FD	1-Methylnaphthalene	0.180	0.0270 J H D	0.0270 J	-	mg/kg	H2/TR
IINY-DU-11B-SSIS-20200330	FD	2-Methylnaphthalene	0.180	0.0440 J H D	0.0440 J	-	mg/kg	H2/TR
IINY-DU-11B-SSIS-20200330	FD	Acenaphthene	0.180	0.0290 J H D	0.0290 J	-	mg/kg	H2/TR
IINY-DU-11B-SSIS-20200330	FD	Anthracene	0.180	0.150 J H D	0.150 J	-	mg/kg	H2/TR
IINY-DU-11B-SSIS-20200330	FD	Fluorene	0.180	0.0610 J H D	0.0610 J	-	mg/kg	H2/TR
IINY-DU-11B-SSIS-20200330	FD	Naphthalene	0.180	0.0920 J H D	0.0920 J	-	mg/kg	H2/TR
IINY-DU-11C-SSIS-20200330	FT	1-Methylnaphthalene	0.0920	0.0230 J H D	0.0230 J	-	mg/kg	H2/TR

Table of All Trace Results

Test Method: BNASIMD Extraction Method: SW3546

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-11C-SSIS-20200330	FT	2-Methylnaphthalene	0.0920	0.0360 J H D	0.0360 J	-	mg/kg	H2/TR
IINY-DU-11C-SSIS-20200330	FT	Acenaphthene	0.0920	0.0150 J H D	0.0150 J	-	mg/kg	H2/TR
IINY-DU-11C-SSIS-20200330	FT	Fluorene	0.0920	0.0280 J H D	0.0280 J	-	mg/kg	H2/TR
IINY-DU-11C-SSIS-20200330	FT	Naphthalene	0.0920	0.0680 J H D	0.0680 J	-	mg/kg	H2/TR
IINY-DU-12A-SSIS-20200330	N	1-Methylnaphthalene	0.370	0.0730 J H D	0.0730 J	-	mg/kg	H2/TR
IINY-DU-12A-SSIS-20200330	N	2-Methylnaphthalene	0.370	0.0980 J H D	0.0980 J	-	mg/kg	H2/TR
IINY-DU-12A-SSIS-20200330	N	Acenaphthylene	0.370	0.0880 J H D	0.0880 J	-	mg/kg	H2/TR
IINY-DU-12A-SSIS-20200330	N	Naphthalene	0.370	0.250 J H D	0.250 J	-	mg/kg	H2/TR
IINY-DU-12B-SSIS-20200330	FD	1-Methylnaphthalene	0.380	0.0440 J H D	0.0440 J	-	mg/kg	H2/TR
IINY-DU-12B-SSIS-20200330	FD	2-Methylnaphthalene	0.380	0.0550 J H D	0.0550 J	-	mg/kg	H2/TR
IINY-DU-12B-SSIS-20200330	FD	Acenaphthene	0.380	0.360 J H D	0.360 J	-	mg/kg	H2/TR
IINY-DU-12B-SSIS-20200330	FD	Acenaphthylene	0.380	0.0290 J H D	0.0290 J	-	mg/kg	H2/TR
IINY-DU-12B-SSIS-20200330	FD	Dibenz(a,h)anthracene	0.380	0.200 J H D	0.200 J	-	mg/kg	H2/TR
IINY-DU-12B-SSIS-20200330	FD	Fluorene	0.380	0.280 J H D	0.280 J	-	mg/kg	H2/TR
IINY-DU-12B-SSIS-20200330	FD	Naphthalene	0.380	0.120 J H D	0.120 J	-	mg/kg	H2/TR
IINY-DU-12C-SSIS-20200330	FT	1-Methylnaphthalene	0.370	0.0530 J H D	0.0530 J	-	mg/kg	H2/TR
IINY-DU-12C-SSIS-20200330	FT	2-Methylnaphthalene	0.370	0.0530 J H D	0.0530 J	-	mg/kg	H2/TR
IINY-DU-12C-SSIS-20200330	FT	Acenaphthylene	0.370	0.0620 J H D	0.0620 J	-	mg/kg	H2/TR
IINY-DU-12C-SSIS-20200330	FT	Fluorene	0.370	0.320 J H D	0.320 J	-	mg/kg	H2/TR
IINY-DU-12C-SSIS-20200330	FT	Naphthalene	0.370	0.0860 J H D	0.0860 J	-	mg/kg	H2/TR
IINY-DU-13A-SSIS-20200330	N	1-Methylnaphthalene	1.90	0.380 J H D	0.380 J	-	mg/kg	H2/TR
IINY-DU-13A-SSIS-20200330	N	2-Methylnaphthalene	1.90	0.430 J H D	0.430 J	-	mg/kg	H2/TR
IINY-DU-13A-SSIS-20200330	N	Naphthalene	1.90	0.950 J H D	0.950 J	-	mg/kg	H2/TR
IINY-DU-13B-SSIS-20200330	FD	1-Methylnaphthalene	1.80	0.450 J H D	0.450 J	-	mg/kg	H2/TR
IINY-DU-13B-SSIS-20200330	FD	2-Methylnaphthalene	1.80	0.500 J H D	0.500 J	-	mg/kg	H2/TR
IINY-DU-13B-SSIS-20200330	FD	Acenaphthylene	1.80	1.30 J H D	1.30 J	-	mg/kg	H2/TR
IINY-DU-13B-SSIS-20200330	FD	Naphthalene	1.80	1.10 J H D	1.10 J	-	mg/kg	H2/TR

Table of All Trace Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-13C-SSIS-20200330	FT	1-Methylnaphthalene	1.90	0.260 J H D	0.260 J	-	mg/kg	H2/TR
IINY-DU-13C-SSIS-20200330	FT	2-Methylnaphthalene	1.90	0.310 J H D	0.310 J	-	mg/kg	H2/TR
IINY-DU-13C-SSIS-20200330	FT	Dibenz(a,h)anthracene	1.90	1.20 J H D	1.20 J	-	mg/kg	H2/TR
IINY-DU-13C-SSIS-20200330	FT	Naphthalene	1.90	0.750 J H D	0.750 J	-	mg/kg	H2/TR

Test Method: SW6010C	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-11A-SSIS-20200330	N	Sodium	490	61.0 J	61.0 J		mg/kg	TR
IINY-DU-11B-SSIS-20200330	FD	Sodium	500	56.0 J	56.0 J		mg/kg	TR
IINY-DU-11C-SSIS-20200330	FT	Sodium	490	64.0 J	64.0 J		mg/kg	TR
IINY-DU-12A-SSIS-20200330	N	Sodium	490	73.0 J	73.0 J		mg/kg	TR
IINY-DU-12B-SSIS-20200330	FD	Sodium	490	67.0 J	67.0 J		mg/kg	TR
IINY-DU-12C-SSIS-20200330	FT	Sodium	490	68.0 J	68.0 J		mg/kg	TR
IINY-DU-13A-SSIS-20200330	N	Sodium	500	120 J	120 J		mg/kg	TR
IINY-DU-13B-SSIS-20200330	FD	Sodium	490	120 J	120 J		mg/kg	TR
IINY-DU-13C-SSIS-20200330	FT	Sodium	500	130 J	130 J		mg/kg	TR

Test Method: SW6020A	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-11A-SSIS-20200330	N	Selenium	0.500	0.470 J	0.470 J		mg/kg	TR
IINY-DU-11A-SSIS-20200330	N	Silver	0.0980	0.0730 J	0.0730 J		mg/kg	TR
IINY-DU-11B-SSIS-20200330	FD	Silver	0.0980	0.0820 J	0.0820 J		mg/kg	TR
IINY-DU-11C-SSIS-20200330	FT	Silver	0.0980	0.0840 J	0.0840 J		mg/kg	TR
IINY-DU-12A-SSIS-20200330	N	Silver	0.0970	0.0690 J	0.0690 J		mg/kg	TR
IINY-DU-12B-SSIS-20200330	FD	Silver	0.0980	0.0690 J	0.0690 J		mg/kg	TR
IINY-DU-12C-SSIS-20200330	FT	Selenium	0.450	0.240 J	0.240 J		mg/kg	TR
IINY-DU-12C-SSIS-20200330	FT	Silver	0.0980	0.0750 J	0.0750 J		mg/kg	TR
IINY-DU-13A-SSIS-20200330	N	Silver	0.0980	0.0860 J	0.0860 J		mg/kg	TR
IINY-DU-13B-SSIS-20200330	FD	Silver	0.0990	0.0940 J	0.0940 J		mg/kg	TR

Table of All Trace Results

Test Method: SW6020A	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-13C-SSIS-20200330	FT	Silver	0.0990	0.0890 J	0.0890 J		mg/kg	TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW6010C

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-11A-SSIS-20200330	N	Iron	78.0	17000 J1	17000	17000 J	A

Modified Qualifiers for test method SW7471B, Total

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-11A-SSIS-20200330	N	Mercury	0.0170	0.250 J1	0.250 J	0.250 J	M
IINY-DU-11B-SSIS-20200330	FD	Mercury	0.0160	0.150	0.150 J	0.150 J	M
IINY-DU-11C-SSIS-20200330	FT	Mercury	0.0170	0.150	0.150 J	0.150 J	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
A	Serial dilution
D	MS RPD
H2	Prep Hold Time
I	Surrogate recovery outside project limits.
L	Lab Blank
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: BNASIMD (GC/MS-SIM Analysis by SW8270D)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?		•		Due to ISM prep the samples were received at the Denver lab outside hold time. Associated data were J or UJ qualified.
Were all requested target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was instrument tuning completed every 12 hours during sample analysis?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Were Internal Standard retention times and area criteria within method requirements?	•			
Were internal standards spiked for every sample, standard, and QC sample?	•			
Were surrogate recoveries within project acceptance limits?		•		Several surrogates were outside QC limits due to the required dilutions. The surrogates diluted out of samples run at 40-200x dilution, and data were not qualified.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	Field blanks were not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	A LCSD was not provided.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Benzo(a)anthracene, Benzo(a)pyrene, Benzo (b)fluoranthene, Benzo(g,h,i)perylene, Benzo (k)fluoranthene, Chrysene, Fluoranthene, Indeno(1,2,3-c,d)pyrene, Phenanthrene, Pyrene have recoveries outside QC limits. Because of high concentrations in the parent sample and required dilutions data were not qualified.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM-Field Triplicates were collected. The % RSD ranges are 6.93-56.9.
Were QAPP specified laboratory PQLs achieved?	•			Dilutions resulted in elevated LOQs.
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			

Review Questions

Method: BNASIMD (GC/MS-SIM Analysis by SW8270D)

Review Questions	Yes	No	NA	Comment
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Did the ICSA have any non-target interferents above the MDL?		•		
Were the ICSA/ICSAB recoveries within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Iron was detected in the blank less than 1/2 the LOQ. Associated results were greater than the LOQ and 10x the blank so no data were qualified
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Aluminum, Iron, Magnesium, and Calcium recovered above QC limits. However, the analytes were present in the parent sample at concentrations more than 4x the spike concentration, therefore data were not qualified.
Was the MS/MSD RPD within project acceptance limits?	•			
Were the post spike recoveries within project acceptance limits?		•		Aluminum, Iron, and Magnesium recovered outside QC limits. The concentrations of these metals in the parent sample were more than 4 times greater than the spike concentration, therefore data were not qualified.
Were the serial dilution RPD values within project acceptance limits?		•		The %D was outside QC limits for Iron in sample IINY-DU-11A-SSIS-20200330. The Iron result was J qualified.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM- Field Triplicates were collected. The % RSD for TAL Metals ranges from 0-58.
Were QAPP specified laboratory PQLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the system properly tuned based on method criteria?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?		•		The %Rs for Antimony and Vanadium in the ICVL were above QC limits.
Were CCVs run at the required frequency and within acceptance criteria?		•		Several metals in the CCVL were outside QC limits.
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Did the ICSA have any non-target interferents above the MDL?		•		
Were the ICSA/ICSAB recoveries within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Barium, Lead, Vanadium, Zinc, Manganese, and Chromium were outside QC limits. Barium, Lead, Zinc, and Manganese analytes in the parent sample were more than 4x the spike concentration, therefore the data for these metals were not qualified. Chromium and vanadium data for the triplicate samples from location IINY-DU-11 were J qualified.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM- Field Triplicates were collected. The % RSD for TAL Metals ranges from 0-58.
Were the post spike recoveries within project acceptance limits?		•		Lead and Zinc recoveries were outside QC limits. The concentrations of these analytes in the parent sample were more than 4x the spike concentration, therefore the data were not qualified.
Were the serial dilution RPD values within project acceptance limits?	•			
Were QAPP specified laboratory PQLs achieved?	•			Required dilutions raised limits.
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)

Review Questions	Yes	No	NA	Comment
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW7471B (Mercury in Soil (Manual Cold-Vapor Technique))				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			Due to analyst error, CCV/CCB brackets were not run every ten samples. CCV/CCB was run at the beginning and end of run, according to source method.
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	A LCSD was not provided.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		The MSD recovered below QC limits. The mercury results for the triplicate samples collected from location IINY-DU-11 were J qualified.
Was the MS/MSD RPD within project acceptance limits?	•			The ADR report shows an RPD of 20.17% and that data were qualified. However professional judgement was used to remove the RPD reason code for sample IINY-DU-11A-SSIS-20200330 since the QC limit for RPDs is 20%.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM- Field Triplicates were collected. The % RSD ranges from 12-32.
Were QAPP specified laboratory PQLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

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Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling
SDG:	280-135117-1_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Tim Reese
Contract Laboratory(ies):	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	EA Engineering, Science, and Technology, Inc., PBC
Data Review Level:	S2BVEM
Primary Data Reviewer:	Tara Lamond, Data Manager
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	May 27, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	BNASIMD	SW6010C	SW6020A	SW7471B	SW8082A	SW8330B
IINY-DU-16A-SSIS-20200331	280-135117-13	Soil	Field Sample/N	X	X	X	X		
IINY-DU-16B-SSIS-20200331	280-135117-14	Soil	Field Duplicate/FD	X	X	X	X		
IINY-DU-16C-SSIS-20200331	280-135117-15	Soil	Field Triplicate/FT	X	X	X	X		
IINY-DU-17A-SBIS1-20200331	280-135117-7	Soil	Field Sample/N	X	X	X	X	X	X
IINY-DU-17A-SSIS-20200331	280-135117-10	Soil	Field Sample/N	X	X	X	X	X	X
IINY-DU-17B-SBIS1-20200331	280-135117-8	Soil	Field Duplicate/FD	X	X	X	X	X	X
IINY-DU-17B-SSIS-20200331	280-135117-11	Soil	Field Duplicate/FD	X	X	X	X	X	X
IINY-DU-17C-SBIS1-20200331	280-135117-9	Soil	Field Triplicate/FT	X	X	X	X	X	X
IINY-DU-17C-SSIS-20200331	280-135117-12	Soil	Field Triplicate/FT	X	X	X	X	X	X
IINY-DU-18A-SBIS1-20200331	280-135117-19	Soil	Field Sample/N	X	X	X	X	X	X
IINY-DU-18A-SSIS-20200331	280-135117-16	Soil	Field Sample/N	X	X	X	X	X	X
IINY-DU-18B-SBIS1-20200331	280-135117-20	Soil	Field Duplicate/FD	X	X	X	X	X	X
IINY-DU-18B-SSIS-20200331	280-135117-17	Soil	Field Duplicate/FD	X	X	X	X	X	X
IINY-DU-18C-SBIS1-20200331	280-135117-21	Soil	Field Triplicate/FT	X	X	X	X	X	X
IINY-DU-18C-SSIS-20200331	280-135117-18	Soil	Field Triplicate/FT	X	X	X	X	X	X
IINY-DU-19A-SBIS1-20200331	280-135117-4	Soil	Field Sample/N	X	X	X	X	X	X
IINY-DU-19A-SSIS-20200331	280-135117-1	Soil	Field Sample/N	X	X	X	X	X	X
IINY-DU-19B-SBIS1-20200331	280-135117-5	Soil	Field Duplicate/FD	X	X	X	X	X	X

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	BNASIMD	SW6010C	SW6020A	SW7471B	SW8082A	SW8330B
IINY-DU-19B-SSIS-20200331	280-135117-2	Soil	Field Duplicate/FD	X	X	X	X	X	X
IINY-DU-19C-SBIS1-20200331	280-135117-6	Soil	Field Triplicate/FT	X	X	X	X	X	X
IINY-DU-19C-SSIS-20200331	280-135117-3	Soil	Field Triplicate/FT	X	X	X	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-135117-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Field Duplicate RPD
- Field Triplicate RSD
- Lab Blank
- Lab Replicate RPD
- Laboratory Triplicate RSD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Reference Material
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 445 results (32.62%) out of the 1364 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
BNASIMD	No additional comments; see Checklist for detail.
SW6010C	The laboratory was unable to keep the 10g samples from foaming out of the cup with the addition of acid or peroxide. Replacement 10g aliquots were therefore divided into two 5 gram aliquots, digested, filtered into one container and brought to its normal 500ml final volume.
SW6020A	No additional comments; see Checklist for detail.
SW7471B	No additional comments; see Checklist for detail.
SW8082A	EPA Method 8082/8082A requires a minimum of 3 peaks to be used for PCB quantitation. Due to the presence of matrix interferences, one of five peaks were unidentified because it was causing a false E flag and may result in biased recoveries. Only 4 peaks were used for quantitation of Aroclor 1260 for IINY-DU-18C-SSIS-20200331 (280-135117-18). This is for preparation batch 280-492221 and analytical batch 280-493242.
SW8330B	No additional comments; see Checklist for detail.

May 22, 2020

Reviewed by Tara Lamond, Data Manager, EA Engineering, Science, and Technology, Inc., PBC

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

May 27, 2020

Reviewed by Samantha Saalfield, Project Chemist, EA Engineering, Science, and Technology, Inc., PBC

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method BNASIMD, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Fluorene	39.66	47 - 114	10 - 114	percent	J/UJ	M	
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Fluoranthene	-1017	55 - 119	10 - 119	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Benzo (k)fluoranthene	-133.3	56 - 123	10 - 123	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Indeno(1,2,3-c,d)pyrene	-33.33	49 - 130	10 - 130	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Benzo(a)pyrene	-333.3	50 - 125	10 - 125	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Chrysene	-366.7	57 - 118	10 - 118	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Benzo (b)fluoranthene	-483.3	53 - 128	10 - 128	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Benzo (g,h,i)perylene	-50.00	49 - 127	10 - 127	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Benzo (a)anthracene	-583.3	54 - 122	10 - 122	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Phenanthrene	-616.7	49 - 113	10 - 113	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Pyrene	-766.7	55 - 117	10 - 117	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Anthracene	-81.03	50 - 114	10 - 114	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Dibenz (a,h)anthracene	31.03	50 - 129	10 - 129	percent	J/UJ	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Indeno(1,2,3-c,d)pyrene	-116.7	49 - 130	10 - 130	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Benzo (g,h,i)perylene	-16.67	49 - 127	10 - 127	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Benzo (k)fluoranthene	-166.7	56 - 123	10 - 123	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Benzo(a)pyrene	-250.0	50 - 125	10 - 125	percent	J/X	M	Spike amount Insignificant

Quality Control Outliers for test method BNASIMD, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Benzo (b)fluoranthene	-250.0	53 - 128	10 - 128	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Chrysene	-333.3	57 - 118	10 - 118	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Benzo (a)anthracene	-400.0	54 - 122	10 - 122	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Phenanthrene	-483.3	49 - 113	10 - 113	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Anthracene	-49.12	50 - 114	10 - 114	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Pyrene	-700.0	55 - 117	10 - 117	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Fluoranthene	-850.0	55 - 119	10 - 119	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Acenaphthylene	134.0	39 - 116	10 - 116	percent	J/None	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Dibenz (a,h)anthracene	28.07	50 - 129	10 - 129	percent	J/UJ	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19A-SSIS-20200331	N	Fluorene	0.00920	0.0770 J1	0.0770 J	-	mg/kg	M
IINY-DU-19B-SSIS-20200331	FD	Fluorene	0.00960	0.0280	0.0280 J	-	mg/kg	M
IINY-DU-19C-SSIS-20200331	FT	Fluorene	0.0100	0.0390	0.0390 J	-	mg/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method BNASIMD, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Acenaphthylene	0.09400	< 0.0097	< 0.0097	mg/kg	J/None	D	
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Naphthalene	20.58	< 20	< 20	rpd	J/None	D	
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	2-Methylnaphthalene	22.98	< 20	< 20	rpd	J/None	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS RPD for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19A-SSIS-20200331	N	2-Methylnaphthalene	0.00920	0.0350 J1	0.0350 J	-	mg/kg	D
IINY-DU-19A-SSIS-20200331	N	Acenaphthylene	0.00920	0.270 J1	0.270 J	-	mg/kg	D
IINY-DU-19A-SSIS-20200331	N	Naphthalene	0.00920	0.0830 J1	0.0830 J	-	mg/kg	D
IINY-DU-19B-SSIS-20200331	FD	2-Methylnaphthalene	0.00960	0.0180	0.0180 J	-	mg/kg	D
IINY-DU-19B-SSIS-20200331	FD	Acenaphthylene	0.00960	0.130	0.130 J	-	mg/kg	D
IINY-DU-19B-SSIS-20200331	FD	Naphthalene	0.00960	0.0460	0.0460 J	-	mg/kg	D
IINY-DU-19C-SSIS-20200331	FT	2-Methylnaphthalene	0.0100	0.0280	0.0280 J	-	mg/kg	D
IINY-DU-19C-SSIS-20200331	FT	Acenaphthylene	0.0100	0.210	0.210 J	-	mg/kg	D
IINY-DU-19C-SSIS-20200331	FT	Naphthalene	0.0100	0.0680	0.0680 J	-	mg/kg	D

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method BNASIMD, Prep Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of extraction found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-16A-SSIS-20200331 (N)/ 280-135117-13		14.28	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-16A-SSIS-20200331 (N)/ 280-135117-13		14.28	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL

Quality Control Outliers for test method BNASIMD, Prep Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of extraction found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-16B-SSIS-20200331 (FD)/ 280-135117-14		14.28	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-16B-SSIS-20200331 (FD)/ 280-135117-14		14.28	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-16C-SSIS-20200331 (FT)/ 280-135117-15		14.28	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-16C-SSIS-20200331 (FT)/ 280-135117-15		14.28	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17A-SBIS1-20200331 (N)/ 280-135117-7		14.32	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17A-SBIS1-20200331 (N)/ 280-135117-7		14.32	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17A-SSIS-20200331 (N)/ 280-135117-10		14.34	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17A-SSIS-20200331 (N)/ 280-135117-10		14.34	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17B-SBIS1-20200331 (FD)/ 280-135117-8		14.32	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17B-SBIS1-20200331 (FD)/ 280-135117-8		14.32	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17B-SSIS-20200331 (FD)/ 280-135117-11		14.34	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17B-SSIS-20200331 (FD)/ 280-135117-11		14.34	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17C-SBIS1-20200331 (FT)/ 280-135117-9		14.32	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17C-SBIS1-20200331 (FT)/ 280-135117-9		14.32	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17C-SSIS-20200331 (FT)/ 280-135117-12		14.34	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17C-SSIS-20200331 (FT)/ 280-135117-12		14.34	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18A-SBIS1-20200331 (N)/ 280-135117-19		14.09	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18A-SBIS1-20200331 (N)/ 280-135117-19		14.09	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL

Quality Control Outliers for test method BNASIMD, Prep Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of extraction found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-18A-SSIS-20200331 (N)/ 280-135117-16		14.11	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18A-SSIS-20200331 (N)/ 280-135117-16		14.11	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18B-SBIS1-20200331 (FD)/ 280-135117-20		14.09	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18B-SBIS1-20200331 (FD)/ 280-135117-20		14.09	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18B-SSIS-20200331 (FD)/ 280-135117-17		14.11	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18B-SSIS-20200331 (FD)/ 280-135117-17		14.11	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18C-SBIS1-20200331 (FT)/ 280-135117-21		14.09	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18C-SBIS1-20200331 (FT)/ 280-135117-21		14.09	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18C-SSIS-20200331 (FT)/ 280-135117-18		14.11	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18C-SSIS-20200331 (FT)/ 280-135117-18		14.11	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19A-SBIS1-20200331 (N)/ 280-135117-4		14.23	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19A-SSIS-20200331 (N)/ 280-135117-1		14.24	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19A-SSIS-20200331 (N)/ 280-135117-1		14.24	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19A-SSIS-20200331 (N)/ 280-135117-1DUP		14.24	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19A-SSIS-20200331 (N)/ 280-135117-1DUP		14.24	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19A-SSIS-20200331 (N)/ 280-135117-1TRL		14.24	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19A-SSIS-20200331 (N)/ 280-135117-1TRL		14.24	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19B-SBIS1-20200331 (FD)/ 280-135117-5		14.23	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL

Quality Control Outliers for test method BNASIMD, Prep Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of extraction found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-19B-SSIS-20200331 (FD)/ 280-135117-2		14.24	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19B-SSIS-20200331 (FD)/ 280-135117-2		14.24	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19C-SBIS1-20200331 (FT)/ 280-135117-6		14.23	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19C-SSIS-20200331 (FT)/ 280-135117-3		14.24	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19C-SSIS-20200331 (FT)/ 280-135117-3		14.24	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method BNASIMD, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-16A-SSIS-20200331 (N)/ 280-135117-13	Nitrobenzene-d5	42.00	44 - 125	10 - 125	percent	J/UJ	I	
IINY-DU-16A-SSIS-20200331 (N)/ 280-135117-13	Nitrobenzene-d5	37.00	44 - 125	10 - 125	percent	J/UJ	I	
IINY-DU-17A-SBIS1-20200331 (N)/ 280-135117-7	2-Methylnaphthalene-d10	36.00	41 - 100	10 - 100	percent	J/UJ	I	
IINY-DU-17A-SBIS1-20200331 (N)/ 280-135117-7	2-Fluorobiphenyl	44.00	46 - 115	10 - 115	percent	J/UJ	I	
IINY-DU-17A-SBIS1-20200331 (N)/ 280-135117-7	Fluoranthene-d10	53.00	55 - 101	10 - 101	percent	J/UJ	I	
IINY-DU-17A-SBIS1-20200331 (N)/ 280-135117-7	Fluoranthene-d10	50.00	55 - 101	10 - 101	percent	J/UJ	I	Diluted Out

Quality Control Outliers for test method BNASIMD, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-17B-SBIS1-20200331 (FD)/ 280-135117-8	2-Methylnaphthalene-d10	37.00	41 - 100	10 - 100	percent	J/UJ	I	
IINY-DU-17B-SBIS1-20200331 (FD)/ 280-135117-8	Fluoranthene-d10	42.00	55 - 101	10 - 101	percent	J/UJ	I	
IINY-DU-17B-SBIS1-20200331 (FD)/ 280-135117-8	2-Fluorobiphenyl	45.00	46 - 115	10 - 115	percent	J/UJ	I	
IINY-DU-17B-SBIS1-20200331 (FD)/ 280-135117-8	Terphenyl-d14	50.00	58 - 133	10 - 133	percent	J/UJ	I	
IINY-DU-17B-SBIS1-20200331 (FD)/ 280-135117-8	Fluoranthene-d10	44.00	55 - 101	10 - 101	percent	J/UJ	I	
IINY-DU-17B-SBIS1-20200331 (FD)/ 280-135117-8	Terphenyl-d14	50.00	58 - 133	10 - 133	percent	J/UJ	I	
IINY-DU-17B-SSIS-20200331 (FD)/ 280-135117-11	Fluoranthene-d10	50.00	55 - 101	10 - 101	percent	J/UJ	I	
IINY-DU-17B-SSIS-20200331 (FD)/ 280-135117-11	Terphenyl-d14	53.00	58 - 133	10 - 133	percent	J/UJ	I	
IINY-DU-17C-SBIS1-20200331 (FT)/ 280-135117-9	2-Methylnaphthalene-d10	38.00	41 - 100	10 - 100	percent	J/UJ	I	
IINY-DU-17C-SBIS1-20200331 (FT)/ 280-135117-9	Fluoranthene-d10	45.00	55 - 101	10 - 101	percent	J/UJ	I	
IINY-DU-17C-SBIS1-20200331 (FT)/ 280-135117-9	Terphenyl-d14	57.00	58 - 133	10 - 133	percent	J/UJ	I	
IINY-DU-17C-SBIS1-20200331 (FT)/ 280-135117-9	Fluoranthene-d10	44.00	55 - 101	10 - 101	percent	J/UJ	I	
IINY-DU-17C-SBIS1-20200331 (FT)/ 280-135117-9	Terphenyl-d14	51.00	58 - 133	10 - 133	percent	J/UJ	I	
IINY-DU-17C-SSIS-20200331 (FT)/ 280-135117-12	Nitrobenzene-d5	43.00	44 - 125	10 - 125	percent	J/UJ	I	Diluted Out
IINY-DU-17C-SSIS-20200331 (FT)/ 280-135117-12	Terphenyl-d14	48.00	58 - 133	10 - 133	percent	J/UJ	I	Diluted Out
IINY-DU-18A-SBIS1-20200331 (N)/ 280-135117-19	Fluoranthene-d10	31.00	55 - 101	10 - 101	percent	J/UJ	I	
IINY-DU-18A-SBIS1-20200331 (N)/ 280-135117-19	2-Methylnaphthalene-d10	34.00	41 - 100	10 - 100	percent	J/UJ	I	
IINY-DU-18A-SBIS1-20200331 (N)/ 280-135117-19	2-Fluorobiphenyl	37.00	46 - 115	10 - 115	percent	J/UJ	I	

Quality Control Outliers for test method BNASIMD, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-18A-SBIS1-20200331 (N)/ 280-135117-19	Terphenyl-d14	50.00	58 - 133	10 - 133	percent	J/UJ	I	
IINY-DU-18A-SBIS1-20200331 (N)/ 280-135117-19	Fluoranthene-d10	24.00	55 - 101	10 - 101	percent	J/UJ	I	
IINY-DU-18A-SBIS1-20200331 (N)/ 280-135117-19	2-Methylnaphthalene-d10	34.00	41 - 100	10 - 100	percent	J/UJ	I	
IINY-DU-18A-SBIS1-20200331 (N)/ 280-135117-19	2-Fluorobiphenyl	39.00	46 - 115	10 - 115	percent	J/UJ	I	
IINY-DU-18A-SBIS1-20200331 (N)/ 280-135117-19	Terphenyl-d14	44.00	58 - 133	10 - 133	percent	J/UJ	I	
IINY-DU-18A-SSIS-20200331 (N)/ 280-135117-16	2-Fluorobiphenyl	43.00	46 - 115	10 - 115	percent	J/UJ	I	
IINY-DU-18A-SSIS-20200331 (N)/ 280-135117-16	Terphenyl-d14	57.00	58 - 133	10 - 133	percent	J/UJ	I	
IINY-DU-18B-SBIS1-20200331 (FD)/ 280-135117-20	2-Methylnaphthalene-d10	34.00	41 - 100	10 - 100	percent	J/UJ	I	
IINY-DU-18B-SBIS1-20200331 (FD)/ 280-135117-20	2-Fluorobiphenyl	39.00	46 - 115	10 - 115	percent	J/UJ	I	
IINY-DU-18B-SBIS1-20200331 (FD)/ 280-135117-20	2-Methylnaphthalene-d10	37.00	41 - 100	10 - 100	percent	J/UJ	I	
IINY-DU-18B-SBIS1-20200331 (FD)/ 280-135117-20	2-Fluorobiphenyl	43.00	46 - 115	10 - 115	percent	J/UJ	I	
IINY-DU-18B-SBIS1-20200331 (FD)/ 280-135117-20	Terphenyl-d14	55.00	58 - 133	10 - 133	percent	J/UJ	I	
IINY-DU-18B-SSIS-20200331 (FD)/ 280-135117-17	2-Methylnaphthalene-d10	38.00	41 - 100	10 - 100	percent	J/UJ	I	
IINY-DU-18B-SSIS-20200331 (FD)/ 280-135117-17	2-Fluorobiphenyl	40.00	46 - 115	10 - 115	percent	J/UJ	I	
IINY-DU-18B-SSIS-20200331 (FD)/ 280-135117-17	2-Fluorobiphenyl	45.00	46 - 115	10 - 115	percent	J/UJ	I	
IINY-DU-18C-SBIS1-20200331 (FT)/ 280-135117-21	2-Methylnaphthalene-d10	38.00	41 - 100	10 - 100	percent	J/UJ	I	
IINY-DU-18C-SBIS1-20200331 (FT)/ 280-135117-21	2-Fluorobiphenyl	40.00	46 - 115	10 - 115	percent	J/UJ	I	
IINY-DU-18C-SBIS1-20200331 (FT)/ 280-135117-21	2-Fluorobiphenyl	43.00	46 - 115	10 - 115	percent	J/UJ	I	Diluted Out

Quality Control Outliers for test method BNASIMD, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-18C-SSIS-20200331 (FT)/ 280-135117-18	2-Methylnaphthalene-d10	31.00	41 - 100	10 - 100	percent	J/UJ	I	
IINY-DU-18C-SSIS-20200331 (FT)/ 280-135117-18	2-Fluorobiphenyl	34.00	46 - 115	10 - 115	percent	J/UJ	I	
IINY-DU-18C-SSIS-20200331 (FT)/ 280-135117-18	2-Methylnaphthalene-d10	37.00	41 - 100	10 - 100	percent	J/UJ	I	Diluted Out
IINY-DU-18C-SSIS-20200331 (FT)/ 280-135117-18	2-Fluorobiphenyl	38.00	46 - 115	10 - 115	percent	J/UJ	I	Diluted Out
IINY-DU-18C-SSIS-20200331 (FT)/ 280-135117-18	Terphenyl-d14	45.00	58 - 133	10 - 133	percent	J/UJ	I	Diluted Out
IINY-DU-18C-SSIS-20200331 (FT)/ 280-135117-18	Fluoranthene-d10	48.00	55 - 101	10 - 101	percent	J/UJ	I	Diluted Out

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-16A-SSIS-20200331	N	1-Methylnaphthalene	0.00940	0.0260 Q	0.0260 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	2-Methylnaphthalene	0.00940	0.0330 Q	0.0330 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Acenaphthene	0.00940	0.150	0.150 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Acenaphthylene	0.00940	0.0320	0.0320 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Anthracene	0.00940	0.180	0.180 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Benzo(a)anthracene	0.0380	0.500 D	0.500 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Benzo(a)pyrene	0.0380	0.470 D	0.470 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Benzo(b)fluoranthene	0.0380	0.710 D	0.710 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Benzo(g,h,i)perylene	0.0380	0.310 D	0.310 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Benzo(k)fluoranthene	0.00940	0.260	0.260 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Chrysene	0.0380	0.490 D	0.490 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Dibenz(a,h)anthracene	0.00940	0.100	0.100 J	-	mg/kg	I

Qualified Results associated with the Surrogate for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-16A-SSIS-20200331	N	Fluoranthene	0.0380	1.00 D	1.00 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Fluorene	0.00940	0.100	0.100 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Indeno(1,2,3-c,d)pyrene	0.0380	0.380 D	0.380 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Naphthalene	0.00940	0.0640 Q	0.0640 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Phenanthrene	0.0380	0.740 D	0.740 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Pyrene	0.0380	0.860 D	0.860 J	-	mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	1-Methylnaphthalene	0.00910	0.0870	0.0870 J	-	mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	2-Methylnaphthalene	0.00910	0.120	0.120 J	-	mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	Acenaphthene	0.00910	0.0680 Q	0.0680 J	-	mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	Acenaphthylene	0.00910	0.0310 Q	0.0310 J	-	mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	Benzo(k)fluoranthene	0.00910	0.230	0.230 J	-	mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	Dibenz(a,h)anthracene	0.00910	0.150	0.150 J	-	mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	Fluorene	0.00910	0.0760 Q	0.0760 J	-	mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	Naphthalene	0.00910	0.200	0.200 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	1-Methylnaphthalene	0.00960	0.0980	0.0980 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	2-Methylnaphthalene	0.00960	0.140	0.140 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Acenaphthene	0.00960	0.0580 Q	0.0580 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Acenaphthylene	0.00960	0.0350 Q	0.0350 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Anthracene	0.00960	0.0810 Q	0.0810 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Benzo(a)anthracene	0.00960	0.200 Q	0.200 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Benzo(a)pyrene	0.00960	0.110 M Q	0.110 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Benzo(b)fluoranthene	0.00960	0.320 M Q	0.320 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Benzo(g,h,i)perylene	0.00960	0.130 Q	0.130 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Benzo(k)fluoranthene	0.00960	0.0510 M Q	0.0510 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Chrysene	0.0380	0.480 D Q	0.480 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Dibenz(a,h)anthracene	0.00960	0.0680 Q	0.0680 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Fluoranthene	0.0380	0.440 D	0.440 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Fluorene	0.00960	0.0640 Q	0.0640 J	-	mg/kg	I

Qualified Results associated with the Surrogate for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-17B-SBIS1-20200331	FD	Indeno(1,2,3-c,d)pyrene	0.00960	0.0850 Q	0.0850 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Naphthalene	0.00960	0.240	0.240 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Phenanthrene	0.0380	0.480 D	0.480 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Pyrene	0.0380	0.400 D	0.400 J	-	mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Benzo(a)anthracene	0.0360	0.480 D Q	0.480 J	-	mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Benzo(a)pyrene	0.0360	0.410 D Q	0.410 J	-	mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Benzo(b)fluoranthene	0.0360	0.710 D Q	0.710 J	-	mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Chrysene	0.0360	0.570 D Q	0.570 J	-	mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Fluoranthene	0.0360	0.940 D	0.940 J	-	mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Indeno(1,2,3-c,d)pyrene	0.0360	0.300 D Q	0.300 J	-	mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Phenanthrene	0.0360	0.400 D	0.400 J	-	mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Pyrene	0.0360	0.920 D	0.920 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	1-Methylnaphthalene	0.00890	0.110	0.110 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	2-Methylnaphthalene	0.00890	0.160	0.160 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Acenaphthene	0.00890	0.0870	0.0870 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Acenaphthylene	0.00890	0.0420	0.0420 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Anthracene	0.00890	0.160	0.160 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Benzo(a)anthracene	0.0360	0.470 D Q	0.470 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Benzo(a)pyrene	0.0360	0.310 D Q	0.310 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Benzo(b)fluoranthene	0.0360	0.670 D Q	0.670 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Benzo(g,h,i)perylene	0.0360	0.270 D Q	0.270 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Benzo(k)fluoranthene	0.00890	0.170 M Q	0.170 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Chrysene	0.0360	0.800 D Q	0.800 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Dibenz(a,h)anthracene	0.00890	0.130 Q	0.130 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Fluoranthene	0.0360	1.00 D	1.00 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Fluorene	0.00890	0.110	0.110 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Indeno(1,2,3-c,d)pyrene	0.00890	0.250 Q	0.250 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Naphthalene	0.00890	0.280	0.280 J	-	mg/kg	I

Qualified Results associated with the Surrogate for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-17C-SBIS1-20200331	FT	Phenanthrene	0.0360	0.880 D	0.880 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Pyrene	0.0360	0.870 D	0.870 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	1-Methylnaphthalene	0.00910	0.100	0.100 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	2-Methylnaphthalene	0.00910	0.120	0.120 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Acenaphthene	0.00910	0.230 Q	0.230 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Acenaphthylene	0.00910	0.0410 Q	0.0410 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Anthracene	0.00910	0.120 Q	0.120 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Benzo(a)anthracene	0.00910	0.280 Q	0.280 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Benzo(a)pyrene	0.00910	0.150 M Q	0.150 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Benzo(b)fluoranthene	0.0360	0.440 D Q	0.440 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Benzo(g,h,i)perylene	0.00910	0.140 Q	0.140 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Benzo(k)fluoranthene	0.00910	0.0750 M Q	0.0750 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Chrysene	0.0360	0.650 D Q	0.650 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Dibenz(a,h)anthracene	0.00910	0.0640 Q	0.0640 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Fluoranthene	0.0360	0.720 D Q	0.720 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Fluorene	0.00910	0.150 Q	0.150 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Indeno(1,2,3-c,d)pyrene	0.00910	0.100 Q	0.100 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Naphthalene	0.0360	0.710 D	0.710 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Phenanthrene	0.0360	0.660 D Q	0.660 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Pyrene	0.0360	0.620 D Q	0.620 J	-	mg/kg	I
IINY-DU-18A-SSIS-20200331	N	Benzo(a)anthracene	0.0390	0.490 D Q	0.490 J	-	mg/kg	I
IINY-DU-18A-SSIS-20200331	N	Benzo(a)pyrene	0.0390	0.440 D Q	0.440 J	-	mg/kg	I
IINY-DU-18A-SSIS-20200331	N	Benzo(b)fluoranthene	0.0390	0.860 D Q	0.860 J	-	mg/kg	I
IINY-DU-18A-SSIS-20200331	N	Chrysene	0.0390	0.860 D Q	0.860 J	-	mg/kg	I
IINY-DU-18A-SSIS-20200331	N	Fluoranthene	0.0390	0.970 D Q	0.970 J	-	mg/kg	I
IINY-DU-18A-SSIS-20200331	N	Phenanthrene	0.0390	0.620 D Q	0.620 J	-	mg/kg	I
IINY-DU-18A-SSIS-20200331	N	Pyrene	0.0390	0.870 D Q	0.870 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	1-Methylnaphthalene	0.00910	0.0800	0.0800 J	-	mg/kg	I

Qualified Results associated with the Surrogate for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-18B-SBIS1-20200331	FD	2-Methylnaphthalene	0.00910	0.0950	0.0950 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Acenaphthene	0.00910	0.180 Q	0.180 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Acenaphthylene	0.00910	0.0630 Q	0.0630 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Anthracene	0.00910	0.160 Q	0.160 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Benzo(a)anthracene	0.0370	0.440 D Q	0.440 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Benzo(a)pyrene	0.00910	0.280	0.280 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Benzo(b)fluoranthene	0.0370	0.770 D Q	0.770 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Benzo(g,h,i)perylene	0.00910	0.240	0.240 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Benzo(k)fluoranthene	0.00910	0.140	0.140 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Chrysene	0.0370	1.10 D Q	1.10 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Dibenz(a,h)anthracene	0.00910	0.100	0.100 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Fluoranthene	0.0370	0.930 D Q	0.930 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Fluorene	0.00910	0.140 Q	0.140 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Indeno(1,2,3-c,d)pyrene	0.00910	0.220	0.220 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Naphthalene	0.0370	0.460 D	0.460 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Phenanthrene	0.0370	0.860 D Q	0.860 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Pyrene	0.0370	0.890 D Q	0.890 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	1-Methylnaphthalene	0.00940	0.0400	0.0400 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	2-Methylnaphthalene	0.00940	0.0600	0.0600 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Acenaphthene	0.00940	0.0550 Q	0.0550 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Acenaphthylene	0.00940	0.0740 Q	0.0740 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Anthracene	0.00940	0.170 Q	0.170 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Benzo(a)anthracene	0.0380	0.630 D	0.630 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Benzo(a)pyrene	0.0380	0.580 D	0.580 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Benzo(b)fluoranthene	0.0380	1.10 D	1.10 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Benzo(g,h,i)perylene	0.0380	0.410 D	0.410 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Benzo(k)fluoranthene	0.00940	0.310	0.310 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Chrysene	0.0380	1.10 D	1.10 J	-	mg/kg	I

Qualified Results associated with the Surrogate for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-18B-SSIS-20200331	FD	Dibenz(a,h)anthracene	0.00940	0.160	0.160 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Fluoranthene	0.0380	1.20 D Q	1.20 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Fluorene	0.00940	0.0710 Q	0.0710 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Indeno(1,2,3-c,d)pyrene	0.0380	0.450 D	0.450 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Naphthalene	0.00940	0.200	0.200 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Phenanthrene	0.0380	0.780 D Q	0.780 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Pyrene	0.0380	1.10 D Q	1.10 J	-	mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	1-Methylnaphthalene	0.00890	0.0860	0.0860 J	-	mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	2-Methylnaphthalene	0.00890	0.100	0.100 J	-	mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	Acenaphthene	0.00890	0.180 Q	0.180 J	-	mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	Acenaphthylene	0.00890	0.0660 Q	0.0660 J	-	mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	Anthracene	0.00890	0.230 Q	0.230 J	-	mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	Dibenz(a,h)anthracene	0.00890	0.200	0.200 J	-	mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	Fluorene	0.00890	0.160 Q	0.160 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	1-Methylnaphthalene	0.00890	0.0410	0.0410 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	2-Methylnaphthalene	0.00890	0.0720	0.0720 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	Acenaphthene	0.00890	0.0520 Q	0.0520 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	Acenaphthylene	0.00890	0.120 Q	0.120 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	Anthracene	0.00890	0.210 Q	0.210 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	Dibenz(a,h)anthracene	0.00890	0.190	0.190 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	Fluorene	0.00890	0.0680 Q	0.0680 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	Naphthalene	0.00890	0.240	0.240 J	-	mg/kg	I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6010C, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-490960/1-A (LB)/ MB 280-490960/1-A	Iron	126.0	< 83	< 800	mg/kg	U/None	L	
MB 280-490960/1-A (LB)/ MB 280-490960/1-A	Aluminum	26.90	< 16	< 500	mg/kg	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6010C, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Magnesium	116.3	78 - 115	30 - 125	percent	J/None	M	
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Calcium	191.3	81 - 116	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Iron	380.0	81 - 118	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Aluminum	540.0	74 - 119	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Magnesium	123.5	78 - 115	30 - 125	percent	J/None	M	
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Calcium	200.0	81 - 116	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Iron	500.0	81 - 118	30 - 125	percent	J/None	M	Spike amount Insignificant

Quality Control Outliers for test method SW6010C, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Aluminum	620.0	74 - 119	30 - 125	percent	J/None	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW6010C

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19A-SSIS-20200331	N	Magnesium	25.0	5700 J1	5700 J	+	mg/kg	M
IINY-DU-19B-SSIS-20200331	FD	Magnesium	30.0	8300	8300 J	+	mg/kg	M/A
IINY-DU-19C-SSIS-20200331	FT	Magnesium	28.0	6700	6700 J	+	mg/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6020A, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-492996/1-A (LB)/ MB 280-492996/1-A	Lead	0.04180	< 0.018	< 0.4	mg/kg	U/None	L	
MB 280-492997/1-A (LB)/ MB 280-492997/1-A	Lead	0.3370	< 0.018	< 0.39	mg/kg	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6020A, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Arsenic	120.4	82 - 118	30 - 125	percent	J/None	M	
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Beryllium	123.5	80 - 120	30 - 125	percent	J/None	M	
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Zinc	130.0	82 - 119	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Chromium	130.6	83 - 119	30 - 125	percent	J/None	M	
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Thallium	122.4	83 - 118	30 - 125	percent	J/None	M	
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Barium	182.7	86 - 116	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Manganese	490.0	85 - 116	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Antimony	59.39	72 - 124	30 - 125	percent	J/UJ	M	
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Lead	212.1	84 - 118	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Vanadium	74.75	82 - 116	30 - 125	percent	J/UJ	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Copper	-175.0	84 - 119	30 - 125	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Zinc	-187.5	82 - 119	30 - 125	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Nickel	76.54	84 - 119	30 - 125	percent	J/UJ	M	
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Barium	-66.67	86 - 116	30 - 125	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Manganese	-712.5	85 - 116	30 - 125	percent	J/X	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Thallium	118.4	83 - 118	30 - 125	percent	J/None	M	
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Antimony	60.40	72 - 124	30 - 125	percent	J/UJ	M	

Quality Control Outliers for test method SW6020A, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Lead	173.7	84 - 118	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Vanadium	79.80	82 - 116	30 - 125	percent	J/UJ	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW6020A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19A-SSIS-20200331	N	Antimony	0.200	0.500 J1	0.500 J	-	mg/kg	M
IINY-DU-19A-SSIS-20200331	N	Arsenic	0.590	9.60 J1	9.60 J	+	mg/kg	M/D
IINY-DU-19A-SSIS-20200331	N	Beryllium	0.0990	0.420 J1	0.420 J	+	mg/kg	M/D
IINY-DU-19A-SSIS-20200331	N	Chromium	5.90	10.0 D J1	10.0 J	+	mg/kg	M
IINY-DU-19A-SSIS-20200331	N	Nickel	3.50	16.0 D J1	16.0 J	-	mg/kg	M/D
IINY-DU-19A-SSIS-20200331	N	Thallium	0.0990	0.120 J1	0.120 J	+	mg/kg	M/D
IINY-DU-19B-SSIS-20200331	FD	Antimony	0.200	0.280	0.280 J	-	mg/kg	M
IINY-DU-19B-SSIS-20200331	FD	Arsenic	0.560	6.80	6.80 J	+	mg/kg	M/D
IINY-DU-19B-SSIS-20200331	FD	Beryllium	0.0930	0.350	0.350 J	+	mg/kg	M/D
IINY-DU-19B-SSIS-20200331	FD	Chromium	5.60	10.0 D	10.0 J	+	mg/kg	M
IINY-DU-19B-SSIS-20200331	FD	Nickel	3.30	17.0 D	17.0 J	-	mg/kg	M/D
IINY-DU-19B-SSIS-20200331	FD	Thallium	0.0930	0.120	0.120 J	+	mg/kg	M/D
IINY-DU-19C-SSIS-20200331	FT	Antimony	0.200	0.500	0.500 J	-	mg/kg	M
IINY-DU-19C-SSIS-20200331	FT	Arsenic	0.570	12.0	12.0 J	+	mg/kg	M/D
IINY-DU-19C-SSIS-20200331	FT	Beryllium	0.0950	0.450	0.450 J	+	mg/kg	M/D
IINY-DU-19C-SSIS-20200331	FT	Chromium	5.70	11.0 D	11.0 J	+	mg/kg	M
IINY-DU-19C-SSIS-20200331	FT	Nickel	3.30	17.0 D	17.0 J	-	mg/kg	M/D

Qualified Results associated with the MS Recovery for SW6020A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19C-SSIS-20200331	FT	Thallium	0.0950	0.140	0.140 J	+	mg/kg	M/D

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6020A, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Selenium	22.22	< 20	< 20	rpd	J/UJ	D	
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Arsenic	24.08	< 20	< 20	rpd	J/UJ	D	
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Beryllium	24.62	< 20	< 20	rpd	J/UJ	D	
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Nickel	20.97	< 20	< 20	rpd	J/UJ	D	
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Zinc	23.53	< 20	< 20	rpd	J/UJ	D	
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Thallium	22.02	< 20	< 20	rpd	J/UJ	D	
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Manganese	26.11	< 20	< 20	rpd	J/UJ	D	
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Barium	26.70	< 20	< 20	rpd	J/UJ	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS RPD for SW6020A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19A-SSIS-20200331	N	Arsenic	0.590	9.60 J1	9.60 J	+	mg/kg	M/D
IINY-DU-19A-SSIS-20200331	N	Barium	0.400	81.0 J1	81.0 J		mg/kg	D/M2
IINY-DU-19A-SSIS-20200331	N	Beryllium	0.0990	0.420 J1	0.420 J	+	mg/kg	M/D
IINY-DU-19A-SSIS-20200331	N	Manganese	0.990	410 J1	410 J		mg/kg	D/M2
IINY-DU-19A-SSIS-20200331	N	Nickel	3.50	16.0 D J1	16.0 J	-	mg/kg	M/D

Qualified Results associated with the MS RPD for SW6020A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19A-SSIS-20200331	N	Selenium	0.500	0.420 J J1	0.420 J		mg/kg	D/TR
IINY-DU-19A-SSIS-20200331	N	Thallium	0.0990	0.120 J1	0.120 J	+	mg/kg	M/D
IINY-DU-19A-SSIS-20200331	N	Zinc	25.0	120 D J1	120 J		mg/kg	D
IINY-DU-19B-SSIS-20200331	FD	Arsenic	0.560	6.80	6.80 J	+	mg/kg	M/D
IINY-DU-19B-SSIS-20200331	FD	Barium	0.370	63.0	63.0 J		mg/kg	D
IINY-DU-19B-SSIS-20200331	FD	Beryllium	0.0930	0.350	0.350 J	+	mg/kg	M/D
IINY-DU-19B-SSIS-20200331	FD	Manganese	0.930	410	410 J		mg/kg	D
IINY-DU-19B-SSIS-20200331	FD	Nickel	3.30	17.0 D	17.0 J	-	mg/kg	M/D
IINY-DU-19B-SSIS-20200331	FD	Selenium	0.470	0.350 J	0.350 J		mg/kg	D/TR
IINY-DU-19B-SSIS-20200331	FD	Thallium	0.0930	0.120	0.120 J	+	mg/kg	M/D
IINY-DU-19B-SSIS-20200331	FD	Zinc	23.0	90.0 D	90.0 J		mg/kg	D
IINY-DU-19C-SSIS-20200331	FT	Arsenic	0.570	12.0	12.0 J	+	mg/kg	M/D
IINY-DU-19C-SSIS-20200331	FT	Barium	0.380	83.0	83.0 J		mg/kg	D
IINY-DU-19C-SSIS-20200331	FT	Beryllium	0.0950	0.450	0.450 J	+	mg/kg	M/D
IINY-DU-19C-SSIS-20200331	FT	Manganese	9.50	470 D	470 J		mg/kg	D
IINY-DU-19C-SSIS-20200331	FT	Nickel	3.30	17.0 D	17.0 J	-	mg/kg	M/D
IINY-DU-19C-SSIS-20200331	FT	Selenium	0.480	0.440 J	0.440 J		mg/kg	D/TR
IINY-DU-19C-SSIS-20200331	FT	Thallium	0.0950	0.140	0.140 J	+	mg/kg	M/D
IINY-DU-19C-SSIS-20200331	FT	Zinc	24.0	110 D	110 J		mg/kg	D

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW7471B, Total, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	Mercury	58.26	80 - 124	30 - 125	percent	J/UJ	M	

Quality Control Outliers for test method SW7471B, Total, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-19A-SSIS-20200331 (SD)/ 280-135117-1MSD	Mercury	74.29	80 - 124	30 - 125	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW7471B, Total

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19A-SSIS-20200331	N	Mercury	0.0170	0.460 J1	0.460 J	-	mg/kg	M
IINY-DU-19B-SSIS-20200331	FD	Mercury	0.0180	0.110	0.110 J	-	mg/kg	M
IINY-DU-19C-SSIS-20200331	FT	Mercury	0.0170	0.430	0.430 J	-	mg/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW8082A, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	PCB-1260 (Aroclor 1260)	44.10	53 - 140	20 - 140	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW8082A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19A-SSIS-20200331	N	PCB-1260 (Aroclor 1260)	0.0630	0.0110 J J1	0.0110 J	-	mg/kg	M/TR/P1/V2
IINY-DU-19B-SSIS-20200331	FD	PCB-1260 (Aroclor 1260)	0.0590	0.00710 J	0.00710 J	-	mg/kg	M/TR/P1/V2

Qualified Results associated with the MS Recovery for SW8082A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19C-SSIS-20200331	FT	PCB-1260 (Aroclor 1260)	0.0620	0.00220 J	0.00220 J	-	mg/kg	M/I/TR/P1/V2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW8082A, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-17A-SBIS1-20200331 (N)/ 280-135117-7	Decachlorobiphenyl	54.00	59 - 130	10 - 130	percent	J/UJ	I	
IINY-DU-17B-SBIS1-20200331 (FD)/ 280-135117-8	Decachlorobiphenyl	47.00	59 - 130	10 - 130	percent	J/UJ	I	
IINY-DU-17C-SBIS1-20200331 (FT)/ 280-135117-9	Decachlorobiphenyl	55.00	59 - 130	10 - 130	percent	J/UJ	I	
IINY-DU-18C-SSIS-20200331 (FT)/ 280-135117-18	Decachlorobiphenyl	56.00	59 - 130	10 - 130	percent	J/UJ	I	
IINY-DU-19C-SSIS-20200331 (FT)/ 280-135117-3	Decachlorobiphenyl	54.00	59 - 130	10 - 130	percent	J/UJ	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for SW8082A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-17A-SBIS1-20200331	N	PCB, Total	0.0670	0.0160 U	0.0160 UJ		mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	PCB-1016 (Aroclor 1016)	0.0670	0.0310 U M Q	0.0310 UJ		mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	PCB-1221 (Aroclor 1221)	0.0960	0.0820 U Q	0.0820 UJ		mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	PCB-1232 (Aroclor 1232)	0.0670	0.0310 U M Q	0.0310 UJ		mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	PCB-1242 (Aroclor 1242)	0.0670	0.0490 U M Q	0.0490 UJ		mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	PCB-1248 (Aroclor 1248)	0.0670	0.0150 U M Q	0.0150 UJ		mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	PCB-1254 (Aroclor 1254)	0.0670	0.0340 U M Q	0.0340 UJ		mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	PCB-1260 (Aroclor 1260)	0.0670	0.00680 U Q	0.00680 UJ		mg/kg	I/V2
IINY-DU-17A-SBIS1-20200331	N	PCB-1262 (Aroclor 1262)	0.0670	0.0160 U M Q	0.0160 UJ		mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	PCB-1268 (Aroclor 1268)	0.0670	0.00680 U M Q	0.00680 UJ		mg/kg	I

Qualified Results associated with the Surrogate for SW8082A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-17B-SBIS1-20200331	FD	PCB, Total	0.0620	0.0150 U	0.0150 UJ		mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	PCB-1016 (Aroclor 1016)	0.0620	0.0290 U M Q	0.0290 UJ		mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	PCB-1221 (Aroclor 1221)	0.0890	0.0750 U M Q	0.0750 UJ		mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	PCB-1232 (Aroclor 1232)	0.0620	0.0290 U M Q	0.0290 UJ		mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	PCB-1242 (Aroclor 1242)	0.0620	0.0450 U M Q	0.0450 UJ		mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	PCB-1248 (Aroclor 1248)	0.0620	0.0140 U M Q	0.0140 UJ		mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	PCB-1254 (Aroclor 1254)	0.0620	0.0310 U M Q	0.0310 UJ		mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	PCB-1260 (Aroclor 1260)	0.0620	0.00630 U Q	0.00630 UJ		mg/kg	I/V2
IINY-DU-17B-SBIS1-20200331	FD	PCB-1262 (Aroclor 1262)	0.0620	0.0150 U M Q	0.0150 UJ		mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	PCB-1268 (Aroclor 1268)	0.0620	0.00630 U M Q	0.00630 UJ		mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	PCB, Total	0.0600	0.0150 U	0.0150 UJ		mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	PCB-1016 (Aroclor 1016)	0.0600	0.0280 U M	0.0280 UJ		mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	PCB-1221 (Aroclor 1221)	0.0850	0.0730 U	0.0730 UJ		mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	PCB-1232 (Aroclor 1232)	0.0600	0.0280 U M	0.0280 UJ		mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	PCB-1242 (Aroclor 1242)	0.0600	0.0440 U M	0.0440 UJ		mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	PCB-1248 (Aroclor 1248)	0.0600	0.0140 U M	0.0140 UJ		mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	PCB-1254 (Aroclor 1254)	0.0600	0.0300 U M	0.0300 UJ		mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	PCB-1260 (Aroclor 1260)	0.0600	0.00310 J	0.00310 J	-	mg/kg	I/TR/V2/P1
IINY-DU-17C-SBIS1-20200331	FT	PCB-1262 (Aroclor 1262)	0.0600	0.0150 U M	0.0150 UJ		mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	PCB-1268 (Aroclor 1268)	0.0600	0.00610 U M	0.00610 UJ		mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	PCB, Total	0.0630	0.400	0.400 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	PCB-1016 (Aroclor 1016)	0.0630	0.0290 U M	0.0290 UJ		mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	PCB-1221 (Aroclor 1221)	0.0890	0.0760 U	0.0760 UJ		mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	PCB-1232 (Aroclor 1232)	0.0630	0.0290 U M	0.0290 UJ		mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	PCB-1242 (Aroclor 1242)	0.0630	0.0460 U M	0.0460 UJ		mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	PCB-1248 (Aroclor 1248)	0.0630	0.140	0.140 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	PCB-1254 (Aroclor 1254)	0.0630	0.0320 U M	0.0320 UJ		mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	PCB-1260 (Aroclor 1260)	0.0630	0.250	0.250 J	-	mg/kg	I

Qualified Results associated with the Surrogate for SW8082A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-18C-SSIS-20200331	FT	PCB-1262 (Aroclor 1262)	0.0630	0.0150 U M	0.0150 UJ		mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	PCB-1268 (Aroclor 1268)	0.0630	0.00630 U M	0.00630 UJ		mg/kg	I/V2
IINY-DU-19C-SSIS-20200331	FT	PCB, Total	0.0620	0.0150 U	0.0150 UJ		mg/kg	I
IINY-DU-19C-SSIS-20200331	FT	PCB-1016 (Aroclor 1016)	0.0620	0.0290 U M	0.0290 UJ		mg/kg	I
IINY-DU-19C-SSIS-20200331	FT	PCB-1221 (Aroclor 1221)	0.0880	0.0750 U	0.0750 UJ		mg/kg	I
IINY-DU-19C-SSIS-20200331	FT	PCB-1232 (Aroclor 1232)	0.0620	0.0290 U M	0.0290 UJ		mg/kg	I
IINY-DU-19C-SSIS-20200331	FT	PCB-1242 (Aroclor 1242)	0.0620	0.0450 U	0.0450 UJ		mg/kg	I
IINY-DU-19C-SSIS-20200331	FT	PCB-1248 (Aroclor 1248)	0.0620	0.0140 U M	0.0140 UJ		mg/kg	I
IINY-DU-19C-SSIS-20200331	FT	PCB-1254 (Aroclor 1254)	0.0620	0.0310 U M	0.0310 UJ		mg/kg	I
IINY-DU-19C-SSIS-20200331	FT	PCB-1260 (Aroclor 1260)	0.0620	0.00220 J	0.00220 J	-	mg/kg	M/I/TR/P1/V2
IINY-DU-19C-SSIS-20200331	FT	PCB-1262 (Aroclor 1262)	0.0620	0.0150 U M	0.0150 UJ		mg/kg	I
IINY-DU-19C-SSIS-20200331	FT	PCB-1268 (Aroclor 1268)	0.0620	0.00630 U M	0.00630 UJ		mg/kg	I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW8330B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-19A-SSIS-20200331 (MS)/ 280-135117-1MS	3,5-Dinitroaniline	82.91	86 - 118	20 - 118	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19A-SSIS-20200331	N	3,5-Dinitroaniline	0.0990	0.0200 U M J1	0.0200 UJ		mg/kg	M
IINY-DU-19B-SSIS-20200331	FD	3,5-Dinitroaniline	0.100	0.0200 U	0.0200 UJ		mg/kg	M

Qualified Results associated with the MS Recovery for SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19C-SSIS-20200331	FT	3,5-Dinitroaniline	0.0980	0.0200 U	0.0200 UJ		mg/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW8330B, Prep Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of extraction found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-17A-SBIS1-20200331 (N)/ 280-135117-7		14.37	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17A-SSIS-20200331 (N)/ 280-135117-10		14.39	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17A-SSIS-20200331 (N)/ 280-135117-10		14.39	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17B-SBIS1-20200331 (FD)/ 280-135117-8		14.37	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17B-SSIS-20200331 (FD)/ 280-135117-11		14.39	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17B-SSIS-20200331 (FD)/ 280-135117-11		14.39	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17C-SBIS1-20200331 (FT)/ 280-135117-9		14.37	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17C-SBIS1-20200331 (FT)/ 280-135117-9		14.37	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17C-SSIS-20200331 (FT)/ 280-135117-12		14.39	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-17C-SSIS-20200331 (FT)/ 280-135117-12		14.39	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18A-SBIS1-20200331 (N)/ 280-135117-19		14.13	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18A-SBIS1-20200331 (N)/ 280-135117-19		14.13	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18A-SSIS-20200331 (N)/ 280-135117-16		14.16	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18A-SSIS-20200331 (N)/ 280-135117-16		14.16	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18B-SBIS1-20200331 (FD)/ 280-135117-20		14.13	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18B-SBIS1-20200331 (FD)/ 280-135117-20		14.13	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL

Quality Control Outliers for test method SW8330B, Prep Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of extraction found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-18B-SSIS-20200331 (FD)/ 280-135117-17		14.16	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18B-SSIS-20200331 (FD)/ 280-135117-17		14.16	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18C-SBIS1-20200331 (FT)/ 280-135117-21		14.13	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18C-SBIS1-20200331 (FT)/ 280-135117-21		14.13	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18C-SSIS-20200331 (FT)/ 280-135117-18		14.16	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-18C-SSIS-20200331 (FT)/ 280-135117-18		14.16	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19A-SBIS1-20200331 (N)/ 280-135117-4		14.27	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19A-SSIS-20200331 (N)/ 280-135117-1		14.28	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19A-SSIS-20200331 (N)/ 280-135117-1		14.28	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19A-SSIS-20200331 (N)/ 280-135117-1DUP		14.28	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19A-SSIS-20200331 (N)/ 280-135117-1DUP		14.28	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19A-SSIS-20200331 (N)/ 280-135117-1TRL		14.28	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19A-SSIS-20200331 (N)/ 280-135117-1TRL		14.28	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19B-SBIS1-20200331 (FD)/ 280-135117-5		14.27	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19B-SSIS-20200331 (FD)/ 280-135117-2		14.28	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19C-SBIS1-20200331 (FT)/ 280-135117-6		14.27	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-DU-19C-SSIS-20200331 (FT)/ 280-135117-3		14.28	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL

Quality Control Outliers for test method SW8330B, Prep Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of extraction found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-19C-SSIS-20200331 (FT)/ 280-135117-3		14.28	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW8330B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-17B-SSIS-20200331 (FD)/ 280-135117-11	1,2-Dinitrobenzene	34.00	78 - 119	10 - 119	percent	J/UJ	I	
IINY-DU-17C-SBIS1-20200331 (FT)/ 280-135117-9	1,2-Dinitrobenzene	77.00	78 - 119	10 - 119	percent	J/UJ	I	
IINY-DU-18A-SBIS1-20200331 (N)/ 280-135117-19	1,2-Dinitrobenzene	31.00	78 - 119	10 - 119	percent	J/UJ	I	
IINY-DU-18A-SBIS1-20200331 (N)/ 280-135117-19	1,2-Dinitrobenzene	25.00	78 - 119	10 - 119	percent	J/UJ	I	
IINY-DU-18A-SSIS-20200331 (N)/ 280-135117-16	1,2-Dinitrobenzene	77.00	78 - 119	10 - 119	percent	J/UJ	I	
IINY-DU-18B-SBIS1-20200331 (FD)/ 280-135117-20	1,2-Dinitrobenzene	63.00	78 - 119	10 - 119	percent	J/UJ	I	
IINY-DU-18B-SBIS1-20200331 (FD)/ 280-135117-20	1,2-Dinitrobenzene	54.00	78 - 119	10 - 119	percent	J/UJ	I	
IINY-DU-18C-SBIS1-20200331 (FT)/ 280-135117-21	1,2-Dinitrobenzene	64.00	78 - 119	10 - 119	percent	J/UJ	I	
IINY-DU-18C-SBIS1-20200331 (FT)/ 280-135117-21	1,2-Dinitrobenzene	52.00	78 - 119	10 - 119	percent	J/UJ	I	

Quality Control Outliers for test method SW8330B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-18C-SSIS-20200331 (FT)/ 280-135117-18	1,2-Dinitrobenzene	77.00	78 - 119	10 - 119	percent	J/UJ	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-17B-SSIS-20200331	FD	1,3,5-Trinitrobenzene	0.0930	0.0370 U M Q	0.0370 UJ		mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	1,3-Dinitrobenzene	0.0930	0.0370 U Q	0.0370 UJ	-	mg/kg	I/C
IINY-DU-17B-SSIS-20200331	FD	2,4,6-Trinitrotoluene	0.0930	0.0930 U Q	0.0930 UJ	-	mg/kg	I/C
IINY-DU-17B-SSIS-20200331	FD	2,4-Dinitrotoluene	0.0930	0.0370 U Q	0.0370 UJ	-	mg/kg	I/C
IINY-DU-17B-SSIS-20200331	FD	2,6-Dinitrotoluene	0.0930	0.0370 U Q	0.0370 UJ	-	mg/kg	I/C
IINY-DU-17B-SSIS-20200331	FD	2-Amino-4,6-dinitrotoluene	0.0930	0.0930 U M Q	0.0930 UJ		mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	2-Nitrotoluene	0.190	0.0930 U Q	0.0930 UJ		mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	3,5-Dinitroaniline	0.0930	0.0190 U Q	0.0190 UJ		mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	3-Nitrotoluene	0.190	0.190 U Q	0.190 UJ	-	mg/kg	I/C
IINY-DU-17B-SSIS-20200331	FD	4-Amino-2,6-dinitrotoluene	0.0930	0.0930 U Q	0.0930 UJ		mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	4-Nitrotoluene	0.190	0.0930 U Q	0.0930 UJ	-	mg/kg	I/C
IINY-DU-17B-SSIS-20200331	FD	Nitrobenzene	0.280	0.190 U Q	0.190 UJ	-	mg/kg	I/C
IINY-DU-17B-SSIS-20200331	FD	Nitroglycerin	1.90	0.650 U Q	0.650 UJ		mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0930	0.0650 U M Q	0.0650 UJ		mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Pentaerythritol tetranitrate	1.90	0.930 U Q	0.930 UJ		mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Tetryl	0.190	0.0930 U Q	0.0930 UJ	-	mg/kg	I/C
IINY-DU-17C-SBIS1-20200331	FT	2-Amino-4,6-dinitrotoluene	0.0960	0.0960 U Q	0.0960 UJ		mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	1,3,5-Trinitrobenzene	0.0960	0.0390 U M Q	0.0390 UJ		mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	1,3-Dinitrobenzene	0.0960	0.0390 U Q	0.0390 UJ	-	mg/kg	I/C

Qualified Results associated with the Surrogate for SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-18A-SBIS1-20200331	N	2,4,6-Trinitrotoluene	0.0960	0.0960 U Q	0.0960 UJ	-	mg/kg	I/C
IINY-DU-18A-SBIS1-20200331	N	2,4-Dinitrotoluene	0.0960	0.0390 U Q	0.0390 UJ	-	mg/kg	I/C
IINY-DU-18A-SBIS1-20200331	N	2,6-Dinitrotoluene	0.0960	0.0390 U Q	0.0390 UJ	-	mg/kg	I/C
IINY-DU-18A-SBIS1-20200331	N	2-Amino-4,6-dinitrotoluene	0.0960	0.0960 U Q M	0.0960 UJ		mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	2-Nitrotoluene	0.190	0.0960 U Q	0.0960 UJ		mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	3,5-Dinitroaniline	0.0960	0.0190 U Q	0.0190 UJ		mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	3-Nitrotoluene	0.190	0.190 U Q	0.190 UJ	-	mg/kg	I/C
IINY-DU-18A-SBIS1-20200331	N	4-Amino-2,6-dinitrotoluene	0.0960	0.0960 U M Q	0.0960 UJ		mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	4-Nitrotoluene	0.190	0.0960 U Q	0.0960 UJ	-	mg/kg	I/C
IINY-DU-18A-SBIS1-20200331	N	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0960 U M Q	0.0960 UJ		mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Nitrobenzene	0.290	0.190 U Q	0.190 UJ	-	mg/kg	I/C
IINY-DU-18A-SBIS1-20200331	N	Nitroglycerin	1.90	0.680 U M Q	0.680 UJ		mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0960	0.0680 U M Q	0.0680 UJ		mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Pentaerythritol tetranitrate	1.90	0.960 U Q	0.960 UJ		mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Tetryl	0.190	0.0960 U Q	0.0960 UJ	-	mg/kg	I/C
IINY-DU-18A-SSIS-20200331	N	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0940 U Q M	0.0940 UJ		mg/kg	I
IINY-DU-18A-SSIS-20200331	N	Tetryl	0.190	0.0940 U Q	0.0940 UJ	-	mg/kg	I/C
IINY-DU-18B-SBIS1-20200331	FD	1,3,5-Trinitrobenzene	0.0960	0.0390 U M Q	0.0390 UJ		mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	1,3-Dinitrobenzene	0.0960	0.0390 U Q	0.0390 UJ	-	mg/kg	I/C
IINY-DU-18B-SBIS1-20200331	FD	2,4,6-Trinitrotoluene	0.0960	0.0960 U Q	0.0960 UJ	-	mg/kg	I/C
IINY-DU-18B-SBIS1-20200331	FD	2,4-Dinitrotoluene	0.0960	0.0390 U Q	0.0390 UJ	-	mg/kg	I/C
IINY-DU-18B-SBIS1-20200331	FD	2,6-Dinitrotoluene	0.0960	0.0390 U Q	0.0390 UJ	-	mg/kg	I/C
IINY-DU-18B-SBIS1-20200331	FD	2-Amino-4,6-dinitrotoluene	0.0960	0.0960 U M Q	0.0960 UJ		mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	2-Nitrotoluene	0.190	0.0960 U Q	0.0960 UJ		mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	3,5-Dinitroaniline	0.0960	0.0190 U Q	0.0190 UJ		mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	3-Nitrotoluene	0.190	0.190 U Q	0.190 UJ	-	mg/kg	I/C
IINY-DU-18B-SBIS1-20200331	FD	4-Amino-2,6-dinitrotoluene	0.0960	0.0960 U M Q	0.0960 UJ		mg/kg	I

Qualified Results associated with the Surrogate for SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-18B-SBIS1-20200331	FD	4-Nitrotoluene	0.190	0.0960 U Q M	0.0960 UJ	-	mg/kg	I/C
IINY-DU-18B-SBIS1-20200331	FD	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0960 U M Q	0.0960 UJ		mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Nitrobenzene	0.290	0.190 U Q	0.190 UJ	-	mg/kg	I/C
IINY-DU-18B-SBIS1-20200331	FD	Nitroglycerin	1.90	0.670 U M Q	0.670 UJ		mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0960	0.0670 U M Q	0.0670 UJ		mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Pentaerythritol tetranitrate	1.90	0.960 U Q	0.960 UJ		mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Tetryl	0.190	0.0960 U Q	0.0960 UJ	-	mg/kg	I/C
IINY-DU-18C-SBIS1-20200331	FT	1,3,5-Trinitrobenzene	0.0940	0.0380 U M Q	0.0380 UJ		mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	1,3-Dinitrobenzene	0.0940	0.0380 U Q	0.0380 UJ	-	mg/kg	I/C
IINY-DU-18C-SBIS1-20200331	FT	2,4,6-Trinitrotoluene	0.0940	0.0940 U Q	0.0940 UJ	-	mg/kg	I/C
IINY-DU-18C-SBIS1-20200331	FT	2,4-Dinitrotoluene	0.0940	0.0380 U Q	0.0380 UJ	-	mg/kg	I/C
IINY-DU-18C-SBIS1-20200331	FT	2,6-Dinitrotoluene	0.0940	0.0380 U Q	0.0380 UJ	-	mg/kg	I/C
IINY-DU-18C-SBIS1-20200331	FT	2-Amino-4,6-dinitrotoluene	0.0940	0.0940 U Q	0.0940 UJ		mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	2-Nitrotoluene	0.190	0.0940 U Q	0.0940 UJ		mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	3,5-Dinitroaniline	0.0940	0.0190 U Q	0.0190 UJ		mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	3-Nitrotoluene	0.190	0.190 U Q	0.190 UJ	-	mg/kg	I/C
IINY-DU-18C-SBIS1-20200331	FT	4-Amino-2,6-dinitrotoluene	0.0940	0.0940 U M Q	0.0940 UJ		mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	4-Nitrotoluene	0.190	0.0940 U Q	0.0940 UJ	-	mg/kg	I/C
IINY-DU-18C-SBIS1-20200331	FT	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0940 U Q	0.0940 UJ		mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	Nitrobenzene	0.280	0.190 U Q	0.190 UJ	-	mg/kg	I/C
IINY-DU-18C-SBIS1-20200331	FT	Nitroglycerin	1.90	0.660 U M Q	0.660 UJ		mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0940	0.0660 U M Q	0.0660 UJ		mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	Pentaerythritol tetranitrate	1.90	0.940 U Q	0.940 UJ		mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	Tetryl	0.190	0.0940 U Q	0.0940 UJ	-	mg/kg	I/C
IINY-DU-18C-SSIS-20200331	FT	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0960 U Q M	0.0960 UJ		mg/kg	I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-16A-SSIS-20200331	N	1-Methylnaphthalene	0.00940	0.0260 Q	0.0260 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	2-Methylnaphthalene	0.00940	0.0330 Q	0.0330 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Acenaphthene	0.00940	0.150	0.150 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Acenaphthylene	0.00940	0.0320	0.0320 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Anthracene	0.00940	0.180	0.180 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Benzo(a)anthracene	0.0380	0.500 D	0.500 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Benzo(a)pyrene	0.0380	0.470 D	0.470 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Benzo(b)fluoranthene	0.0380	0.710 D	0.710 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Benzo(g,h,i)perylene	0.0380	0.310 D	0.310 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Benzo(k)fluoranthene	0.00940	0.260	0.260 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Chrysene	0.0380	0.490 D	0.490 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Dibenz(a,h)anthracene	0.00940	0.100	0.100 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Fluoranthene	0.0380	1.00 D	1.00 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Fluorene	0.00940	0.100	0.100 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Indeno(1,2,3-c,d)pyrene	0.0380	0.380 D	0.380 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Naphthalene	0.00940	0.0640 Q	0.0640 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Phenanthrene	0.0380	0.740 D	0.740 J	-	mg/kg	I
IINY-DU-16A-SSIS-20200331	N	Pyrene	0.0380	0.860 D	0.860 J	-	mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	1-Methylnaphthalene	0.00910	0.0870	0.0870 J	-	mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	2-Methylnaphthalene	0.00910	0.120	0.120 J	-	mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	Acenaphthene	0.00910	0.0680 Q	0.0680 J	-	mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	Acenaphthylene	0.00910	0.0310 Q	0.0310 J	-	mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	Benzo(k)fluoranthene	0.00910	0.230	0.230 J	-	mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	Dibenz(a,h)anthracene	0.00910	0.150	0.150 J	-	mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	Fluorene	0.00910	0.0760 Q	0.0760 J	-	mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	Naphthalene	0.00910	0.200	0.200 J	-	mg/kg	I

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-17B-SBIS1-20200331	FD	1-Methylnaphthalene	0.00960	0.0980	0.0980 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	2-Methylnaphthalene	0.00960	0.140	0.140 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Acenaphthene	0.00960	0.0580 Q	0.0580 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Acenaphthylene	0.00960	0.0350 Q	0.0350 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Anthracene	0.00960	0.0810 Q	0.0810 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Benzo(a)anthracene	0.00960	0.200 Q	0.200 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Benzo(a)pyrene	0.00960	0.110 M Q	0.110 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Benzo(b)fluoranthene	0.00960	0.320 M Q	0.320 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Benzo(g,h,i)perylene	0.00960	0.130 Q	0.130 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Benzo(k)fluoranthene	0.00960	0.0510 M Q	0.0510 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Chrysene	0.0380	0.480 D Q	0.480 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Dibenz(a,h)anthracene	0.00960	0.0680 Q	0.0680 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Fluoranthene	0.0380	0.440 D	0.440 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Fluorene	0.00960	0.0640 Q	0.0640 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Indeno(1,2,3-c,d)pyrene	0.00960	0.0850 Q	0.0850 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Naphthalene	0.00960	0.240	0.240 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Phenanthrene	0.0380	0.480 D	0.480 J	-	mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	Pyrene	0.0380	0.400 D	0.400 J	-	mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Benzo(a)anthracene	0.0360	0.480 D Q	0.480 J	-	mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Benzo(a)pyrene	0.0360	0.410 D Q	0.410 J	-	mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Benzo(b)fluoranthene	0.0360	0.710 D Q	0.710 J	-	mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Chrysene	0.0360	0.570 D Q	0.570 J	-	mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Fluoranthene	0.0360	0.940 D	0.940 J	-	mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Indeno(1,2,3-c,d)pyrene	0.0360	0.300 D Q	0.300 J	-	mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Phenanthrene	0.0360	0.400 D	0.400 J	-	mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Pyrene	0.0360	0.920 D	0.920 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	1-Methylnaphthalene	0.00890	0.110	0.110 J	-	mg/kg	I

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-17C-SBIS1-20200331	FT	2-Methylnaphthalene	0.00890	0.160	0.160 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Acenaphthene	0.00890	0.0870	0.0870 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Acenaphthylene	0.00890	0.0420	0.0420 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Anthracene	0.00890	0.160	0.160 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Benzo(a)anthracene	0.0360	0.470 D Q	0.470 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Benzo(a)pyrene	0.0360	0.310 D Q	0.310 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Benzo(b)fluoranthene	0.0360	0.670 D Q	0.670 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Benzo(g,h,i)perylene	0.0360	0.270 D Q	0.270 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Benzo(k)fluoranthene	0.00890	0.170 M Q	0.170 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Chrysene	0.0360	0.800 D Q	0.800 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Dibenz(a,h)anthracene	0.00890	0.130 Q	0.130 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Fluoranthene	0.0360	1.00 D	1.00 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Fluorene	0.00890	0.110	0.110 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Indeno(1,2,3-c,d)pyrene	0.00890	0.250 Q	0.250 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Naphthalene	0.00890	0.280	0.280 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Phenanthrene	0.0360	0.880 D	0.880 J	-	mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	Pyrene	0.0360	0.870 D	0.870 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	1-Methylnaphthalene	0.00910	0.100	0.100 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	2-Methylnaphthalene	0.00910	0.120	0.120 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Acenaphthene	0.00910	0.230 Q	0.230 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Acenaphthylene	0.00910	0.0410 Q	0.0410 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Anthracene	0.00910	0.120 Q	0.120 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Benzo(a)anthracene	0.00910	0.280 Q	0.280 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Benzo(a)pyrene	0.00910	0.150 M Q	0.150 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Benzo(b)fluoranthene	0.0360	0.440 D Q	0.440 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Benzo(g,h,i)perylene	0.00910	0.140 Q	0.140 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Benzo(k)fluoranthene	0.00910	0.0750 M Q	0.0750 J	-	mg/kg	I

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-18A-SBIS1-20200331	N	Chrysene	0.0360	0.650 D Q	0.650 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Dibenz(a,h)anthracene	0.00910	0.0640 Q	0.0640 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Fluoranthene	0.0360	0.720 D Q	0.720 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Fluorene	0.00910	0.150 Q	0.150 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Indeno(1,2,3-c,d)pyrene	0.00910	0.100 Q	0.100 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Naphthalene	0.0360	0.710 D	0.710 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Phenanthrene	0.0360	0.660 D Q	0.660 J	-	mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Pyrene	0.0360	0.620 D Q	0.620 J	-	mg/kg	I
IINY-DU-18A-SSIS-20200331	N	Benzo(a)anthracene	0.0390	0.490 D Q	0.490 J	-	mg/kg	I
IINY-DU-18A-SSIS-20200331	N	Benzo(a)pyrene	0.0390	0.440 D Q	0.440 J	-	mg/kg	I
IINY-DU-18A-SSIS-20200331	N	Benzo(b)fluoranthene	0.0390	0.860 D Q	0.860 J	-	mg/kg	I
IINY-DU-18A-SSIS-20200331	N	Chrysene	0.0390	0.860 D Q	0.860 J	-	mg/kg	I
IINY-DU-18A-SSIS-20200331	N	Fluoranthene	0.0390	0.970 D Q	0.970 J	-	mg/kg	I
IINY-DU-18A-SSIS-20200331	N	Phenanthrene	0.0390	0.620 D Q	0.620 J	-	mg/kg	I
IINY-DU-18A-SSIS-20200331	N	Pyrene	0.0390	0.870 D Q	0.870 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	1-Methylnaphthalene	0.00910	0.0800	0.0800 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	2-Methylnaphthalene	0.00910	0.0950	0.0950 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Acenaphthene	0.00910	0.180 Q	0.180 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Acenaphthylene	0.00910	0.0630 Q	0.0630 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Anthracene	0.00910	0.160 Q	0.160 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Benzo(a)anthracene	0.0370	0.440 D Q	0.440 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Benzo(a)pyrene	0.00910	0.280	0.280 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Benzo(b)fluoranthene	0.0370	0.770 D Q	0.770 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Benzo(g,h,i)perylene	0.00910	0.240	0.240 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Benzo(k)fluoranthene	0.00910	0.140	0.140 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Chrysene	0.0370	1.10 D Q	1.10 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Dibenz(a,h)anthracene	0.00910	0.100	0.100 J	-	mg/kg	I

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-18B-SBIS1-20200331	FD	Fluoranthene	0.0370	0.930 D Q	0.930 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Fluorene	0.00910	0.140 Q	0.140 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Indeno(1,2,3-c,d)pyrene	0.00910	0.220	0.220 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Naphthalene	0.0370	0.460 D	0.460 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Phenanthrene	0.0370	0.860 D Q	0.860 J	-	mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Pyrene	0.0370	0.890 D Q	0.890 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	1-Methylnaphthalene	0.00940	0.0400	0.0400 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	2-Methylnaphthalene	0.00940	0.0600	0.0600 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Acenaphthene	0.00940	0.0550 Q	0.0550 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Acenaphthylene	0.00940	0.0740 Q	0.0740 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Anthracene	0.00940	0.170 Q	0.170 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Benzo(a)anthracene	0.0380	0.630 D	0.630 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Benzo(a)pyrene	0.0380	0.580 D	0.580 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Benzo(b)fluoranthene	0.0380	1.10 D	1.10 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Benzo(g,h,i)perylene	0.0380	0.410 D	0.410 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Benzo(k)fluoranthene	0.00940	0.310	0.310 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Chrysene	0.0380	1.10 D	1.10 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Dibenz(a,h)anthracene	0.00940	0.160	0.160 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Fluoranthene	0.0380	1.20 D Q	1.20 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Fluorene	0.00940	0.0710 Q	0.0710 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Indeno(1,2,3-c,d)pyrene	0.0380	0.450 D	0.450 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Naphthalene	0.00940	0.200	0.200 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Phenanthrene	0.0380	0.780 D Q	0.780 J	-	mg/kg	I
IINY-DU-18B-SSIS-20200331	FD	Pyrene	0.0380	1.10 D Q	1.10 J	-	mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	1-Methylnaphthalene	0.00890	0.0860	0.0860 J	-	mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	2-Methylnaphthalene	0.00890	0.100	0.100 J	-	mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	Acenaphthene	0.00890	0.180 Q	0.180 J	-	mg/kg	I

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-18C-SBIS1-20200331	FT	Acenaphthylene	0.00890	0.0660 Q	0.0660 J	-	mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	Anthracene	0.00890	0.230 Q	0.230 J	-	mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	Dibenz(a,h)anthracene	0.00890	0.200	0.200 J	-	mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	Fluorene	0.00890	0.160 Q	0.160 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	1-Methylnaphthalene	0.00890	0.0410	0.0410 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	2-Methylnaphthalene	0.00890	0.0720	0.0720 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	Acenaphthene	0.00890	0.0520 Q	0.0520 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	Acenaphthylene	0.00890	0.120 Q	0.120 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	Anthracene	0.00890	0.210 Q	0.210 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	Dibenz(a,h)anthracene	0.00890	0.190	0.190 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	Fluorene	0.00890	0.0680 Q	0.0680 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	Naphthalene	0.00890	0.240	0.240 J	-	mg/kg	I
IINY-DU-19A-SSIS-20200331	N	Fluorene	0.00920	0.0770 J1	0.0770 J	-	mg/kg	M
IINY-DU-19A-SSIS-20200331	N	2-Methylnaphthalene	0.00920	0.0350 J1	0.0350 J	-	mg/kg	D
IINY-DU-19A-SSIS-20200331	N	Acenaphthylene	0.00920	0.270 J1	0.270 J	-	mg/kg	D
IINY-DU-19A-SSIS-20200331	N	Naphthalene	0.00920	0.0830 J1	0.0830 J	-	mg/kg	D
IINY-DU-19B-SSIS-20200331	FD	Fluorene	0.00960	0.0280	0.0280 J	-	mg/kg	M
IINY-DU-19B-SSIS-20200331	FD	2-Methylnaphthalene	0.00960	0.0180	0.0180 J	-	mg/kg	D
IINY-DU-19B-SSIS-20200331	FD	Acenaphthylene	0.00960	0.130	0.130 J	-	mg/kg	D
IINY-DU-19B-SSIS-20200331	FD	Naphthalene	0.00960	0.0460	0.0460 J	-	mg/kg	D
IINY-DU-19C-SSIS-20200331	FT	Fluorene	0.0100	0.0390	0.0390 J	-	mg/kg	M
IINY-DU-19C-SSIS-20200331	FT	2-Methylnaphthalene	0.0100	0.0280	0.0280 J	-	mg/kg	D
IINY-DU-19C-SSIS-20200331	FT	Acenaphthylene	0.0100	0.210	0.210 J	-	mg/kg	D
IINY-DU-19C-SSIS-20200331	FT	Naphthalene	0.0100	0.0680	0.0680 J	-	mg/kg	D

Test Method: SW6010C	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19A-SSIS-20200331	N	Magnesium	25.0	5700 J1	5700 J	+	mg/kg	M

Table of All Qualified Results

Test Method: SW6010C	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19B-SSIS-20200331	FD	Magnesium	30.0	8300	8300 J	+	mg/kg	M/A
IINY-DU-19C-SSIS-20200331	FT	Magnesium	28.0	6700	6700 J	+	mg/kg	M

Test Method: SW6020A	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19A-SSIS-20200331	N	Antimony	0.200	0.500 J1	0.500 J	-	mg/kg	M
IINY-DU-19A-SSIS-20200331	N	Arsenic	0.590	9.60 J1	9.60 J	+	mg/kg	M/D
IINY-DU-19A-SSIS-20200331	N	Beryllium	0.0990	0.420 J1	0.420 J	+	mg/kg	M/D
IINY-DU-19A-SSIS-20200331	N	Chromium	5.90	10.0 D J1	10.0 J	+	mg/kg	M
IINY-DU-19A-SSIS-20200331	N	Barium	0.400	81.0 J1	81.0 J		mg/kg	D/M2
IINY-DU-19A-SSIS-20200331	N	Manganese	0.990	410 J1	410 J		mg/kg	D/M2
IINY-DU-19A-SSIS-20200331	N	Nickel	3.50	16.0 D J1	16.0 J	-	mg/kg	M/D
IINY-DU-19A-SSIS-20200331	N	Selenium	0.500	0.420 J J1	0.420 J		mg/kg	D/TR
IINY-DU-19A-SSIS-20200331	N	Thallium	0.0990	0.120 J1	0.120 J	+	mg/kg	M/D
IINY-DU-19A-SSIS-20200331	N	Zinc	25.0	120 D J1	120 J		mg/kg	D
IINY-DU-19B-SSIS-20200331	FD	Antimony	0.200	0.280	0.280 J	-	mg/kg	M
IINY-DU-19B-SSIS-20200331	FD	Arsenic	0.560	6.80	6.80 J	+	mg/kg	M/D
IINY-DU-19B-SSIS-20200331	FD	Beryllium	0.0930	0.350	0.350 J	+	mg/kg	M/D
IINY-DU-19B-SSIS-20200331	FD	Chromium	5.60	10.0 D	10.0 J	+	mg/kg	M
IINY-DU-19B-SSIS-20200331	FD	Barium	0.370	63.0	63.0 J		mg/kg	D
IINY-DU-19B-SSIS-20200331	FD	Manganese	0.930	410	410 J		mg/kg	D
IINY-DU-19B-SSIS-20200331	FD	Nickel	3.30	17.0 D	17.0 J	-	mg/kg	M/D
IINY-DU-19B-SSIS-20200331	FD	Selenium	0.470	0.350 J	0.350 J		mg/kg	D/TR
IINY-DU-19B-SSIS-20200331	FD	Thallium	0.0930	0.120	0.120 J	+	mg/kg	M/D
IINY-DU-19B-SSIS-20200331	FD	Zinc	23.0	90.0 D	90.0 J		mg/kg	D
IINY-DU-19C-SSIS-20200331	FT	Antimony	0.200	0.500	0.500 J	-	mg/kg	M
IINY-DU-19C-SSIS-20200331	FT	Arsenic	0.570	12.0	12.0 J	+	mg/kg	M/D
IINY-DU-19C-SSIS-20200331	FT	Beryllium	0.0950	0.450	0.450 J	+	mg/kg	M/D

Table of All Qualified Results

Test Method: SW6020A	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19C-SSIS-20200331	FT	Chromium	5.70	11.0 D	11.0 J	+	mg/kg	M
IINY-DU-19C-SSIS-20200331	FT	Barium	0.380	83.0	83.0 J		mg/kg	D
IINY-DU-19C-SSIS-20200331	FT	Manganese	9.50	470 D	470 J		mg/kg	D
IINY-DU-19C-SSIS-20200331	FT	Nickel	3.30	17.0 D	17.0 J	-	mg/kg	M/D
IINY-DU-19C-SSIS-20200331	FT	Selenium	0.480	0.440 J	0.440 J		mg/kg	D/TR
IINY-DU-19C-SSIS-20200331	FT	Thallium	0.0950	0.140	0.140 J	+	mg/kg	M/D
IINY-DU-19C-SSIS-20200331	FT	Zinc	24.0	110 D	110 J		mg/kg	D

Test Method: SW7471B	Extraction Method: , Total							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19A-SSIS-20200331	N	Mercury	0.0170	0.460 J1	0.460 J	-	mg/kg	M
IINY-DU-19B-SSIS-20200331	FD	Mercury	0.0180	0.110	0.110 J	-	mg/kg	M
IINY-DU-19C-SSIS-20200331	FT	Mercury	0.0170	0.430	0.430 J	-	mg/kg	M

Test Method: SW8082A	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-17A-SBIS1-20200331	N	PCB, Total	0.0670	0.0160 U	0.0160 UJ		mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	PCB-1016 (Aroclor 1016)	0.0670	0.0310 U M Q	0.0310 UJ		mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	PCB-1221 (Aroclor 1221)	0.0960	0.0820 U Q	0.0820 UJ		mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	PCB-1232 (Aroclor 1232)	0.0670	0.0310 U M Q	0.0310 UJ		mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	PCB-1242 (Aroclor 1242)	0.0670	0.0490 U M Q	0.0490 UJ		mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	PCB-1248 (Aroclor 1248)	0.0670	0.0150 U M Q	0.0150 UJ		mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	PCB-1254 (Aroclor 1254)	0.0670	0.0340 U M Q	0.0340 UJ		mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	PCB-1260 (Aroclor 1260)	0.0670	0.00680 U Q	0.00680 UJ		mg/kg	I/V2
IINY-DU-17A-SBIS1-20200331	N	PCB-1262 (Aroclor 1262)	0.0670	0.0160 U M Q	0.0160 UJ		mg/kg	I
IINY-DU-17A-SBIS1-20200331	N	PCB-1268 (Aroclor 1268)	0.0670	0.00680 U M Q	0.00680 UJ		mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	PCB, Total	0.0620	0.0150 U	0.0150 UJ		mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	PCB-1016 (Aroclor 1016)	0.0620	0.0290 U M Q	0.0290 UJ		mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	PCB-1221 (Aroclor 1221)	0.0890	0.0750 U M Q	0.0750 UJ		mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	PCB-1232 (Aroclor 1232)	0.0620	0.0290 U M Q	0.0290 UJ		mg/kg	I

Table of All Qualified Results

Test Method: SW8082A	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-17B-SBIS1-20200331	FD	PCB-1242 (Aroclor 1242)	0.0620	0.0450 U M Q	0.0450 UJ		mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	PCB-1248 (Aroclor 1248)	0.0620	0.0140 U M Q	0.0140 UJ		mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	PCB-1254 (Aroclor 1254)	0.0620	0.0310 U M Q	0.0310 UJ		mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	PCB-1260 (Aroclor 1260)	0.0620	0.00630 U Q	0.00630 UJ		mg/kg	I/V2
IINY-DU-17B-SBIS1-20200331	FD	PCB-1262 (Aroclor 1262)	0.0620	0.0150 U M Q	0.0150 UJ		mg/kg	I
IINY-DU-17B-SBIS1-20200331	FD	PCB-1268 (Aroclor 1268)	0.0620	0.00630 U M Q	0.00630 UJ		mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	PCB, Total	0.0600	0.0150 U	0.0150 UJ		mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	PCB-1016 (Aroclor 1016)	0.0600	0.0280 U M	0.0280 UJ		mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	PCB-1221 (Aroclor 1221)	0.0850	0.0730 U	0.0730 UJ		mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	PCB-1232 (Aroclor 1232)	0.0600	0.0280 U M	0.0280 UJ		mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	PCB-1242 (Aroclor 1242)	0.0600	0.0440 U M	0.0440 UJ		mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	PCB-1248 (Aroclor 1248)	0.0600	0.0140 U M	0.0140 UJ		mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	PCB-1254 (Aroclor 1254)	0.0600	0.0300 U M	0.0300 UJ		mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	PCB-1260 (Aroclor 1260)	0.0600	0.00310 J	0.00310 J	-	mg/kg	I/TR/V2/P1
IINY-DU-17C-SBIS1-20200331	FT	PCB-1262 (Aroclor 1262)	0.0600	0.0150 U M	0.0150 UJ		mg/kg	I
IINY-DU-17C-SBIS1-20200331	FT	PCB-1268 (Aroclor 1268)	0.0600	0.00610 U M	0.00610 UJ		mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	PCB, Total	0.0630	0.400	0.400 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	PCB-1016 (Aroclor 1016)	0.0630	0.0290 U M	0.0290 UJ		mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	PCB-1221 (Aroclor 1221)	0.0890	0.0760 U	0.0760 UJ		mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	PCB-1232 (Aroclor 1232)	0.0630	0.0290 U M	0.0290 UJ		mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	PCB-1242 (Aroclor 1242)	0.0630	0.0460 U M	0.0460 UJ		mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	PCB-1248 (Aroclor 1248)	0.0630	0.140	0.140 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	PCB-1254 (Aroclor 1254)	0.0630	0.0320 U M	0.0320 UJ		mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	PCB-1260 (Aroclor 1260)	0.0630	0.250	0.250 J	-	mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	PCB-1262 (Aroclor 1262)	0.0630	0.0150 U M	0.0150 UJ		mg/kg	I
IINY-DU-18C-SSIS-20200331	FT	PCB-1268 (Aroclor 1268)	0.0630	0.00630 U M	0.00630 UJ		mg/kg	I/V2
IINY-DU-19A-SSIS-20200331	N	PCB-1260 (Aroclor 1260)	0.0630	0.0110 J J1	0.0110 J	-	mg/kg	M/TR/P1/V2

Table of All Qualified Results

Test Method: SW8082A	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19B-SSIS-20200331	FD	PCB-1260 (Aroclor 1260)	0.0590	0.00710 J	0.00710 J	-	mg/kg	M/TR/P1/V2
IINY-DU-19C-SSIS-20200331	FT	PCB-1260 (Aroclor 1260)	0.0620	0.00220 J	0.00220 J	-	mg/kg	M/I/TR/P1/V2
IINY-DU-19C-SSIS-20200331	FT	PCB, Total	0.0620	0.0150 U	0.0150 UJ		mg/kg	I
IINY-DU-19C-SSIS-20200331	FT	PCB-1016 (Aroclor 1016)	0.0620	0.0290 U M	0.0290 UJ		mg/kg	I
IINY-DU-19C-SSIS-20200331	FT	PCB-1221 (Aroclor 1221)	0.0880	0.0750 U	0.0750 UJ		mg/kg	I
IINY-DU-19C-SSIS-20200331	FT	PCB-1232 (Aroclor 1232)	0.0620	0.0290 U M	0.0290 UJ		mg/kg	I
IINY-DU-19C-SSIS-20200331	FT	PCB-1242 (Aroclor 1242)	0.0620	0.0450 U	0.0450 UJ		mg/kg	I
IINY-DU-19C-SSIS-20200331	FT	PCB-1248 (Aroclor 1248)	0.0620	0.0140 U M	0.0140 UJ		mg/kg	I
IINY-DU-19C-SSIS-20200331	FT	PCB-1254 (Aroclor 1254)	0.0620	0.0310 U M	0.0310 UJ		mg/kg	I
IINY-DU-19C-SSIS-20200331	FT	PCB-1262 (Aroclor 1262)	0.0620	0.0150 U M	0.0150 UJ		mg/kg	I
IINY-DU-19C-SSIS-20200331	FT	PCB-1268 (Aroclor 1268)	0.0620	0.00630 U M	0.00630 UJ		mg/kg	I

Test Method: SW8330B	Extraction Method: METHOD							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-17B-SSIS-20200331	FD	1,3,5-Trinitrobenzene	0.0930	0.0370 U M Q	0.0370 UJ		mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	1,3-Dinitrobenzene	0.0930	0.0370 U Q	0.0370 UJ	-	mg/kg	I/C
IINY-DU-17B-SSIS-20200331	FD	2,4,6-Trinitrotoluene	0.0930	0.0930 U Q	0.0930 UJ	-	mg/kg	I/C
IINY-DU-17B-SSIS-20200331	FD	2,4-Dinitrotoluene	0.0930	0.0370 U Q	0.0370 UJ	-	mg/kg	I/C
IINY-DU-17B-SSIS-20200331	FD	2,6-Dinitrotoluene	0.0930	0.0370 U Q	0.0370 UJ	-	mg/kg	I/C
IINY-DU-17B-SSIS-20200331	FD	2-Amino-4,6-dinitrotoluene	0.0930	0.0930 U M Q	0.0930 UJ		mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	2-Nitrotoluene	0.190	0.0930 U Q	0.0930 UJ		mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	3,5-Dinitroaniline	0.0930	0.0190 U Q	0.0190 UJ		mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	3-Nitrotoluene	0.190	0.190 U Q	0.190 UJ	-	mg/kg	I/C
IINY-DU-17B-SSIS-20200331	FD	4-Amino-2,6-dinitrotoluene	0.0930	0.0930 U Q	0.0930 UJ		mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	4-Nitrotoluene	0.190	0.0930 U Q	0.0930 UJ	-	mg/kg	I/C
IINY-DU-17B-SSIS-20200331	FD	Nitrobenzene	0.280	0.190 U Q	0.190 UJ	-	mg/kg	I/C
IINY-DU-17B-SSIS-20200331	FD	Nitroglycerin	1.90	0.650 U Q	0.650 UJ		mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0930	0.0650 U M Q	0.0650 UJ		mg/kg	I

Table of All Qualified Results

Test Method: SW8330B Extraction Method: METHOD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-17B-SSIS-20200331	FD	Pentaerythritol tetranitrate	1.90	0.930 U Q	0.930 UJ		mg/kg	I
IINY-DU-17B-SSIS-20200331	FD	Tetryl	0.190	0.0930 U Q	0.0930 UJ	-	mg/kg	I/C
IINY-DU-17C-SBIS1-20200331	FT	2-Amino-4,6-dinitrotoluene	0.0960	0.0960 U Q	0.0960 UJ		mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	1,3,5-Trinitrobenzene	0.0960	0.0390 U M Q	0.0390 UJ		mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	1,3-Dinitrobenzene	0.0960	0.0390 U Q	0.0390 UJ	-	mg/kg	I/C
IINY-DU-18A-SBIS1-20200331	N	2,4,6-Trinitrotoluene	0.0960	0.0960 U Q	0.0960 UJ	-	mg/kg	I/C
IINY-DU-18A-SBIS1-20200331	N	2,4-Dinitrotoluene	0.0960	0.0390 U Q	0.0390 UJ	-	mg/kg	I/C
IINY-DU-18A-SBIS1-20200331	N	2,6-Dinitrotoluene	0.0960	0.0390 U Q	0.0390 UJ	-	mg/kg	I/C
IINY-DU-18A-SBIS1-20200331	N	2-Amino-4,6-dinitrotoluene	0.0960	0.0960 U Q M	0.0960 UJ		mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	2-Nitrotoluene	0.190	0.0960 U Q	0.0960 UJ		mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	3,5-Dinitroaniline	0.0960	0.0190 U Q	0.0190 UJ		mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	3-Nitrotoluene	0.190	0.190 U Q	0.190 UJ	-	mg/kg	I/C
IINY-DU-18A-SBIS1-20200331	N	4-Amino-2,6-dinitrotoluene	0.0960	0.0960 U M Q	0.0960 UJ		mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	4-Nitrotoluene	0.190	0.0960 U Q	0.0960 UJ	-	mg/kg	I/C
IINY-DU-18A-SBIS1-20200331	N	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0960 U M Q	0.0960 UJ		mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Nitrobenzene	0.290	0.190 U Q	0.190 UJ	-	mg/kg	I/C
IINY-DU-18A-SBIS1-20200331	N	Nitroglycerin	1.90	0.680 U M Q	0.680 UJ		mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0960	0.0680 U M Q	0.0680 UJ		mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Pentaerythritol tetranitrate	1.90	0.960 U Q	0.960 UJ		mg/kg	I
IINY-DU-18A-SBIS1-20200331	N	Tetryl	0.190	0.0960 U Q	0.0960 UJ	-	mg/kg	I/C
IINY-DU-18A-SSIS-20200331	N	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0940 U Q M	0.0940 UJ		mg/kg	I
IINY-DU-18A-SSIS-20200331	N	Tetryl	0.190	0.0940 U Q	0.0940 UJ	-	mg/kg	I/C
IINY-DU-18B-SBIS1-20200331	FD	1,3,5-Trinitrobenzene	0.0960	0.0390 U M Q	0.0390 UJ		mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	1,3-Dinitrobenzene	0.0960	0.0390 U Q	0.0390 UJ	-	mg/kg	I/C
IINY-DU-18B-SBIS1-20200331	FD	2,4,6-Trinitrotoluene	0.0960	0.0960 U Q	0.0960 UJ	-	mg/kg	I/C
IINY-DU-18B-SBIS1-20200331	FD	2,4-Dinitrotoluene	0.0960	0.0390 U Q	0.0390 UJ	-	mg/kg	I/C
IINY-DU-18B-SBIS1-20200331	FD	2,6-Dinitrotoluene	0.0960	0.0390 U Q	0.0390 UJ	-	mg/kg	I/C

Table of All Qualified Results

Test Method: SW8330B Extraction Method: METHOD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-18B-SBIS1-20200331	FD	2-Amino-4,6-dinitrotoluene	0.0960	0.0960 U M Q	0.0960 UJ		mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	2-Nitrotoluene	0.190	0.0960 U Q	0.0960 UJ		mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	3,5-Dinitroaniline	0.0960	0.0190 U Q	0.0190 UJ		mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	3-Nitrotoluene	0.190	0.190 U Q	0.190 UJ	-	mg/kg	I/C
IINY-DU-18B-SBIS1-20200331	FD	4-Amino-2,6-dinitrotoluene	0.0960	0.0960 U M Q	0.0960 UJ		mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	4-Nitrotoluene	0.190	0.0960 U Q M	0.0960 UJ	-	mg/kg	I/C
IINY-DU-18B-SBIS1-20200331	FD	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0960 U M Q	0.0960 UJ		mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Nitrobenzene	0.290	0.190 U Q	0.190 UJ	-	mg/kg	I/C
IINY-DU-18B-SBIS1-20200331	FD	Nitroglycerin	1.90	0.670 U M Q	0.670 UJ		mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0960	0.0670 U M Q	0.0670 UJ		mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Pentaerythritol tetranitrate	1.90	0.960 U Q	0.960 UJ		mg/kg	I
IINY-DU-18B-SBIS1-20200331	FD	Tetryl	0.190	0.0960 U Q	0.0960 UJ	-	mg/kg	I/C
IINY-DU-18C-SBIS1-20200331	FT	1,3,5-Trinitrobenzene	0.0940	0.0380 U M Q	0.0380 UJ		mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	1,3-Dinitrobenzene	0.0940	0.0380 U Q	0.0380 UJ	-	mg/kg	I/C
IINY-DU-18C-SBIS1-20200331	FT	2,4,6-Trinitrotoluene	0.0940	0.0940 U Q	0.0940 UJ	-	mg/kg	I/C
IINY-DU-18C-SBIS1-20200331	FT	2,4-Dinitrotoluene	0.0940	0.0380 U Q	0.0380 UJ	-	mg/kg	I/C
IINY-DU-18C-SBIS1-20200331	FT	2,6-Dinitrotoluene	0.0940	0.0380 U Q	0.0380 UJ	-	mg/kg	I/C
IINY-DU-18C-SBIS1-20200331	FT	2-Amino-4,6-dinitrotoluene	0.0940	0.0940 U Q	0.0940 UJ		mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	2-Nitrotoluene	0.190	0.0940 U Q	0.0940 UJ		mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	3,5-Dinitroaniline	0.0940	0.0190 U Q	0.0190 UJ		mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	3-Nitrotoluene	0.190	0.190 U Q	0.190 UJ	-	mg/kg	I/C
IINY-DU-18C-SBIS1-20200331	FT	4-Amino-2,6-dinitrotoluene	0.0940	0.0940 U M Q	0.0940 UJ		mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	4-Nitrotoluene	0.190	0.0940 U Q	0.0940 UJ	-	mg/kg	I/C
IINY-DU-18C-SBIS1-20200331	FT	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0940 U Q	0.0940 UJ		mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	Nitrobenzene	0.280	0.190 U Q	0.190 UJ	-	mg/kg	I/C
IINY-DU-18C-SBIS1-20200331	FT	Nitroglycerin	1.90	0.660 U M Q	0.660 UJ		mg/kg	I

Table of All Qualified Results

Test Method: SW8330B	Extraction Method: METHOD							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-18C-SBIS1-20200331	FT	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0940	0.0660 U M Q	0.0660 UJ		mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	Pentaerythritol tetranitrate	1.90	0.940 U Q	0.940 UJ		mg/kg	I
IINY-DU-18C-SBIS1-20200331	FT	Tetryl	0.190	0.0940 U Q	0.0940 UJ	-	mg/kg	I/C
IINY-DU-18C-SSIS-20200331	FT	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0960 U Q M	0.0960 UJ		mg/kg	I
IINY-DU-19A-SSIS-20200331	N	3,5-Dinitroaniline	0.0990	0.0200 U M J1	0.0200 UJ		mg/kg	M
IINY-DU-19B-SSIS-20200331	FD	3,5-Dinitroaniline	0.100	0.0200 U	0.0200 UJ		mg/kg	M
IINY-DU-19C-SSIS-20200331	FT	3,5-Dinitroaniline	0.0980	0.0200 U	0.0200 UJ		mg/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-16C-SSIS-20200331	FT	1-Methylnaphthalene	0.00960	0.00770 J	0.00770 J	-	mg/kg	TR
IINY-DU-16C-SSIS-20200331	FT	2-Methylnaphthalene	0.00960	0.00820 J	0.00820 J	-	mg/kg	TR
IINY-DU-19A-SBIS1-20200331	N	1-Methylnaphthalene	0.00940	0.00110 J	0.00110 J	-	mg/kg	TR
IINY-DU-19A-SBIS1-20200331	N	2-Methylnaphthalene	0.00940	0.00170 J	0.00170 J	-	mg/kg	TR
IINY-DU-19A-SBIS1-20200331	N	Acenaphthene	0.00940	0.00240 J	0.00240 J	-	mg/kg	TR
IINY-DU-19A-SBIS1-20200331	N	Acenaphthylene	0.00940	0.00660 J	0.00660 J	-	mg/kg	TR
IINY-DU-19A-SBIS1-20200331	N	Anthracene	0.00940	0.00670 J	0.00670 J	-	mg/kg	TR
IINY-DU-19A-SBIS1-20200331	N	Dibenz(a,h)anthracene	0.00940	0.00610 J	0.00610 J	-	mg/kg	TR
IINY-DU-19A-SBIS1-20200331	N	Fluorene	0.00940	0.00370 J	0.00370 J	-	mg/kg	TR
IINY-DU-19A-SBIS1-20200331	N	Naphthalene	0.00940	0.00190 J	0.00190 J	-	mg/kg	TR
IINY-DU-19A-SSIS-20200331	LR	1-Methylnaphthalene	0.180	0.0226 J D	0.0226 J	-	mg/kg	TR
IINY-DU-19A-SSIS-20200331	LR	2-Methylnaphthalene	0.180	0.0345 J D	0.0345 J	-	mg/kg	TR
IINY-DU-19A-SSIS-20200331	LR	Acenaphthene	0.180	0.0535 J D	0.0535 J	-	mg/kg	TR
IINY-DU-19A-SSIS-20200331	LR	Fluorene	0.180	0.0672 J D	0.0672 J	-	mg/kg	TR
IINY-DU-19A-SSIS-20200331	LR	Naphthalene	0.180	0.0931 J D	0.0931 J	-	mg/kg	TR
IINY-DU-19A-SSIS-20200331	LT	1-Methylnaphthalene	0.200	0.0211 J D J1	0.0211 J	-	mg/kg	TR
IINY-DU-19A-SSIS-20200331	LT	2-Methylnaphthalene	0.200	0.0331 J D	0.0331 J	-	mg/kg	TR
IINY-DU-19A-SSIS-20200331	LT	Acenaphthene	0.200	0.0473 J D J1	0.0473 J	-	mg/kg	TR
IINY-DU-19A-SSIS-20200331	LT	Acenaphthylene	0.200	0.171 J D	0.171 J	-	mg/kg	TR
IINY-DU-19A-SSIS-20200331	LT	Fluorene	0.200	0.0662 J D	0.0662 J	-	mg/kg	TR
IINY-DU-19A-SSIS-20200331	LT	Naphthalene	0.200	0.0830 J D	0.0830 J	-	mg/kg	TR
IINY-DU-19B-SBIS1-20200331	FD	1-Methylnaphthalene	0.00940	0.00120 J	0.00120 J	-	mg/kg	TR
IINY-DU-19B-SBIS1-20200331	FD	2-Methylnaphthalene	0.00940	0.00190 J	0.00190 J	-	mg/kg	TR
IINY-DU-19B-SBIS1-20200331	FD	Acenaphthene	0.00940	0.00150 J	0.00150 J	-	mg/kg	TR
IINY-DU-19B-SBIS1-20200331	FD	Acenaphthylene	0.00940	0.00690 J	0.00690 J	-	mg/kg	TR
IINY-DU-19B-SBIS1-20200331	FD	Anthracene	0.00940	0.00640 J	0.00640 J	-	mg/kg	TR
IINY-DU-19B-SBIS1-20200331	FD	Dibenz(a,h)anthracene	0.00940	0.00670 J	0.00670 J	-	mg/kg	TR

Table of All Trace Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19B-SBIS1-20200331	FD	Fluorene	0.00940	0.00280 J	0.00280 J	-	mg/kg	TR
IINY-DU-19B-SBIS1-20200331	FD	Naphthalene	0.00940	0.00220 J	0.00220 J	-	mg/kg	TR
IINY-DU-19C-SBIS1-20200331	FT	1-Methylnaphthalene	0.00940	0.000640 J	0.000640 J	-	mg/kg	TR
IINY-DU-19C-SBIS1-20200331	FT	2-Methylnaphthalene	0.00940	0.000930 J	0.000930 J	-	mg/kg	TR
IINY-DU-19C-SBIS1-20200331	FT	Acenaphthene	0.00940	0.000870 J	0.000870 J	-	mg/kg	TR
IINY-DU-19C-SBIS1-20200331	FT	Acenaphthylene	0.00940	0.00340 J	0.00340 J	-	mg/kg	TR
IINY-DU-19C-SBIS1-20200331	FT	Anthracene	0.00940	0.00320 J	0.00320 J	-	mg/kg	TR
IINY-DU-19C-SBIS1-20200331	FT	Benzo(k)fluoranthene	0.00940	0.00720 J	0.00720 J	-	mg/kg	TR
IINY-DU-19C-SBIS1-20200331	FT	Dibenz(a,h)anthracene	0.00940	0.00390 J	0.00390 J	-	mg/kg	TR
IINY-DU-19C-SBIS1-20200331	FT	Fluorene	0.00940	0.00110 J	0.00110 J	-	mg/kg	TR
IINY-DU-19C-SBIS1-20200331	FT	Phenanthrene	0.00940	0.00910 J	0.00910 J	-	mg/kg	TR

Test Method: SW6010C	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-16A-SSIS-20200331	N	Sodium	480	440 J	440 J		mg/kg	TR
IINY-DU-16B-SSIS-20200331	FD	Sodium	460	360 J	360 J		mg/kg	TR
IINY-DU-16C-SSIS-20200331	FT	Sodium	490	330 J	330 J		mg/kg	TR
IINY-DU-17A-SSIS-20200331	N	Sodium	490	400 J	400 J		mg/kg	TR
IINY-DU-17B-SSIS-20200331	FD	Sodium	470	370 J	370 J		mg/kg	TR
IINY-DU-18A-SBIS1-20200331	N	Sodium	490	420 J	420 J		mg/kg	TR
IINY-DU-18B-SBIS1-20200331	FD	Sodium	490	430 J	430 J		mg/kg	TR
IINY-DU-18C-SBIS1-20200331	FT	Sodium	480	430 J	430 J		mg/kg	TR

Test Method: SW6020A	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-16A-SSIS-20200331	N	Selenium	0.470	0.400 J	0.400 J		mg/kg	TR
IINY-DU-16A-SSIS-20200331	N	Silver	0.0990	0.0550 J	0.0550 J		mg/kg	TR
IINY-DU-16B-SSIS-20200331	FD	Selenium	0.460	0.400 J	0.400 J		mg/kg	TR
IINY-DU-16B-SSIS-20200331	FD	Silver	0.0980	0.0630 J	0.0630 J		mg/kg	TR

Table of All Trace Results

Test Method: SW6020A	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-16C-SSIS-20200331	FT	Selenium	0.480	0.350 J	0.350 J		mg/kg	TR
IINY-DU-16C-SSIS-20200331	FT	Silver	0.0990	0.0570 J	0.0570 J		mg/kg	TR
IINY-DU-17B-SSIS-20200331	FD	Selenium	0.470	0.200 J	0.200 J		mg/kg	TR
IINY-DU-18A-SSIS-20200331	N	Selenium	0.500	0.360 J	0.360 J		mg/kg	TR
IINY-DU-19A-SBIS1-20200331	N	Antimony	0.200	0.120 J	0.120 J		mg/kg	TR
IINY-DU-19A-SBIS1-20200331	N	Cadmium	0.0990	0.0970 J	0.0970 J		mg/kg	TR
IINY-DU-19A-SBIS1-20200331	N	Selenium	0.450	0.230 J	0.230 J		mg/kg	TR
IINY-DU-19A-SBIS1-20200331	N	Thallium	0.0900	0.0700 J	0.0700 J		mg/kg	TR
IINY-DU-19A-SSIS-20200331	N	Selenium	0.500	0.420 J J1	0.420 J		mg/kg	D/TR
IINY-DU-19B-SBIS1-20200331	FD	Antimony	0.200	0.110 J	0.110 J		mg/kg	TR
IINY-DU-19B-SBIS1-20200331	FD	Cadmium	0.0990	0.0930 J	0.0930 J		mg/kg	TR
IINY-DU-19B-SBIS1-20200331	FD	Selenium	0.460	0.230 J	0.230 J		mg/kg	TR
IINY-DU-19B-SBIS1-20200331	FD	Silver	0.0980	0.0970 J	0.0970 J		mg/kg	TR
IINY-DU-19B-SBIS1-20200331	FD	Thallium	0.0930	0.0760 J	0.0760 J		mg/kg	TR
IINY-DU-19B-SSIS-20200331	FD	Selenium	0.470	0.350 J	0.350 J		mg/kg	D/TR
IINY-DU-19C-SBIS1-20200331	FT	Antimony	0.200	0.110 J	0.110 J		mg/kg	TR
IINY-DU-19C-SBIS1-20200331	FT	Cadmium	0.0960	0.0870 J	0.0870 J		mg/kg	TR
IINY-DU-19C-SBIS1-20200331	FT	Selenium	0.480	0.230 J	0.230 J		mg/kg	TR
IINY-DU-19C-SBIS1-20200331	FT	Thallium	0.0960	0.0710 J	0.0710 J		mg/kg	TR
IINY-DU-19C-SSIS-20200331	FT	Selenium	0.480	0.440 J	0.440 J		mg/kg	D/TR

Test Method: SW8082A	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-17A-SSIS-20200331	N	PCB-1260 (Aroclor 1260)	0.0640	0.0440 J	0.0440 J		mg/kg	TR
IINY-DU-17B-SSIS-20200331	FD	PCB-1260 (Aroclor 1260)	0.0590	0.0410 J M	0.0410 J		mg/kg	TR
IINY-DU-17C-SBIS1-20200331	FT	PCB-1260 (Aroclor 1260)	0.0600	0.00310 J	0.00310 J	-	mg/kg	I/TR/V2/P1
IINY-DU-17C-SSIS-20200331	FT	PCB-1260 (Aroclor 1260)	0.0590	0.0480 J Q	0.0480 J		mg/kg	TR
IINY-DU-18C-SBIS1-20200331	FT	PCB, Total	0.0610	0.0570 J	0.0570 J		mg/kg	TR

Table of All Trace Results

Test Method: SW8082A	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-18C-SBIS1-20200331	FT	PCB-1262 (Aroclor 1262)	0.0610	0.0570 J	0.0570 J		mg/kg	TR/V2
IINY-DU-19A-SBIS1-20200331	N	PCB, Total	0.0640	0.0500 J	0.0500 J		mg/kg	TR
IINY-DU-19A-SBIS1-20200331	N	PCB-1260 (Aroclor 1260)	0.0640	0.0500 J	0.0500 J		mg/kg	TR/V2
IINY-DU-19A-SSIS-20200331	N	PCB, Total	0.0630	0.0110 J	0.0110 J		mg/kg	TR
IINY-DU-19A-SSIS-20200331	N	PCB-1260 (Aroclor 1260)	0.0630	0.0110 J J1	0.0110 J	-	mg/kg	M/TR/P1/V2
IINY-DU-19B-SBIS1-20200331	FD	PCB, Total	0.0630	0.0490 J	0.0490 J		mg/kg	TR
IINY-DU-19B-SBIS1-20200331	FD	PCB-1260 (Aroclor 1260)	0.0630	0.0490 J	0.0490 J		mg/kg	TR/V2/P1
IINY-DU-19B-SSIS-20200331	FD	PCB, Total	0.0590	0.00710 J	0.00710 J		mg/kg	TR
IINY-DU-19B-SSIS-20200331	FD	PCB-1260 (Aroclor 1260)	0.0590	0.00710 J	0.00710 J	-	mg/kg	M/TR/P1/V2
IINY-DU-19C-SBIS1-20200331	FT	PCB, Total	0.0640	0.0540 J	0.0540 J		mg/kg	TR
IINY-DU-19C-SBIS1-20200331	FT	PCB-1260 (Aroclor 1260)	0.0640	0.0540 J	0.0540 J		mg/kg	TR/V2
IINY-DU-19C-SSIS-20200331	FT	PCB-1260 (Aroclor 1260)	0.0620	0.00220 J	0.00220 J	-	mg/kg	M/I/TR/P1/V2

Test Method: SW8330B	Extraction Method: METHOD							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19A-SSIS-20200331	LR	4-Nitrotoluene	0.190	0.0509 J M Q	0.0509 J	-	mg/kg	TR/C
IINY-DU-19A-SSIS-20200331	LR	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0627 J	0.0627 J	-	mg/kg	TR
IINY-DU-19A-SSIS-20200331	LT	4-Nitrotoluene	0.190	0.0679 J	0.0679 J	-	mg/kg	TR/C
IINY-DU-19A-SSIS-20200331	LT	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0584 J	0.0584 J	-	mg/kg	TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-16A-SSIS-20200331	N	1-Methylnaphthalene	0.00940	0.0260 Q	0.0260 J	0.0260 J	I
IINY-DU-16A-SSIS-20200331	N	2-Methylnaphthalene	0.00940	0.0330 Q	0.0330 J	0.0330 J	I
IINY-DU-16A-SSIS-20200331	N	Acenaphthene	0.00940	0.150	0.150 J	0.150 J	I
IINY-DU-16A-SSIS-20200331	N	Acenaphthylene	0.00940	0.0320	0.0320 J	0.0320 J	I
IINY-DU-16A-SSIS-20200331	N	Anthracene	0.00940	0.180	0.180 J	0.180 J	I
IINY-DU-16A-SSIS-20200331	N	Benzo(a)anthracene	0.0380	0.500 D	0.500 J	0.500 J	I
IINY-DU-16A-SSIS-20200331	N	Benzo(a)pyrene	0.0380	0.470 D	0.470 J	0.470 J	I
IINY-DU-16A-SSIS-20200331	N	Benzo(b)fluoranthene	0.0380	0.710 D	0.710 J	0.710 J	I
IINY-DU-16A-SSIS-20200331	N	Benzo(g,h,i)perylene	0.0380	0.310 D	0.310 J	0.310 J	I
IINY-DU-16A-SSIS-20200331	N	Benzo(k)fluoranthene	0.00940	0.260	0.260 J	0.260 J	I
IINY-DU-16A-SSIS-20200331	N	Chrysene	0.0380	0.490 D	0.490 J	0.490 J	I
IINY-DU-16A-SSIS-20200331	N	Dibenz(a,h)anthracene	0.00940	0.100	0.100 J	0.100 J	I
IINY-DU-16A-SSIS-20200331	N	Fluoranthene	0.0380	1.00 D	1.00 J	1.00 J	I
IINY-DU-16A-SSIS-20200331	N	Fluorene	0.00940	0.100	0.100 J	0.100 J	I
IINY-DU-16A-SSIS-20200331	N	Indeno(1,2,3-c,d)pyrene	0.0380	0.380 D	0.380 J	0.380 J	I
IINY-DU-16A-SSIS-20200331	N	Naphthalene	0.00940	0.0640 Q	0.0640 J	0.0640 J	I
IINY-DU-16A-SSIS-20200331	N	Phenanthrene	0.0380	0.740 D	0.740 J	0.740 J	I
IINY-DU-16A-SSIS-20200331	N	Pyrene	0.0380	0.860 D	0.860 J	0.860 J	I
IINY-DU-16B-SSIS-20200331	FD	1-Methylnaphthalene	0.00930	0.0280	0.0280 J	0.0280	
IINY-DU-16B-SSIS-20200331	FD	2-Methylnaphthalene	0.00930	0.0410	0.0410 J	0.0410	
IINY-DU-16B-SSIS-20200331	FD	Acenaphthene	0.00930	0.140	0.140 J	0.140	
IINY-DU-16B-SSIS-20200331	FD	Acenaphthylene	0.00930	0.0340	0.0340 J	0.0340	
IINY-DU-16B-SSIS-20200331	FD	Anthracene	0.00930	0.160	0.160 J	0.160	
IINY-DU-16B-SSIS-20200331	FD	Benzo(a)anthracene	0.0370	0.440 D	0.440 J	0.440	
IINY-DU-16B-SSIS-20200331	FD	Benzo(a)pyrene	0.0370	0.430 D	0.430 J	0.430	
IINY-DU-16B-SSIS-20200331	FD	Benzo(b)fluoranthene	0.0370	0.650 D	0.650 J	0.650	
IINY-DU-16B-SSIS-20200331	FD	Benzo(g,h,i)perylene	0.00930	0.290	0.290 J	0.290	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-16B-SSIS-20200331	FD	Benzo(k)fluoranthene	0.00930	0.230	0.230 J	0.230	
IINY-DU-16B-SSIS-20200331	FD	Chrysene	0.0370	0.440 D	0.440 J	0.440	
IINY-DU-16B-SSIS-20200331	FD	Dibenz(a,h)anthracene	0.00930	0.0850	0.0850 J	0.0850	
IINY-DU-16B-SSIS-20200331	FD	Fluoranthene	0.0370	0.960 D	0.960 J	0.960	
IINY-DU-16B-SSIS-20200331	FD	Fluorene	0.00930	0.100	0.100 J	0.100	
IINY-DU-16B-SSIS-20200331	FD	Indeno(1,2,3-c,d)pyrene	0.0370	0.350 D	0.350 J	0.350	
IINY-DU-16B-SSIS-20200331	FD	Naphthalene	0.00930	0.0890	0.0890 J	0.0890	
IINY-DU-16B-SSIS-20200331	FD	Phenanthrene	0.0370	0.660 D	0.660 J	0.660	
IINY-DU-16B-SSIS-20200331	FD	Pyrene	0.0370	0.800 D	0.800 J	0.800	
IINY-DU-16C-SSIS-20200331	FT	1-Methylnaphthalene	0.00960	0.00770 J	0.00770 J	0.00770 J	TR
IINY-DU-16C-SSIS-20200331	FT	2-Methylnaphthalene	0.00960	0.00820 J	0.00820 J	0.00820 J	TR
IINY-DU-16C-SSIS-20200331	FT	Acenaphthene	0.00960	0.0360	0.0360 J	0.0360	
IINY-DU-16C-SSIS-20200331	FT	Acenaphthylene	0.00960	0.0280	0.0280 J	0.0280	
IINY-DU-16C-SSIS-20200331	FT	Anthracene	0.00960	0.0630	0.0630 J	0.0630	
IINY-DU-16C-SSIS-20200331	FT	Benzo(a)anthracene	0.00960	0.210	0.210 J	0.210	
IINY-DU-16C-SSIS-20200331	FT	Benzo(a)pyrene	0.00960	0.240	0.240 J	0.240	
IINY-DU-16C-SSIS-20200331	FT	Benzo(b)fluoranthene	0.0380	0.330 D	0.330 J	0.330	
IINY-DU-16C-SSIS-20200331	FT	Benzo(g,h,i)perylene	0.00960	0.150	0.150 J	0.150	
IINY-DU-16C-SSIS-20200331	FT	Benzo(k)fluoranthene	0.00960	0.120	0.120 J	0.120	
IINY-DU-16C-SSIS-20200331	FT	Chrysene	0.00960	0.210	0.210 J	0.210	
IINY-DU-16C-SSIS-20200331	FT	Dibenz(a,h)anthracene	0.00960	0.0420	0.0420 J	0.0420	
IINY-DU-16C-SSIS-20200331	FT	Fluoranthene	0.0380	0.410 D	0.410 J	0.410	
IINY-DU-16C-SSIS-20200331	FT	Fluorene	0.00960	0.0270	0.0270 J	0.0270	
IINY-DU-16C-SSIS-20200331	FT	Indeno(1,2,3-c,d)pyrene	0.00960	0.190	0.190 J	0.190	
IINY-DU-16C-SSIS-20200331	FT	Naphthalene	0.00960	0.0120	0.0120 J	0.0120	
IINY-DU-16C-SSIS-20200331	FT	Phenanthrene	0.00960	0.200	0.200 J	0.200	
IINY-DU-16C-SSIS-20200331	FT	Pyrene	0.0380	0.350 D	0.350 J	0.350	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-17A-SBIS1-20200331	N	1-Methylnaphthalene	0.00910	0.0870	0.0870 J	0.0870 J	I
IINY-DU-17A-SBIS1-20200331	N	2-Methylnaphthalene	0.00910	0.120	0.120 J	0.120 J	I
IINY-DU-17A-SBIS1-20200331	N	Acenaphthene	0.00910	0.0680 Q	0.0680 J	0.0680 J	I
IINY-DU-17A-SBIS1-20200331	N	Acenaphthylene	0.00910	0.0310 Q	0.0310 J	0.0310 J	I
IINY-DU-17A-SBIS1-20200331	N	Anthracene	0.0910	0.210 D	0.210 J	0.210	
IINY-DU-17A-SBIS1-20200331	N	Benzo(a)anthracene	0.0910	0.700 D	0.700 J	0.700	
IINY-DU-17A-SBIS1-20200331	N	Benzo(a)pyrene	0.0910	0.450 D	0.450 J	0.450	
IINY-DU-17A-SBIS1-20200331	N	Benzo(b)fluoranthene	0.0910	0.970 D	0.970 J	0.970	
IINY-DU-17A-SBIS1-20200331	N	Benzo(g,h,i)perylene	0.0910	0.340 D	0.340 J	0.340	
IINY-DU-17A-SBIS1-20200331	N	Benzo(k)fluoranthene	0.00910	0.230	0.230 J	0.230 J	I
IINY-DU-17A-SBIS1-20200331	N	Chrysene	0.0910	1.00 D	1.00 J	1.00	
IINY-DU-17A-SBIS1-20200331	N	Dibenz(a,h)anthracene	0.00910	0.150	0.150 J	0.150 J	I
IINY-DU-17A-SBIS1-20200331	N	Fluoranthene	0.0910	1.50 D	1.50 J	1.50	
IINY-DU-17A-SBIS1-20200331	N	Fluorene	0.00910	0.0760 Q	0.0760 J	0.0760 J	I
IINY-DU-17A-SBIS1-20200331	N	Indeno(1,2,3-c,d)pyrene	0.0910	0.290 D	0.290 J	0.290	
IINY-DU-17A-SBIS1-20200331	N	Naphthalene	0.00910	0.200	0.200 J	0.200 J	I
IINY-DU-17A-SBIS1-20200331	N	Phenanthrene	0.0910	1.10 D	1.10 J	1.10	
IINY-DU-17A-SBIS1-20200331	N	Pyrene	0.0910	1.20 D	1.20 J	1.20	
IINY-DU-17A-SSIS-20200331	N	1-Methylnaphthalene	0.0100	0.0300	0.0300 J	0.0300	
IINY-DU-17A-SSIS-20200331	N	2-Methylnaphthalene	0.0100	0.0440	0.0440 J	0.0440	
IINY-DU-17A-SSIS-20200331	N	Acenaphthene	0.0100	0.0350	0.0350 J	0.0350	
IINY-DU-17A-SSIS-20200331	N	Acenaphthylene	0.0100	0.130	0.130 J	0.130	
IINY-DU-17A-SSIS-20200331	N	Anthracene	0.0100	0.170	0.170 J	0.170	
IINY-DU-17A-SSIS-20200331	N	Benzo(a)anthracene	0.0410	0.580 D	0.580 J	0.580	
IINY-DU-17A-SSIS-20200331	N	Benzo(a)pyrene	0.0410	0.500 D	0.500 J	0.500	
IINY-DU-17A-SSIS-20200331	N	Benzo(b)fluoranthene	0.0410	0.880 D	0.880 J	0.880	
IINY-DU-17A-SSIS-20200331	N	Benzo(g,h,i)perylene	0.0410	0.320 D	0.320 J	0.320	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-17A-SSIS-20200331	N	Benzo(k)fluoranthene	0.0100	0.280	0.280 J	0.280	
IINY-DU-17A-SSIS-20200331	N	Chrysene	0.0410	0.660 D	0.660 J	0.660	
IINY-DU-17A-SSIS-20200331	N	Dibenz(a,h)anthracene	0.0100	0.120	0.120 J	0.120	
IINY-DU-17A-SSIS-20200331	N	Fluoranthene	0.0410	1.10 D	1.10 J	1.10	
IINY-DU-17A-SSIS-20200331	N	Fluorene	0.0100	0.0430	0.0430 J	0.0430	
IINY-DU-17A-SSIS-20200331	N	Indeno(1,2,3-c,d)pyrene	0.0410	0.380 D	0.380 J	0.380	
IINY-DU-17A-SSIS-20200331	N	Naphthalene	0.0100	0.0730	0.0730 J	0.0730	
IINY-DU-17A-SSIS-20200331	N	Phenanthrene	0.0410	0.490 D	0.490 J	0.490	
IINY-DU-17A-SSIS-20200331	N	Pyrene	0.0410	1.10 D	1.10 J	1.10	
IINY-DU-17B-SBIS1-20200331	FD	1-Methylnaphthalene	0.00960	0.0980	0.0980 J	0.0980 J	I
IINY-DU-17B-SBIS1-20200331	FD	2-Methylnaphthalene	0.00960	0.140	0.140 J	0.140 J	I
IINY-DU-17B-SBIS1-20200331	FD	Acenaphthene	0.00960	0.0580 Q	0.0580 J	0.0580 J	I
IINY-DU-17B-SBIS1-20200331	FD	Acenaphthylene	0.00960	0.0350 Q	0.0350 J	0.0350 J	I
IINY-DU-17B-SBIS1-20200331	FD	Anthracene	0.00960	0.0810 Q	0.0810 J	0.0810 J	I
IINY-DU-17B-SBIS1-20200331	FD	Benzo(a)anthracene	0.00960	0.200 Q	0.200 J	0.200 J	I
IINY-DU-17B-SBIS1-20200331	FD	Benzo(a)pyrene	0.00960	0.110 M Q	0.110 J	0.110 J	I
IINY-DU-17B-SBIS1-20200331	FD	Benzo(b)fluoranthene	0.00960	0.320 M Q	0.320 J	0.320 J	I
IINY-DU-17B-SBIS1-20200331	FD	Benzo(g,h,i)perylene	0.00960	0.130 Q	0.130 J	0.130 J	I
IINY-DU-17B-SBIS1-20200331	FD	Benzo(k)fluoranthene	0.00960	0.0510 M Q	0.0510 J	0.0510 J	I
IINY-DU-17B-SBIS1-20200331	FD	Chrysene	0.0380	0.480 D Q	0.480 J	0.480 J	I
IINY-DU-17B-SBIS1-20200331	FD	Dibenz(a,h)anthracene	0.00960	0.0680 Q	0.0680 J	0.0680 J	I
IINY-DU-17B-SBIS1-20200331	FD	Fluoranthene	0.0380	0.440 D	0.440 J	0.440 J	I
IINY-DU-17B-SBIS1-20200331	FD	Fluorene	0.00960	0.0640 Q	0.0640 J	0.0640 J	I
IINY-DU-17B-SBIS1-20200331	FD	Indeno(1,2,3-c,d)pyrene	0.00960	0.0850 Q	0.0850 J	0.0850 J	I
IINY-DU-17B-SBIS1-20200331	FD	Naphthalene	0.00960	0.240	0.240 J	0.240 J	I
IINY-DU-17B-SBIS1-20200331	FD	Phenanthrene	0.0380	0.480 D	0.480 J	0.480 J	I
IINY-DU-17B-SBIS1-20200331	FD	Pyrene	0.0380	0.400 D	0.400 J	0.400 J	I

Table of Results with Modified Qualifiers

Modified Qualifiers for test method BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-17B-SSIS-20200331	FD	1-Methylnaphthalene	0.00900	0.0260	0.0260 J	0.0260	
IINY-DU-17B-SSIS-20200331	FD	2-Methylnaphthalene	0.00900	0.0390	0.0390 J	0.0390	
IINY-DU-17B-SSIS-20200331	FD	Acenaphthene	0.00900	0.0280	0.0280 J	0.0280	
IINY-DU-17B-SSIS-20200331	FD	Acenaphthylene	0.00900	0.110	0.110 J	0.110	
IINY-DU-17B-SSIS-20200331	FD	Anthracene	0.00900	0.150	0.150 J	0.150	
IINY-DU-17B-SSIS-20200331	FD	Benzo(a)anthracene	0.0360	0.480 D Q	0.480 J	0.480 J	I
IINY-DU-17B-SSIS-20200331	FD	Benzo(a)pyrene	0.0360	0.410 D Q	0.410 J	0.410 J	I
IINY-DU-17B-SSIS-20200331	FD	Benzo(b)fluoranthene	0.0360	0.710 D Q	0.710 J	0.710 J	I
IINY-DU-17B-SSIS-20200331	FD	Benzo(g,h,i)perylene	0.00900	0.290	0.290 J	0.290	
IINY-DU-17B-SSIS-20200331	FD	Benzo(k)fluoranthene	0.00900	0.240	0.240 J	0.240	
IINY-DU-17B-SSIS-20200331	FD	Chrysene	0.0360	0.570 D Q	0.570 J	0.570 J	I
IINY-DU-17B-SSIS-20200331	FD	Dibenz(a,h)anthracene	0.00900	0.0930	0.0930 J	0.0930	
IINY-DU-17B-SSIS-20200331	FD	Fluoranthene	0.0360	0.940 D	0.940 J	0.940 J	I
IINY-DU-17B-SSIS-20200331	FD	Fluorene	0.00900	0.0350	0.0350 J	0.0350	
IINY-DU-17B-SSIS-20200331	FD	Indeno(1,2,3-c,d)pyrene	0.0360	0.300 D Q	0.300 J	0.300 J	I
IINY-DU-17B-SSIS-20200331	FD	Naphthalene	0.00900	0.0690	0.0690 J	0.0690	
IINY-DU-17B-SSIS-20200331	FD	Phenanthrene	0.0360	0.400 D	0.400 J	0.400 J	I
IINY-DU-17B-SSIS-20200331	FD	Pyrene	0.0360	0.920 D	0.920 J	0.920 J	I
IINY-DU-17C-SBIS1-20200331	FT	1-Methylnaphthalene	0.00890	0.110	0.110 J	0.110 J	I
IINY-DU-17C-SBIS1-20200331	FT	2-Methylnaphthalene	0.00890	0.160	0.160 J	0.160 J	I
IINY-DU-17C-SBIS1-20200331	FT	Acenaphthene	0.00890	0.0870	0.0870 J	0.0870 J	I
IINY-DU-17C-SBIS1-20200331	FT	Acenaphthylene	0.00890	0.0420	0.0420 J	0.0420 J	I
IINY-DU-17C-SBIS1-20200331	FT	Anthracene	0.00890	0.160	0.160 J	0.160 J	I
IINY-DU-17C-SBIS1-20200331	FT	Benzo(a)anthracene	0.0360	0.470 D Q	0.470 J	0.470 J	I
IINY-DU-17C-SBIS1-20200331	FT	Benzo(a)pyrene	0.0360	0.310 D Q	0.310 J	0.310 J	I
IINY-DU-17C-SBIS1-20200331	FT	Benzo(b)fluoranthene	0.0360	0.670 D Q	0.670 J	0.670 J	I
IINY-DU-17C-SBIS1-20200331	FT	Benzo(g,h,i)perylene	0.0360	0.270 D Q	0.270 J	0.270 J	I

Table of Results with Modified Qualifiers

Modified Qualifiers for test method BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-17C-SBIS1-20200331	FT	Benzo(k)fluoranthene	0.00890	0.170 M Q	0.170 J	0.170 J	I
IINY-DU-17C-SBIS1-20200331	FT	Chrysene	0.0360	0.800 D Q	0.800 J	0.800 J	I
IINY-DU-17C-SBIS1-20200331	FT	Dibenz(a,h)anthracene	0.00890	0.130 Q	0.130 J	0.130 J	I
IINY-DU-17C-SBIS1-20200331	FT	Fluoranthene	0.0360	1.00 D	1.00 J	1.00 J	I
IINY-DU-17C-SBIS1-20200331	FT	Fluorene	0.00890	0.110	0.110 J	0.110 J	I
IINY-DU-17C-SBIS1-20200331	FT	Indeno(1,2,3-c,d)pyrene	0.00890	0.250 Q	0.250 J	0.250 J	I
IINY-DU-17C-SBIS1-20200331	FT	Naphthalene	0.00890	0.280	0.280 J	0.280 J	I
IINY-DU-17C-SBIS1-20200331	FT	Phenanthrene	0.0360	0.880 D	0.880 J	0.880 J	I
IINY-DU-17C-SBIS1-20200331	FT	Pyrene	0.0360	0.870 D	0.870 J	0.870 J	I
IINY-DU-17C-SSIS-20200331	FT	1-Methylnaphthalene	0.00930	0.0370	0.0370 J	0.0370	
IINY-DU-17C-SSIS-20200331	FT	2-Methylnaphthalene	0.00930	0.0560	0.0560 J	0.0560	
IINY-DU-17C-SSIS-20200331	FT	Acenaphthene	0.00930	0.0440	0.0440 J	0.0440	
IINY-DU-17C-SSIS-20200331	FT	Acenaphthylene	0.00930	0.180	0.180 J	0.180	
IINY-DU-17C-SSIS-20200331	FT	Anthracene	0.00930	0.240	0.240 J	0.240	
IINY-DU-17C-SSIS-20200331	FT	Benzo(a)anthracene	0.0930	0.890 D Q	0.890 J	0.890	
IINY-DU-17C-SSIS-20200331	FT	Benzo(a)pyrene	0.0930	0.750 D Q	0.750 J	0.750	
IINY-DU-17C-SSIS-20200331	FT	Benzo(b)fluoranthene	0.0930	1.30 D Q	1.30 J	1.30	
IINY-DU-17C-SSIS-20200331	FT	Benzo(g,h,i)perylene	0.0930	0.450 D Q	0.450 J	0.450	
IINY-DU-17C-SSIS-20200331	FT	Benzo(k)fluoranthene	0.0930	0.380 D Q	0.380 J	0.380	
IINY-DU-17C-SSIS-20200331	FT	Chrysene	0.0930	1.00 D Q	1.00 J	1.00	
IINY-DU-17C-SSIS-20200331	FT	Dibenz(a,h)anthracene	0.00930	0.150	0.150 J	0.150	
IINY-DU-17C-SSIS-20200331	FT	Fluoranthene	0.0930	1.60 D	1.60 J	1.60	
IINY-DU-17C-SSIS-20200331	FT	Fluorene	0.00930	0.0600	0.0600 J	0.0600	
IINY-DU-17C-SSIS-20200331	FT	Indeno(1,2,3-c,d)pyrene	0.0930	0.520 D Q	0.520 J	0.520	
IINY-DU-17C-SSIS-20200331	FT	Naphthalene	0.00930	0.0940	0.0940 J	0.0940	
IINY-DU-17C-SSIS-20200331	FT	Phenanthrene	0.0930	0.740 D	0.740 J	0.740	
IINY-DU-17C-SSIS-20200331	FT	Pyrene	0.0930	1.60 D	1.60 J	1.60	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-18A-SBIS1-20200331	N	1-Methylnaphthalene	0.00910	0.100	0.100 J	0.100 J	I
IINY-DU-18A-SBIS1-20200331	N	2-Methylnaphthalene	0.00910	0.120	0.120 J	0.120 J	I
IINY-DU-18A-SBIS1-20200331	N	Acenaphthene	0.00910	0.230 Q	0.230 J	0.230 J	I
IINY-DU-18A-SBIS1-20200331	N	Acenaphthylene	0.00910	0.0410 Q	0.0410 J	0.0410 J	I
IINY-DU-18A-SBIS1-20200331	N	Anthracene	0.00910	0.120 Q	0.120 J	0.120 J	I
IINY-DU-18A-SBIS1-20200331	N	Benzo(a)anthracene	0.00910	0.280 Q	0.280 J	0.280 J	I
IINY-DU-18A-SBIS1-20200331	N	Benzo(a)pyrene	0.00910	0.150 M Q	0.150 J	0.150 J	I
IINY-DU-18A-SBIS1-20200331	N	Benzo(b)fluoranthene	0.0360	0.440 D Q	0.440 J	0.440 J	I
IINY-DU-18A-SBIS1-20200331	N	Benzo(g,h,i)perylene	0.00910	0.140 Q	0.140 J	0.140 J	I
IINY-DU-18A-SBIS1-20200331	N	Benzo(k)fluoranthene	0.00910	0.0750 M Q	0.0750 J	0.0750 J	I
IINY-DU-18A-SBIS1-20200331	N	Chrysene	0.0360	0.650 D Q	0.650 J	0.650 J	I
IINY-DU-18A-SBIS1-20200331	N	Dibenz(a,h)anthracene	0.00910	0.0640 Q	0.0640 J	0.0640 J	I
IINY-DU-18A-SBIS1-20200331	N	Fluoranthene	0.0360	0.720 D Q	0.720 J	0.720 J	I
IINY-DU-18A-SBIS1-20200331	N	Fluorene	0.00910	0.150 Q	0.150 J	0.150 J	I
IINY-DU-18A-SBIS1-20200331	N	Indeno(1,2,3-c,d)pyrene	0.00910	0.100 Q	0.100 J	0.100 J	I
IINY-DU-18A-SBIS1-20200331	N	Naphthalene	0.0360	0.710 D	0.710 J	0.710 J	I
IINY-DU-18A-SBIS1-20200331	N	Phenanthrene	0.0360	0.660 D Q	0.660 J	0.660 J	I
IINY-DU-18A-SBIS1-20200331	N	Pyrene	0.0360	0.620 D Q	0.620 J	0.620 J	I
IINY-DU-18A-SSIS-20200331	N	1-Methylnaphthalene	0.00990	0.0400	0.0400 J	0.0400	
IINY-DU-18A-SSIS-20200331	N	2-Methylnaphthalene	0.00990	0.0700	0.0700 J	0.0700	
IINY-DU-18A-SSIS-20200331	N	Acenaphthene	0.00990	0.0460	0.0460 J	0.0460	
IINY-DU-18A-SSIS-20200331	N	Acenaphthylene	0.00990	0.0590	0.0590 J	0.0590	
IINY-DU-18A-SSIS-20200331	N	Anthracene	0.00990	0.130	0.130 J	0.130	
IINY-DU-18A-SSIS-20200331	N	Benzo(a)anthracene	0.0390	0.490 D Q	0.490 J	0.490 J	I
IINY-DU-18A-SSIS-20200331	N	Benzo(a)pyrene	0.0390	0.440 D Q	0.440 J	0.440 J	I
IINY-DU-18A-SSIS-20200331	N	Benzo(b)fluoranthene	0.0390	0.860 D Q	0.860 J	0.860 J	I
IINY-DU-18A-SSIS-20200331	N	Benzo(g,h,i)perylene	0.00990	0.300	0.300 J	0.300	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-18A-SSIS-20200331	N	Benzo(k)fluoranthene	0.00990	0.210	0.210 J	0.210	
IINY-DU-18A-SSIS-20200331	N	Chrysene	0.0390	0.860 D Q	0.860 J	0.860 J	I
IINY-DU-18A-SSIS-20200331	N	Dibenz(a,h)anthracene	0.00990	0.110	0.110 J	0.110	
IINY-DU-18A-SSIS-20200331	N	Fluoranthene	0.0390	0.970 D Q	0.970 J	0.970 J	I
IINY-DU-18A-SSIS-20200331	N	Fluorene	0.00990	0.0610	0.0610 J	0.0610	
IINY-DU-18A-SSIS-20200331	N	Indeno(1,2,3-c,d)pyrene	0.00990	0.310	0.310 J	0.310	
IINY-DU-18A-SSIS-20200331	N	Naphthalene	0.00990	0.240	0.240 J	0.240	
IINY-DU-18A-SSIS-20200331	N	Phenanthrene	0.0390	0.620 D Q	0.620 J	0.620 J	I
IINY-DU-18A-SSIS-20200331	N	Pyrene	0.0390	0.870 D Q	0.870 J	0.870 J	I
IINY-DU-18B-SBIS1-20200331	FD	1-Methylnaphthalene	0.00910	0.0800	0.0800 J	0.0800 J	I
IINY-DU-18B-SBIS1-20200331	FD	2-Methylnaphthalene	0.00910	0.0950	0.0950 J	0.0950 J	I
IINY-DU-18B-SBIS1-20200331	FD	Acenaphthene	0.00910	0.180 Q	0.180 J	0.180 J	I
IINY-DU-18B-SBIS1-20200331	FD	Acenaphthylene	0.00910	0.0630 Q	0.0630 J	0.0630 J	I
IINY-DU-18B-SBIS1-20200331	FD	Anthracene	0.00910	0.160 Q	0.160 J	0.160 J	I
IINY-DU-18B-SBIS1-20200331	FD	Benzo(a)anthracene	0.0370	0.440 D Q	0.440 J	0.440 J	I
IINY-DU-18B-SBIS1-20200331	FD	Benzo(a)pyrene	0.00910	0.280	0.280 J	0.280 J	I
IINY-DU-18B-SBIS1-20200331	FD	Benzo(b)fluoranthene	0.0370	0.770 D Q	0.770 J	0.770 J	I
IINY-DU-18B-SBIS1-20200331	FD	Benzo(g,h,i)perylene	0.00910	0.240	0.240 J	0.240 J	I
IINY-DU-18B-SBIS1-20200331	FD	Benzo(k)fluoranthene	0.00910	0.140	0.140 J	0.140 J	I
IINY-DU-18B-SBIS1-20200331	FD	Chrysene	0.0370	1.10 D Q	1.10 J	1.10 J	I
IINY-DU-18B-SBIS1-20200331	FD	Dibenz(a,h)anthracene	0.00910	0.100	0.100 J	0.100 J	I
IINY-DU-18B-SBIS1-20200331	FD	Fluoranthene	0.0370	0.930 D Q	0.930 J	0.930 J	I
IINY-DU-18B-SBIS1-20200331	FD	Fluorene	0.00910	0.140 Q	0.140 J	0.140 J	I
IINY-DU-18B-SBIS1-20200331	FD	Indeno(1,2,3-c,d)pyrene	0.00910	0.220	0.220 J	0.220 J	I
IINY-DU-18B-SBIS1-20200331	FD	Naphthalene	0.0370	0.460 D	0.460 J	0.460 J	I
IINY-DU-18B-SBIS1-20200331	FD	Phenanthrene	0.0370	0.860 D Q	0.860 J	0.860 J	I
IINY-DU-18B-SBIS1-20200331	FD	Pyrene	0.0370	0.890 D Q	0.890 J	0.890 J	I

Table of Results with Modified Qualifiers

Modified Qualifiers for test method BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-18B-SSIS-20200331	FD	1-Methylnaphthalene	0.00940	0.0400	0.0400 J	0.0400 J	I
IINY-DU-18B-SSIS-20200331	FD	2-Methylnaphthalene	0.00940	0.0600	0.0600 J	0.0600 J	I
IINY-DU-18B-SSIS-20200331	FD	Acenaphthene	0.00940	0.0550 Q	0.0550 J	0.0550 J	I
IINY-DU-18B-SSIS-20200331	FD	Acenaphthylene	0.00940	0.0740 Q	0.0740 J	0.0740 J	I
IINY-DU-18B-SSIS-20200331	FD	Anthracene	0.00940	0.170 Q	0.170 J	0.170 J	I
IINY-DU-18B-SSIS-20200331	FD	Benzo(a)anthracene	0.0380	0.630 D	0.630 J	0.630 J	I
IINY-DU-18B-SSIS-20200331	FD	Benzo(a)pyrene	0.0380	0.580 D	0.580 J	0.580 J	I
IINY-DU-18B-SSIS-20200331	FD	Benzo(b)fluoranthene	0.0380	1.10 D	1.10 J	1.10 J	I
IINY-DU-18B-SSIS-20200331	FD	Benzo(g,h,i)perylene	0.0380	0.410 D	0.410 J	0.410 J	I
IINY-DU-18B-SSIS-20200331	FD	Benzo(k)fluoranthene	0.00940	0.310	0.310 J	0.310 J	I
IINY-DU-18B-SSIS-20200331	FD	Chrysene	0.0380	1.10 D	1.10 J	1.10 J	I
IINY-DU-18B-SSIS-20200331	FD	Dibenz(a,h)anthracene	0.00940	0.160	0.160 J	0.160 J	I
IINY-DU-18B-SSIS-20200331	FD	Fluoranthene	0.0380	1.20 D Q	1.20 J	1.20 J	I
IINY-DU-18B-SSIS-20200331	FD	Fluorene	0.00940	0.0710 Q	0.0710 J	0.0710 J	I
IINY-DU-18B-SSIS-20200331	FD	Indeno(1,2,3-c,d)pyrene	0.0380	0.450 D	0.450 J	0.450 J	I
IINY-DU-18B-SSIS-20200331	FD	Naphthalene	0.00940	0.200	0.200 J	0.200 J	I
IINY-DU-18B-SSIS-20200331	FD	Phenanthrene	0.0380	0.780 D Q	0.780 J	0.780 J	I
IINY-DU-18B-SSIS-20200331	FD	Pyrene	0.0380	1.10 D Q	1.10 J	1.10 J	I
IINY-DU-18C-SBIS1-20200331	FT	1-Methylnaphthalene	0.00890	0.0860	0.0860 J	0.0860 J	I
IINY-DU-18C-SBIS1-20200331	FT	2-Methylnaphthalene	0.00890	0.100	0.100 J	0.100 J	I
IINY-DU-18C-SBIS1-20200331	FT	Acenaphthene	0.00890	0.180 Q	0.180 J	0.180 J	I
IINY-DU-18C-SBIS1-20200331	FT	Acenaphthylene	0.00890	0.0660 Q	0.0660 J	0.0660 J	I
IINY-DU-18C-SBIS1-20200331	FT	Anthracene	0.00890	0.230 Q	0.230 J	0.230 J	I
IINY-DU-18C-SBIS1-20200331	FT	Benzo(a)anthracene	0.0890	0.790 D	0.790 J	0.790	
IINY-DU-18C-SBIS1-20200331	FT	Benzo(a)pyrene	0.0890	0.640 D	0.640 J	0.640	
IINY-DU-18C-SBIS1-20200331	FT	Benzo(b)fluoranthene	0.0890	1.30 D	1.30 J	1.30	
IINY-DU-18C-SBIS1-20200331	FT	Benzo(g,h,i)perylene	0.0890	0.510 D	0.510 J	0.510	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-18C-SBIS1-20200331	FT	Benzo(k)fluoranthene	0.0890	0.280 D	0.280 J	0.280	
IINY-DU-18C-SBIS1-20200331	FT	Chrysene	0.0890	1.70 D	1.70 J	1.70	
IINY-DU-18C-SBIS1-20200331	FT	Dibenz(a,h)anthracene	0.00890	0.200	0.200 J	0.200 J	I
IINY-DU-18C-SBIS1-20200331	FT	Fluoranthene	0.0890	1.40 D Q	1.40 J	1.40	
IINY-DU-18C-SBIS1-20200331	FT	Fluorene	0.00890	0.160 Q	0.160 J	0.160 J	I
IINY-DU-18C-SBIS1-20200331	FT	Indeno(1,2,3-c,d)pyrene	0.0890	0.450 D	0.450 J	0.450	
IINY-DU-18C-SBIS1-20200331	FT	Naphthalene	0.0890	0.510 D	0.510 J	0.510	
IINY-DU-18C-SBIS1-20200331	FT	Phenanthrene	0.0890	1.40 D Q	1.40 J	1.40	
IINY-DU-18C-SBIS1-20200331	FT	Pyrene	0.0890	1.30 D Q	1.30 J	1.30	
IINY-DU-18C-SSIS-20200331	FT	1-Methylnaphthalene	0.00890	0.0410	0.0410 J	0.0410 J	I
IINY-DU-18C-SSIS-20200331	FT	2-Methylnaphthalene	0.00890	0.0720	0.0720 J	0.0720 J	I
IINY-DU-18C-SSIS-20200331	FT	Acenaphthene	0.00890	0.0520 Q	0.0520 J	0.0520 J	I
IINY-DU-18C-SSIS-20200331	FT	Acenaphthylene	0.00890	0.120 Q	0.120 J	0.120 J	I
IINY-DU-18C-SSIS-20200331	FT	Anthracene	0.00890	0.210 Q	0.210 J	0.210 J	I
IINY-DU-18C-SSIS-20200331	FT	Benzo(a)anthracene	0.0890	1.00 D Q	1.00 J	1.00	
IINY-DU-18C-SSIS-20200331	FT	Benzo(a)pyrene	0.0890	0.920 D Q	0.920 J	0.920	
IINY-DU-18C-SSIS-20200331	FT	Benzo(b)fluoranthene	0.0890	1.60 D Q	1.60 J	1.60	
IINY-DU-18C-SSIS-20200331	FT	Benzo(g,h,i)perylene	0.0890	0.640 D Q	0.640 J	0.640	
IINY-DU-18C-SSIS-20200331	FT	Benzo(k)fluoranthene	0.0890	0.450 D Q	0.450 J	0.450	
IINY-DU-18C-SSIS-20200331	FT	Chrysene	0.0890	1.50 D Q	1.50 J	1.50	
IINY-DU-18C-SSIS-20200331	FT	Dibenz(a,h)anthracene	0.00890	0.190	0.190 J	0.190 J	I
IINY-DU-18C-SSIS-20200331	FT	Fluoranthene	0.0890	1.70 D Q	1.70 J	1.70	
IINY-DU-18C-SSIS-20200331	FT	Fluorene	0.00890	0.0680 Q	0.0680 J	0.0680 J	I
IINY-DU-18C-SSIS-20200331	FT	Indeno(1,2,3-c,d)pyrene	0.0890	0.710 D Q	0.710 J	0.710	
IINY-DU-18C-SSIS-20200331	FT	Naphthalene	0.00890	0.240	0.240 J	0.240 J	I
IINY-DU-18C-SSIS-20200331	FT	Phenanthrene	0.0890	0.900 D Q	0.900 J	0.900	
IINY-DU-18C-SSIS-20200331	FT	Pyrene	0.0890	1.70 D Q	1.70 J	1.70	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-19A-SBIS1-20200331	N	1-Methylnaphthalene	0.00940	0.00110 J	0.00110 J	0.00110 J	TR
IINY-DU-19A-SBIS1-20200331	N	2-Methylnaphthalene	0.00940	0.00170 J	0.00170 J	0.00170 J	TR
IINY-DU-19A-SBIS1-20200331	N	Acenaphthene	0.00940	0.00240 J	0.00240 J	0.00240 J	TR
IINY-DU-19A-SBIS1-20200331	N	Acenaphthylene	0.00940	0.00660 J	0.00660 J	0.00660 J	TR
IINY-DU-19A-SBIS1-20200331	N	Anthracene	0.00940	0.00670 J	0.00670 J	0.00670 J	TR
IINY-DU-19A-SBIS1-20200331	N	Benzo(a)anthracene	0.00940	0.0240	0.0240 J	0.0240	
IINY-DU-19A-SBIS1-20200331	N	Benzo(a)pyrene	0.00940	0.0290	0.0290 J	0.0290	
IINY-DU-19A-SBIS1-20200331	N	Benzo(b)fluoranthene	0.00940	0.0450	0.0450 J	0.0450	
IINY-DU-19A-SBIS1-20200331	N	Benzo(g,h,i)perylene	0.00940	0.0250	0.0250 J	0.0250	
IINY-DU-19A-SBIS1-20200331	N	Benzo(k)fluoranthene	0.00940	0.0130	0.0130 J	0.0130	
IINY-DU-19A-SBIS1-20200331	N	Chrysene	0.00940	0.0270	0.0270 J	0.0270	
IINY-DU-19A-SBIS1-20200331	N	Dibenz(a,h)anthracene	0.00940	0.00610 J	0.00610 J	0.00610 J	TR
IINY-DU-19A-SBIS1-20200331	N	Fluoranthene	0.00940	0.0460	0.0460 J	0.0460	
IINY-DU-19A-SBIS1-20200331	N	Fluorene	0.00940	0.00370 J	0.00370 J	0.00370 J	TR
IINY-DU-19A-SBIS1-20200331	N	Indeno(1,2,3-c,d)pyrene	0.00940	0.0270	0.0270 J	0.0270	
IINY-DU-19A-SBIS1-20200331	N	Naphthalene	0.00940	0.00190 J	0.00190 J	0.00190 J	TR
IINY-DU-19A-SBIS1-20200331	N	Phenanthrene	0.00940	0.0220	0.0220 J	0.0220	
IINY-DU-19A-SBIS1-20200331	N	Pyrene	0.00940	0.0440	0.0440 J	0.0440	
IINY-DU-19A-SSIS-20200331	N	1-Methylnaphthalene	0.00920	0.0230	0.0230 J	0.0230	
IINY-DU-19A-SSIS-20200331	N	2-Methylnaphthalene	0.00920	0.0350 J1	0.0350 J	0.0350 J	D
IINY-DU-19A-SSIS-20200331	N	Acenaphthene	0.00920	0.0600	0.0600 J	0.0600	
IINY-DU-19A-SSIS-20200331	N	Acenaphthylene	0.00920	0.270 J1	0.270 J	0.270 J	D
IINY-DU-19A-SSIS-20200331	N	Anthracene	0.180	0.430 D J1	0.430 J	0.430	
IINY-DU-19A-SSIS-20200331	N	Benzo(a)anthracene	0.180	2.50 D J1	2.50 J	2.50	
IINY-DU-19A-SSIS-20200331	N	Benzo(a)pyrene	0.180	1.90 D J1	1.90 J	1.90	
IINY-DU-19A-SSIS-20200331	N	Benzo(b)fluoranthene	0.180	3.40 D J1	3.40 J	3.40	
IINY-DU-19A-SSIS-20200331	N	Benzo(g,h,i)perylene	0.180	1.10 D J1	1.10 J	1.10	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-19A-SSIS-20200331	N	Benzo(k)fluoranthene	0.180	1.20 D J1	1.20 J	1.20	
IINY-DU-19A-SSIS-20200331	N	Chrysene	0.180	2.30 D J1	2.30 J	2.30	
IINY-DU-19A-SSIS-20200331	N	Dibenz(a,h)anthracene	0.180	0.410 D J1	0.410 J	0.410	
IINY-DU-19A-SSIS-20200331	N	Fluoranthene	0.180	4.00 D J1	4.00 J	4.00	
IINY-DU-19A-SSIS-20200331	N	Fluorene	0.00920	0.0770 J1	0.0770 J	0.0770 J	M
IINY-DU-19A-SSIS-20200331	N	Indeno(1,2,3-c,d)pyrene	0.180	1.50 D J1	1.50 J	1.50	
IINY-DU-19A-SSIS-20200331	N	Naphthalene	0.00920	0.0830 J1	0.0830 J	0.0830 J	D
IINY-DU-19A-SSIS-20200331	N	Phenanthrene	0.180	1.50 D J1	1.50 J	1.50	
IINY-DU-19A-SSIS-20200331	N	Pyrene	0.180	3.20 D J1	3.20 J	3.20	
IINY-DU-19B-SBIS1-20200331	FD	1-Methylnaphthalene	0.00940	0.00120 J	0.00120 J	0.00120 J	TR
IINY-DU-19B-SBIS1-20200331	FD	2-Methylnaphthalene	0.00940	0.00190 J	0.00190 J	0.00190 J	TR
IINY-DU-19B-SBIS1-20200331	FD	Acenaphthene	0.00940	0.00150 J	0.00150 J	0.00150 J	TR
IINY-DU-19B-SBIS1-20200331	FD	Acenaphthylene	0.00940	0.00690 J	0.00690 J	0.00690 J	TR
IINY-DU-19B-SBIS1-20200331	FD	Anthracene	0.00940	0.00640 J	0.00640 J	0.00640 J	TR
IINY-DU-19B-SBIS1-20200331	FD	Benzo(a)anthracene	0.00940	0.0290	0.0290 J	0.0290	
IINY-DU-19B-SBIS1-20200331	FD	Benzo(a)pyrene	0.00940	0.0310	0.0310 J	0.0310	
IINY-DU-19B-SBIS1-20200331	FD	Benzo(b)fluoranthene	0.00940	0.0470	0.0470 J	0.0470	
IINY-DU-19B-SBIS1-20200331	FD	Benzo(g,h,i)perylene	0.00940	0.0280	0.0280 J	0.0280	
IINY-DU-19B-SBIS1-20200331	FD	Benzo(k)fluoranthene	0.00940	0.0150	0.0150 J	0.0150	
IINY-DU-19B-SBIS1-20200331	FD	Chrysene	0.00940	0.0330	0.0330 J	0.0330	
IINY-DU-19B-SBIS1-20200331	FD	Dibenz(a,h)anthracene	0.00940	0.00670 J	0.00670 J	0.00670 J	TR
IINY-DU-19B-SBIS1-20200331	FD	Fluoranthene	0.00940	0.0530	0.0530 J	0.0530	
IINY-DU-19B-SBIS1-20200331	FD	Fluorene	0.00940	0.00280 J	0.00280 J	0.00280 J	TR
IINY-DU-19B-SBIS1-20200331	FD	Indeno(1,2,3-c,d)pyrene	0.00940	0.0290	0.0290 J	0.0290	
IINY-DU-19B-SBIS1-20200331	FD	Naphthalene	0.00940	0.00220 J	0.00220 J	0.00220 J	TR
IINY-DU-19B-SBIS1-20200331	FD	Phenanthrene	0.00940	0.0230	0.0230 J	0.0230	
IINY-DU-19B-SBIS1-20200331	FD	Pyrene	0.00940	0.0520	0.0520 J	0.0520	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-19B-SSIS-20200331	FD	1-Methylnaphthalene	0.00960	0.0120	0.0120 J	0.0120	
IINY-DU-19B-SSIS-20200331	FD	2-Methylnaphthalene	0.00960	0.0180	0.0180 J	0.0180 J	D
IINY-DU-19B-SSIS-20200331	FD	Acenaphthene	0.00960	0.0260	0.0260 J	0.0260	
IINY-DU-19B-SSIS-20200331	FD	Acenaphthylene	0.00960	0.130	0.130 J	0.130 J	D
IINY-DU-19B-SSIS-20200331	FD	Anthracene	0.00960	0.190	0.190 J	0.190	
IINY-DU-19B-SSIS-20200331	FD	Benzo(a)anthracene	0.0960	1.10 D	1.10 J	1.10	
IINY-DU-19B-SSIS-20200331	FD	Benzo(a)pyrene	0.0960	0.900 D	0.900 J	0.900	
IINY-DU-19B-SSIS-20200331	FD	Benzo(b)fluoranthene	0.0960	1.60 D	1.60 J	1.60	
IINY-DU-19B-SSIS-20200331	FD	Benzo(g,h,i)perylene	0.0960	0.550 D	0.550 J	0.550	
IINY-DU-19B-SSIS-20200331	FD	Benzo(k)fluoranthene	0.0960	0.590 D	0.590 J	0.590	
IINY-DU-19B-SSIS-20200331	FD	Chrysene	0.0960	0.980 D	0.980 J	0.980	
IINY-DU-19B-SSIS-20200331	FD	Dibenz(a,h)anthracene	0.00960	0.260	0.260 J	0.260	
IINY-DU-19B-SSIS-20200331	FD	Fluoranthene	0.0960	1.60 D	1.60 J	1.60	
IINY-DU-19B-SSIS-20200331	FD	Fluorene	0.00960	0.0280	0.0280 J	0.0280 J	M
IINY-DU-19B-SSIS-20200331	FD	Indeno(1,2,3-c,d)pyrene	0.0960	0.770 D	0.770 J	0.770	
IINY-DU-19B-SSIS-20200331	FD	Naphthalene	0.00960	0.0460	0.0460 J	0.0460 J	D
IINY-DU-19B-SSIS-20200331	FD	Phenanthrene	0.0960	0.520 D	0.520 J	0.520	
IINY-DU-19B-SSIS-20200331	FD	Pyrene	0.0960	1.30 D	1.30 J	1.30	
IINY-DU-19C-SBIS1-20200331	FT	1-Methylnaphthalene	0.00940	0.000640 J	0.000640 J	0.000640 J	TR
IINY-DU-19C-SBIS1-20200331	FT	2-Methylnaphthalene	0.00940	0.000930 J	0.000930 J	0.000930 J	TR
IINY-DU-19C-SBIS1-20200331	FT	Acenaphthene	0.00940	0.000870 J	0.000870 J	0.000870 J	TR
IINY-DU-19C-SBIS1-20200331	FT	Acenaphthylene	0.00940	0.00340 J	0.00340 J	0.00340 J	TR
IINY-DU-19C-SBIS1-20200331	FT	Anthracene	0.00940	0.00320 J	0.00320 J	0.00320 J	TR
IINY-DU-19C-SBIS1-20200331	FT	Benzo(a)anthracene	0.00940	0.0130	0.0130 J	0.0130	
IINY-DU-19C-SBIS1-20200331	FT	Benzo(a)pyrene	0.00940	0.0150	0.0150 J	0.0150	
IINY-DU-19C-SBIS1-20200331	FT	Benzo(b)fluoranthene	0.00940	0.0230	0.0230 J	0.0230	
IINY-DU-19C-SBIS1-20200331	FT	Benzo(g,h,i)perylene	0.00940	0.0150	0.0150 J	0.0150	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-19C-SBIS1-20200331	FT	Benzo(k)fluoranthene	0.00940	0.00720 J	0.00720 J	0.00720 J	TR
IINY-DU-19C-SBIS1-20200331	FT	Chrysene	0.00940	0.0140	0.0140 J	0.0140	
IINY-DU-19C-SBIS1-20200331	FT	Dibenz(a,h)anthracene	0.00940	0.00390 J	0.00390 J	0.00390 J	TR
IINY-DU-19C-SBIS1-20200331	FT	Fluoranthene	0.00940	0.0230	0.0230 J	0.0230	
IINY-DU-19C-SBIS1-20200331	FT	Fluorene	0.00940	0.00110 J	0.00110 J	0.00110 J	TR
IINY-DU-19C-SBIS1-20200331	FT	Indeno(1,2,3-c,d)pyrene	0.00940	0.0140	0.0140 J	0.0140	
IINY-DU-19C-SBIS1-20200331	FT	Naphthalene	0.00940	0.00190 U	0.00190 UJ	0.00190 U	
IINY-DU-19C-SBIS1-20200331	FT	Phenanthrene	0.00940	0.00910 J	0.00910 J	0.00910 J	TR
IINY-DU-19C-SBIS1-20200331	FT	Pyrene	0.00940	0.0230	0.0230 J	0.0230	
IINY-DU-19C-SSIS-20200331	FT	1-Methylnaphthalene	0.0100	0.0170	0.0170 J	0.0170	
IINY-DU-19C-SSIS-20200331	FT	2-Methylnaphthalene	0.0100	0.0280	0.0280 J	0.0280 J	D
IINY-DU-19C-SSIS-20200331	FT	Acenaphthene	0.0100	0.0270	0.0270 J	0.0270	
IINY-DU-19C-SSIS-20200331	FT	Acenaphthylene	0.0100	0.210	0.210 J	0.210 J	D
IINY-DU-19C-SSIS-20200331	FT	Anthracene	0.0100	0.240	0.240 J	0.240	
IINY-DU-19C-SSIS-20200331	FT	Benzo(a)anthracene	0.100	1.10 D	1.10 J	1.10	
IINY-DU-19C-SSIS-20200331	FT	Benzo(a)pyrene	0.100	0.980 D	0.980 J	0.980	
IINY-DU-19C-SSIS-20200331	FT	Benzo(b)fluoranthene	0.100	1.80 D	1.80 J	1.80	
IINY-DU-19C-SSIS-20200331	FT	Benzo(g,h,i)perylene	0.100	0.640 D	0.640 J	0.640	
IINY-DU-19C-SSIS-20200331	FT	Benzo(k)fluoranthene	0.100	0.590 D	0.590 J	0.590	
IINY-DU-19C-SSIS-20200331	FT	Chrysene	0.100	1.10 D	1.10 J	1.10	
IINY-DU-19C-SSIS-20200331	FT	Dibenz(a,h)anthracene	0.0100	0.270	0.270 J	0.270	
IINY-DU-19C-SSIS-20200331	FT	Fluoranthene	0.100	1.70 D	1.70 J	1.70	
IINY-DU-19C-SSIS-20200331	FT	Fluorene	0.0100	0.0390	0.0390 J	0.0390 J	M
IINY-DU-19C-SSIS-20200331	FT	Indeno(1,2,3-c,d)pyrene	0.100	0.820 D	0.820 J	0.820	
IINY-DU-19C-SSIS-20200331	FT	Naphthalene	0.0100	0.0680	0.0680 J	0.0680 J	D
IINY-DU-19C-SSIS-20200331	FT	Phenanthrene	0.100	0.580 D	0.580 J	0.580	
IINY-DU-19C-SSIS-20200331	FT	Pyrene	0.100	1.40 D	1.40 J	1.40	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW6010C

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-19A-SSIS-20200331	N	Calcium	84.0	10000 J1	10000	10000 J	A
IINY-DU-19A-SSIS-20200331	N	Iron	67.0	23000 J1	23000	23000 J	A
IINY-DU-19B-SSIS-20200331	FD	Magnesium	30.0	8300	8300 J	8300 J	M/A

Modified Qualifiers for test method SW6020A

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-18C-SSIS-20200331	FT	Vanadium	0.490	29.0	29.0	29.0 J	A
IINY-DU-19A-SBIS1-20200331	N	Barium	0.360	34.0	34.0	34.0 J	
IINY-DU-19A-SBIS1-20200331	N	Manganese	0.900	270	270	270 J	
IINY-DU-19A-SSIS-20200331	N	Barium	0.400	81.0 J1	81.0 J	81.0 J	D/M2
IINY-DU-19A-SSIS-20200331	N	Manganese	0.990	410 J1	410 J	410 J	D/M2

Modified Qualifiers for test method SW8082A

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-17A-SBIS1-20200331	N	PCB-1260 (Aroclor 1260)	0.0670	0.00680 U Q	0.00680 UJ	0.00680 UJ	I/V2
IINY-DU-17A-SSIS-20200331	N	PCB-1268 (Aroclor 1268)	0.0640	0.00650 U M	0.00650 U	0.00650 UJ	V2
IINY-DU-17B-SBIS1-20200331	FD	PCB-1260 (Aroclor 1260)	0.0620	0.00630 U Q	0.00630 UJ	0.00630 UJ	I/V2
IINY-DU-17B-SSIS-20200331	FD	PCB-1268 (Aroclor 1268)	0.0590	0.00590 U M	0.00590 U	0.00590 UJ	V2
IINY-DU-17C-SBIS1-20200331	FT	PCB-1260 (Aroclor 1260)	0.0600	0.00310 J	0.00310 J	0.00310 J	I/TR/V2/P1
IINY-DU-17C-SSIS-20200331	FT	PCB-1268 (Aroclor 1268)	0.0590	0.00590 U M Q	0.00590 U	0.00590 UJ	V2
IINY-DU-18A-SBIS1-20200331	N	PCB-1262 (Aroclor 1262)	0.0640	0.150 M	0.150	0.150 J	V2
IINY-DU-18A-SSIS-20200331	N	PCB-1268 (Aroclor 1268)	0.0620	0.00630 U M	0.00630 U	0.00630 UJ	V2
IINY-DU-18B-SBIS1-20200331	FD	PCB-1262 (Aroclor 1262)	0.0590	0.100	0.100	0.100 J	V2
IINY-DU-18B-SSIS-20200331	FD	PCB-1268 (Aroclor 1268)	0.0610	0.00610 U M Q	0.00610 U	0.00610 UJ	V2
IINY-DU-18C-SBIS1-20200331	FT	PCB-1262 (Aroclor 1262)	0.0610	0.0570 J	0.0570 J	0.0570 J	TR/V2
IINY-DU-18C-SSIS-20200331	FT	PCB-1268 (Aroclor 1268)	0.0630	0.00630 U M	0.00630 UJ	0.00630 UJ	I/V2
IINY-DU-19A-SBIS1-20200331	N	PCB-1260 (Aroclor 1260)	0.0640	0.0500 J	0.0500 J	0.0500 J	TR/V2
IINY-DU-19A-SSIS-20200331	N	PCB-1260 (Aroclor 1260)	0.0630	0.0110 J J1	0.0110 J	0.0110 J	M/TR/P1/V2
IINY-DU-19B-SBIS1-20200331	FD	PCB-1260 (Aroclor 1260)	0.0630	0.0490 J	0.0490 J	0.0490 J	TR/V2/P1
IINY-DU-19B-SSIS-20200331	FD	PCB-1260 (Aroclor 1260)	0.0590	0.00710 J	0.00710 J	0.00710 J	M/TR/P1/V2

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8082A

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-19C-SBIS1-20200331	FT	PCB-1260 (Aroclor 1260)	0.0640	0.0540 J	0.0540 J	0.0540 J	TR/V2
IINY-DU-19C-SSIS-20200331	FT	PCB-1260 (Aroclor 1260)	0.0620	0.00220 J	0.00220 J	0.00220 J	M/I/TR/P1/V2

Modified Qualifiers for test method SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-17A-SBIS1-20200331	N	1,3,5-Trinitrobenzene	0.0950	0.0380 U M	0.0380 UJ	0.0380 U	
IINY-DU-17A-SBIS1-20200331	N	1,3-Dinitrobenzene	0.0950	0.0380 U Q	0.0380 UJ	0.0380 UJ	C
IINY-DU-17A-SBIS1-20200331	N	2,4,6-Trinitrotoluene	0.0950	0.0950 U Q	0.0950 UJ	0.0950 UJ	C
IINY-DU-17A-SBIS1-20200331	N	2,4-Dinitrotoluene	0.0950	0.0380 U M Q	0.0380 UJ	0.0380 UJ	C
IINY-DU-17A-SBIS1-20200331	N	2,6-Dinitrotoluene	0.0950	0.0380 U Q	0.0380 UJ	0.0380 UJ	C
IINY-DU-17A-SBIS1-20200331	N	2-Amino-4,6-dinitrotoluene	0.0950	0.0950 U M	0.0950 UJ	0.0950 U	
IINY-DU-17A-SBIS1-20200331	N	2-Nitrotoluene	0.190	0.0950 U	0.0950 UJ	0.0950 U	
IINY-DU-17A-SBIS1-20200331	N	3,5-Dinitroaniline	0.0950	0.0190 U	0.0190 UJ	0.0190 U	
IINY-DU-17A-SBIS1-20200331	N	3-Nitrotoluene	0.190	0.190 U Q	0.190 UJ	0.190 UJ	C
IINY-DU-17A-SBIS1-20200331	N	4-Amino-2,6-dinitrotoluene	0.0950	0.0950 U M	0.0950 UJ	0.0950 U	
IINY-DU-17A-SBIS1-20200331	N	4-Nitrotoluene	0.190	0.0950 U M Q	0.0950 UJ	0.0950 UJ	C
IINY-DU-17A-SBIS1-20200331	N	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0950 U	0.0950 UJ	0.0950 U	
IINY-DU-17A-SBIS1-20200331	N	Nitrobenzene	0.290	0.190 U Q	0.190 UJ	0.190 UJ	C
IINY-DU-17A-SBIS1-20200331	N	Nitroglycerin	1.90	0.670 U M	0.670 UJ	0.670 U	
IINY-DU-17A-SBIS1-20200331	N	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0950	0.0670 U	0.0670 UJ	0.0670 U	
IINY-DU-17A-SBIS1-20200331	N	Pentaerythritol tetranitrate	1.90	0.950 U	0.950 UJ	0.950 U	
IINY-DU-17A-SBIS1-20200331	N	Tetryl	0.190	0.0950 U Q	0.0950 UJ	0.0950 UJ	C
IINY-DU-17A-SSIS-20200331	N	1,3,5-Trinitrobenzene	0.0960	0.0380 U M	0.0380 UJ	0.0380 U	
IINY-DU-17A-SSIS-20200331	N	1,3-Dinitrobenzene	0.0960	0.0380 U Q	0.0380 UJ	0.0380 UJ	C
IINY-DU-17A-SSIS-20200331	N	2,4,6-Trinitrotoluene	0.0960	0.0960 U Q	0.0960 UJ	0.0960 UJ	C
IINY-DU-17A-SSIS-20200331	N	2,4-Dinitrotoluene	0.0960	0.0380 U Q	0.0380 UJ	0.0380 UJ	C
IINY-DU-17A-SSIS-20200331	N	2,6-Dinitrotoluene	0.0960	0.0380 U Q	0.0380 UJ	0.0380 UJ	C
IINY-DU-17A-SSIS-20200331	N	2-Amino-4,6-dinitrotoluene	0.0960	0.0960 U M	0.0960 UJ	0.0960 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-17A-SSIS-20200331	N	2-Nitrotoluene	0.190	0.0960 U	0.0960 UJ	0.0960 U	
IINY-DU-17A-SSIS-20200331	N	3,5-Dinitroaniline	0.0960	0.0190 U	0.0190 UJ	0.0190 U	
IINY-DU-17A-SSIS-20200331	N	3-Nitrotoluene	0.190	0.190 U Q	0.190 UJ	0.190 UJ	C
IINY-DU-17A-SSIS-20200331	N	4-Amino-2,6-dinitrotoluene	0.0960	0.0960 U	0.0960 UJ	0.0960 U	
IINY-DU-17A-SSIS-20200331	N	4-Nitrotoluene	0.190	0.0960 U Q	0.0960 UJ	0.0960 UJ	C
IINY-DU-17A-SSIS-20200331	N	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0960 U	0.0960 UJ	0.0960 U	
IINY-DU-17A-SSIS-20200331	N	Nitrobenzene	0.290	0.190 U M Q	0.190 UJ	0.190 UJ	C
IINY-DU-17A-SSIS-20200331	N	Nitroglycerin	1.90	0.670 U	0.670 UJ	0.670 U	
IINY-DU-17A-SSIS-20200331	N	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0960	0.0670 U M	0.0670 UJ	0.0670 U	
IINY-DU-17A-SSIS-20200331	N	Pentaerythritol tetranitrate	1.90	0.960 U	0.960 UJ	0.960 U	
IINY-DU-17A-SSIS-20200331	N	Tetryl	0.190	0.0960 U Q	0.190 UJ	0.190 U	C
IINY-DU-17B-SBIS1-20200331	FD	1,3,5-Trinitrobenzene	0.0950	0.0380 U M	0.0380 UJ	0.0380 U	
IINY-DU-17B-SBIS1-20200331	FD	1,3-Dinitrobenzene	0.0950	0.0380 U Q	0.0380 UJ	0.0380 UJ	C
IINY-DU-17B-SBIS1-20200331	FD	2,4,6-Trinitrotoluene	0.0950	0.0950 U Q	0.0950 UJ	0.0950 UJ	C
IINY-DU-17B-SBIS1-20200331	FD	2,4-Dinitrotoluene	0.0950	0.0380 U Q	0.0380 UJ	0.0380 UJ	C
IINY-DU-17B-SBIS1-20200331	FD	2,6-Dinitrotoluene	0.0950	0.0380 U Q	0.0380 UJ	0.0380 UJ	C
IINY-DU-17B-SBIS1-20200331	FD	2-Amino-4,6-dinitrotoluene	0.0950	0.0950 U M	0.0950 UJ	0.0950 U	
IINY-DU-17B-SBIS1-20200331	FD	2-Nitrotoluene	0.190	0.0950 U	0.0950 UJ	0.0950 U	
IINY-DU-17B-SBIS1-20200331	FD	3,5-Dinitroaniline	0.0950	0.0190 U	0.0190 UJ	0.0190 U	
IINY-DU-17B-SBIS1-20200331	FD	3-Nitrotoluene	0.190	0.190 U Q	0.190 UJ	0.190 UJ	C
IINY-DU-17B-SBIS1-20200331	FD	4-Amino-2,6-dinitrotoluene	0.0950	0.0950 U M	0.0950 UJ	0.0950 U	
IINY-DU-17B-SBIS1-20200331	FD	4-Nitrotoluene	0.190	0.0950 U Q	0.0950 UJ	0.0950 UJ	C
IINY-DU-17B-SBIS1-20200331	FD	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0950 U	0.0950 UJ	0.0950 U	
IINY-DU-17B-SBIS1-20200331	FD	Nitrobenzene	0.290	0.190 U Q	0.190 UJ	0.190 UJ	C
IINY-DU-17B-SBIS1-20200331	FD	Nitroglycerin	1.90	0.670 U	0.670 UJ	0.670 U	
IINY-DU-17B-SBIS1-20200331	FD	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0950	0.0670 U	0.0670 UJ	0.0670 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-17B-SBIS1-20200331	FD	Pentaerythritol tetranitrate	1.90	0.950 U	0.950 UJ	0.950 U	
IINY-DU-17B-SBIS1-20200331	FD	Tetryl	0.190	0.0950 U Q	0.0950 UJ	0.0950 UJ	C
IINY-DU-17B-SSIS-20200331	FD	1,3,5-Trinitrobenzene	0.0930	0.0370 U M Q	0.0370 UJ	0.0370 UJ	I
IINY-DU-17B-SSIS-20200331	FD	1,3-Dinitrobenzene	0.0930	0.0370 U Q	0.0370 UJ	0.0370 UJ	I/C
IINY-DU-17B-SSIS-20200331	FD	2,4,6-Trinitrotoluene	0.0930	0.0930 U Q	0.0930 UJ	0.0930 UJ	I/C
IINY-DU-17B-SSIS-20200331	FD	2,4-Dinitrotoluene	0.0930	0.0370 U Q	0.0370 UJ	0.0370 UJ	I/C
IINY-DU-17B-SSIS-20200331	FD	2,6-Dinitrotoluene	0.0930	0.0370 U Q	0.0370 UJ	0.0370 UJ	I/C
IINY-DU-17B-SSIS-20200331	FD	2-Amino-4,6-dinitrotoluene	0.0930	0.0930 U M Q	0.0930 UJ	0.0930 UJ	I
IINY-DU-17B-SSIS-20200331	FD	2-Nitrotoluene	0.190	0.0930 U Q	0.0930 UJ	0.0930 UJ	I
IINY-DU-17B-SSIS-20200331	FD	3,5-Dinitroaniline	0.0930	0.0190 U Q	0.0190 UJ	0.0190 UJ	I
IINY-DU-17B-SSIS-20200331	FD	3-Nitrotoluene	0.190	0.190 U Q	0.190 UJ	0.190 UJ	I/C
IINY-DU-17B-SSIS-20200331	FD	4-Amino-2,6-dinitrotoluene	0.0930	0.0930 U Q	0.0930 UJ	0.0930 UJ	I
IINY-DU-17B-SSIS-20200331	FD	4-Nitrotoluene	0.190	0.0930 U Q	0.0930 UJ	0.0930 UJ	I/C
IINY-DU-17B-SSIS-20200331	FD	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0930 U	0.0930 UJ	0.0930 U	
IINY-DU-17B-SSIS-20200331	FD	Nitrobenzene	0.280	0.190 U Q	0.190 UJ	0.190 UJ	I/C
IINY-DU-17B-SSIS-20200331	FD	Nitroglycerin	1.90	0.650 U Q	0.650 UJ	0.650 UJ	I
IINY-DU-17B-SSIS-20200331	FD	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0930	0.0650 U M Q	0.0650 UJ	0.0650 UJ	I
IINY-DU-17B-SSIS-20200331	FD	Pentaerythritol tetranitrate	1.90	0.930 U Q	0.930 UJ	0.930 UJ	I
IINY-DU-17B-SSIS-20200331	FD	Tetryl	0.190	0.0930 U Q	0.0930 UJ	0.0930 UJ	I/C
IINY-DU-17C-SBIS1-20200331	FT	1,3,5-Trinitrobenzene	0.0960	0.0380 U M	0.0380 UJ	0.0380 U	
IINY-DU-17C-SBIS1-20200331	FT	1,3-Dinitrobenzene	0.0960	0.0380 U Q	0.0380 UJ	0.0380 UJ	C
IINY-DU-17C-SBIS1-20200331	FT	2,4,6-Trinitrotoluene	0.0960	0.0960 U Q	0.0960 UJ	0.0960 UJ	C
IINY-DU-17C-SBIS1-20200331	FT	2,4-Dinitrotoluene	0.0960	0.0380 U Q	0.0380 UJ	0.0380 UJ	C
IINY-DU-17C-SBIS1-20200331	FT	2,6-Dinitrotoluene	0.0960	0.0380 U Q	0.0380 UJ	0.0380 UJ	C
IINY-DU-17C-SBIS1-20200331	FT	2-Amino-4,6-dinitrotoluene	0.0960	0.0960 U Q	0.0960 UJ	0.0960 UJ	I
IINY-DU-17C-SBIS1-20200331	FT	2-Nitrotoluene	0.190	0.0960 U	0.0960 UJ	0.0960 U	
IINY-DU-17C-SBIS1-20200331	FT	3,5-Dinitroaniline	0.0960	0.0190 U	0.0190 UJ	0.0190 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-17C-SBIS1-20200331	FT	3-Nitrotoluene	0.190	0.190 U Q	0.190 UJ	0.190 UJ	C
IINY-DU-17C-SBIS1-20200331	FT	4-Amino-2,6-dinitrotoluene	0.0960	0.0960 U M	0.0960 UJ	0.0960 U	
IINY-DU-17C-SBIS1-20200331	FT	4-Nitrotoluene	0.190	0.0960 U Q	0.0960 UJ	0.0960 UJ	C
IINY-DU-17C-SBIS1-20200331	FT	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0960 U	0.0960 UJ	0.0960 U	
IINY-DU-17C-SBIS1-20200331	FT	Nitrobenzene	0.290	0.190 U Q	0.190 UJ	0.190 UJ	C
IINY-DU-17C-SBIS1-20200331	FT	Nitroglycerin	1.90	0.670 U M	0.670 UJ	0.670 U	
IINY-DU-17C-SBIS1-20200331	FT	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0960	0.0670 U	0.0670 UJ	0.0670 U	
IINY-DU-17C-SBIS1-20200331	FT	Pentaerythritol tetranitrate	1.90	0.960 U	0.960 UJ	0.960 U	
IINY-DU-17C-SBIS1-20200331	FT	Tetryl	0.190	0.0960 U Q	0.0960 UJ	0.0960 UJ	C
IINY-DU-17C-SSIS-20200331	FT	1,3,5-Trinitrobenzene	0.0920	0.0370 U M	0.0370 UJ	0.0370 U	
IINY-DU-17C-SSIS-20200331	FT	1,3-Dinitrobenzene	0.0920	0.0370 U Q	0.0370 UJ	0.0370 UJ	C
IINY-DU-17C-SSIS-20200331	FT	2,4,6-Trinitrotoluene	0.0920	0.0920 U Q	0.0920 UJ	0.0920 UJ	C
IINY-DU-17C-SSIS-20200331	FT	2,4-Dinitrotoluene	0.0920	0.0370 U Q	0.0370 UJ	0.0370 UJ	C
IINY-DU-17C-SSIS-20200331	FT	2,6-Dinitrotoluene	0.0920	0.0370 U Q	0.0370 UJ	0.0370 UJ	C
IINY-DU-17C-SSIS-20200331	FT	2-Amino-4,6-dinitrotoluene	0.0920	0.0920 U M	0.0920 UJ	0.0920 U	
IINY-DU-17C-SSIS-20200331	FT	2-Nitrotoluene	0.180	0.0920 U	0.0920 UJ	0.0920 U	
IINY-DU-17C-SSIS-20200331	FT	3,5-Dinitroaniline	0.0920	0.0180 U	0.0180 UJ	0.0180 U	
IINY-DU-17C-SSIS-20200331	FT	3-Nitrotoluene	0.180	0.180 U Q	0.180 UJ	0.180 UJ	C
IINY-DU-17C-SSIS-20200331	FT	4-Amino-2,6-dinitrotoluene	0.0920	0.0920 U	0.0920 UJ	0.0920 U	
IINY-DU-17C-SSIS-20200331	FT	4-Nitrotoluene	0.180	0.0920 U Q	0.0920 UJ	0.0920 UJ	C
IINY-DU-17C-SSIS-20200331	FT	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.180	0.0920 U M	0.0920 UJ	0.0920 U	
IINY-DU-17C-SSIS-20200331	FT	Nitrobenzene	0.280	0.180 U M Q	0.180 UJ	0.180 UJ	C
IINY-DU-17C-SSIS-20200331	FT	Nitroglycerin	1.80	0.640 U M	0.640 UJ	0.640 U	
IINY-DU-17C-SSIS-20200331	FT	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0920	0.0640 U M	0.0640 UJ	0.0640 U	
IINY-DU-17C-SSIS-20200331	FT	Pentaerythritol tetranitrate	1.80	0.920 U	0.920 UJ	0.920 U	
IINY-DU-17C-SSIS-20200331	FT	Tetryl	0.180	0.0920 U Q	0.0920 UJ	0.0920 UJ	C

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-18A-SBIS1-20200331	N	1,3,5-Trinitrobenzene	0.0960	0.0390 U M Q	0.0390 UJ	0.0390 UJ	I
IINY-DU-18A-SBIS1-20200331	N	1,3-Dinitrobenzene	0.0960	0.0390 U Q	0.0390 UJ	0.0390 UJ	I/C
IINY-DU-18A-SBIS1-20200331	N	2,4,6-Trinitrotoluene	0.0960	0.0960 U Q	0.0960 UJ	0.0960 UJ	I/C
IINY-DU-18A-SBIS1-20200331	N	2,4-Dinitrotoluene	0.0960	0.0390 U Q	0.0390 UJ	0.0390 UJ	I/C
IINY-DU-18A-SBIS1-20200331	N	2,6-Dinitrotoluene	0.0960	0.0390 U Q	0.0390 UJ	0.0390 UJ	I/C
IINY-DU-18A-SBIS1-20200331	N	2-Amino-4,6-dinitrotoluene	0.0960	0.0960 U Q M	0.0960 UJ	0.0960 UJ	I
IINY-DU-18A-SBIS1-20200331	N	2-Nitrotoluene	0.190	0.0960 U Q	0.0960 UJ	0.0960 UJ	I
IINY-DU-18A-SBIS1-20200331	N	3,5-Dinitroaniline	0.0960	0.0190 U Q	0.0190 UJ	0.0190 UJ	I
IINY-DU-18A-SBIS1-20200331	N	3-Nitrotoluene	0.190	0.190 U Q	0.190 UJ	0.190 UJ	I/C
IINY-DU-18A-SBIS1-20200331	N	4-Amino-2,6-dinitrotoluene	0.0960	0.0960 U M Q	0.0960 UJ	0.0960 UJ	I
IINY-DU-18A-SBIS1-20200331	N	4-Nitrotoluene	0.190	0.0960 U Q	0.0960 UJ	0.0960 UJ	I/C
IINY-DU-18A-SBIS1-20200331	N	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0960 U M Q	0.0960 UJ	0.0960 UJ	I
IINY-DU-18A-SBIS1-20200331	N	Nitrobenzene	0.290	0.190 U Q	0.190 UJ	0.190 UJ	I/C
IINY-DU-18A-SBIS1-20200331	N	Nitroglycerin	1.90	0.680 U M Q	0.680 UJ	0.680 UJ	I
IINY-DU-18A-SBIS1-20200331	N	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0960	0.0680 U M Q	0.0680 UJ	0.0680 UJ	I
IINY-DU-18A-SBIS1-20200331	N	Pentaerythritol tetranitrate	1.90	0.960 U Q	0.960 UJ	0.960 UJ	I
IINY-DU-18A-SBIS1-20200331	N	Tetryl	0.190	0.0960 U Q	0.0960 UJ	0.0960 UJ	I/C
IINY-DU-18A-SSIS-20200331	N	1,3,5-Trinitrobenzene	0.0940	0.0370 U M	0.0370 UJ	0.0370 U	
IINY-DU-18A-SSIS-20200331	N	1,3-Dinitrobenzene	0.0940	0.0370 U Q	0.0370 UJ	0.0370 UJ	C
IINY-DU-18A-SSIS-20200331	N	2,4,6-Trinitrotoluene	0.0940	0.0940 U Q	0.0940 UJ	0.0940 UJ	C
IINY-DU-18A-SSIS-20200331	N	2,4-Dinitrotoluene	0.0940	0.0370 U Q	0.0370 UJ	0.0370 UJ	C
IINY-DU-18A-SSIS-20200331	N	2,6-Dinitrotoluene	0.0940	0.0370 U M Q	0.0370 UJ	0.0370 UJ	C
IINY-DU-18A-SSIS-20200331	N	2-Amino-4,6-dinitrotoluene	0.0940	0.0940 U	0.0940 UJ	0.0940 U	
IINY-DU-18A-SSIS-20200331	N	2-Nitrotoluene	0.190	0.0940 U	0.0940 UJ	0.0940 U	
IINY-DU-18A-SSIS-20200331	N	3,5-Dinitroaniline	0.0940	0.0190 U	0.0190 UJ	0.0190 U	
IINY-DU-18A-SSIS-20200331	N	3-Nitrotoluene	0.190	0.190 U Q	0.190 UJ	0.190 UJ	C
IINY-DU-18A-SSIS-20200331	N	4-Amino-2,6-dinitrotoluene	0.0940	0.0940 U M	0.0940 UJ	0.0940 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-18A-SSIS-20200331	N	4-Nitrotoluene	0.190	0.0940 U Q	0.0940 UJ	0.0940 UJ	C
IINY-DU-18A-SSIS-20200331	N	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0940 U Q M	0.0940 UJ	0.0940 UJ	I
IINY-DU-18A-SSIS-20200331	N	Nitrobenzene	0.280	0.190 U M Q	0.190 UJ	0.190 UJ	C
IINY-DU-18A-SSIS-20200331	N	Nitroglycerin	1.90	0.650 U M	0.650 UJ	0.650 U	
IINY-DU-18A-SSIS-20200331	N	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0940	0.0650 U M	0.0650 UJ	0.0650 U	
IINY-DU-18A-SSIS-20200331	N	Pentaerythritol tetranitrate	1.90	0.940 U	0.940 UJ	0.940 U	
IINY-DU-18A-SSIS-20200331	N	Tetryl	0.190	0.0940 U Q	0.0940 UJ	0.0940 UJ	I/C
IINY-DU-18B-SBIS1-20200331	FD	1,3,5-Trinitrobenzene	0.0960	0.0390 U M Q	0.0390 UJ	0.0390 UJ	I
IINY-DU-18B-SBIS1-20200331	FD	1,3-Dinitrobenzene	0.0960	0.0390 U Q	0.0390 UJ	0.0390 UJ	I/C
IINY-DU-18B-SBIS1-20200331	FD	2,4,6-Trinitrotoluene	0.0960	0.0960 U Q	0.0960 UJ	0.0960 UJ	I/C
IINY-DU-18B-SBIS1-20200331	FD	2,4-Dinitrotoluene	0.0960	0.0390 U Q	0.0390 UJ	0.0390 UJ	I/C
IINY-DU-18B-SBIS1-20200331	FD	2,6-Dinitrotoluene	0.0960	0.0390 U Q	0.0390 UJ	0.0390 UJ	I/C
IINY-DU-18B-SBIS1-20200331	FD	2-Amino-4,6-dinitrotoluene	0.0960	0.0960 U M Q	0.0960 UJ	0.0960 UJ	I
IINY-DU-18B-SBIS1-20200331	FD	2-Nitrotoluene	0.190	0.0960 U Q	0.0960 UJ	0.0960 UJ	I
IINY-DU-18B-SBIS1-20200331	FD	3,5-Dinitroaniline	0.0960	0.0190 U Q	0.0190 UJ	0.0190 UJ	I
IINY-DU-18B-SBIS1-20200331	FD	3-Nitrotoluene	0.190	0.190 U Q	0.190 UJ	0.190 UJ	I/C
IINY-DU-18B-SBIS1-20200331	FD	4-Amino-2,6-dinitrotoluene	0.0960	0.0960 U M Q	0.0960 UJ	0.0960 UJ	I
IINY-DU-18B-SBIS1-20200331	FD	4-Nitrotoluene	0.190	0.0960 U Q M	0.0960 UJ	0.0960 UJ	I/C
IINY-DU-18B-SBIS1-20200331	FD	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0960 U M Q	0.0960 UJ	0.0960 UJ	I
IINY-DU-18B-SBIS1-20200331	FD	Nitrobenzene	0.290	0.190 U Q	0.190 UJ	0.190 UJ	I/C
IINY-DU-18B-SBIS1-20200331	FD	Nitroglycerin	1.90	0.670 U M Q	0.670 UJ	0.670 UJ	I
IINY-DU-18B-SBIS1-20200331	FD	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0960	0.0670 U M Q	0.0670 UJ	0.0670 UJ	I
IINY-DU-18B-SBIS1-20200331	FD	Pentaerythritol tetranitrate	1.90	0.960 U Q	0.960 UJ	0.960 UJ	I
IINY-DU-18B-SBIS1-20200331	FD	Tetryl	0.190	0.0960 U Q	0.0960 UJ	0.0960 UJ	I/C
IINY-DU-18B-SSIS-20200331	FD	1,3,5-Trinitrobenzene	0.0980	0.0390 U M	0.0390 UJ	0.0390 U	
IINY-DU-18B-SSIS-20200331	FD	1,3-Dinitrobenzene	0.0980	0.0390 U Q	0.0390 UJ	0.0390 UJ	C

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-18B-SSIS-20200331	FD	2,4,6-Trinitrotoluene	0.0980	0.0980 U Q	0.0980 UJ	0.0980 UJ	C
IINY-DU-18B-SSIS-20200331	FD	2,4-Dinitrotoluene	0.0980	0.0390 U Q	0.0390 UJ	0.0390 UJ	C
IINY-DU-18B-SSIS-20200331	FD	2,6-Dinitrotoluene	0.0980	0.0390 U M Q	0.0390 UJ	0.0390 UJ	C
IINY-DU-18B-SSIS-20200331	FD	2-Amino-4,6-dinitrotoluene	0.0980	0.0980 U	0.0980 UJ	0.0980 U	
IINY-DU-18B-SSIS-20200331	FD	2-Nitrotoluene	0.200	0.0980 U	0.0980 UJ	0.0980 U	
IINY-DU-18B-SSIS-20200331	FD	3,5-Dinitroaniline	0.0980	0.0200 U	0.0200 UJ	0.0200 U	
IINY-DU-18B-SSIS-20200331	FD	3-Nitrotoluene	0.200	0.200 U Q	0.200 UJ	0.200 UJ	C
IINY-DU-18B-SSIS-20200331	FD	4-Amino-2,6-dinitrotoluene	0.0980	0.0980 U M	0.0980 UJ	0.0980 U	
IINY-DU-18B-SSIS-20200331	FD	4-Nitrotoluene	0.200	0.0980 U M Q	0.0980 UJ	0.0980 UJ	C
IINY-DU-18B-SSIS-20200331	FD	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.200	0.0980 U M	0.0980 UJ	0.0980 U	
IINY-DU-18B-SSIS-20200331	FD	Nitrobenzene	0.290	0.200 U M Q	0.200 UJ	0.200 UJ	C
IINY-DU-18B-SSIS-20200331	FD	Nitroglycerin	2.00	0.680 U M	0.680 UJ	0.680 U	
IINY-DU-18B-SSIS-20200331	FD	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0980	0.0680 U M	0.0680 UJ	0.0680 U	
IINY-DU-18B-SSIS-20200331	FD	Pentaerythritol tetranitrate	2.00	0.980 U	0.980 UJ	0.980 U	
IINY-DU-18B-SSIS-20200331	FD	Tetryl	0.200	0.0980 U Q	0.0980 UJ	0.0980 UJ	C
IINY-DU-18C-SBIS1-20200331	FT	1,3,5-Trinitrobenzene	0.0940	0.0380 U M Q	0.0380 UJ	0.0380 UJ	I
IINY-DU-18C-SBIS1-20200331	FT	1,3-Dinitrobenzene	0.0940	0.0380 U Q	0.0380 UJ	0.0380 UJ	I/C
IINY-DU-18C-SBIS1-20200331	FT	2,4,6-Trinitrotoluene	0.0940	0.0940 U Q	0.0940 UJ	0.0940 UJ	I/C
IINY-DU-18C-SBIS1-20200331	FT	2,4-Dinitrotoluene	0.0940	0.0380 U Q	0.0380 UJ	0.0380 UJ	I/C
IINY-DU-18C-SBIS1-20200331	FT	2,6-Dinitrotoluene	0.0940	0.0380 U Q	0.0380 UJ	0.0380 UJ	I/C
IINY-DU-18C-SBIS1-20200331	FT	2-Amino-4,6-dinitrotoluene	0.0940	0.0940 U Q	0.0940 UJ	0.0940 UJ	I
IINY-DU-18C-SBIS1-20200331	FT	2-Nitrotoluene	0.190	0.0940 U Q	0.0940 UJ	0.0940 UJ	I
IINY-DU-18C-SBIS1-20200331	FT	3,5-Dinitroaniline	0.0940	0.0190 U Q	0.0190 UJ	0.0190 UJ	I
IINY-DU-18C-SBIS1-20200331	FT	3-Nitrotoluene	0.190	0.190 U Q	0.190 UJ	0.190 UJ	I/C
IINY-DU-18C-SBIS1-20200331	FT	4-Amino-2,6-dinitrotoluene	0.0940	0.0940 U M Q	0.0940 UJ	0.0940 UJ	I
IINY-DU-18C-SBIS1-20200331	FT	4-Nitrotoluene	0.190	0.0940 U Q	0.0940 UJ	0.0940 UJ	I/C
IINY-DU-18C-SBIS1-20200331	FT	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0940 U Q	0.0940 UJ	0.0940 UJ	I

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-18C-SBIS1-20200331	FT	Nitrobenzene	0.280	0.190 U Q	0.190 UJ	0.190 UJ	I/C
IINY-DU-18C-SBIS1-20200331	FT	Nitroglycerin	1.90	0.660 U M Q	0.660 UJ	0.660 UJ	I
IINY-DU-18C-SBIS1-20200331	FT	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0940	0.0660 U M Q	0.0660 UJ	0.0660 UJ	I
IINY-DU-18C-SBIS1-20200331	FT	Pentaerythritol tetranitrate	1.90	0.940 U Q	0.940 UJ	0.940 UJ	I
IINY-DU-18C-SBIS1-20200331	FT	Tetryl	0.190	0.0940 U Q	0.0940 UJ	0.0940 UJ	I/C
IINY-DU-18C-SSIS-20200331	FT	1,3,5-Trinitrobenzene	0.0960	0.0380 U M	0.0380 UJ	0.0380 U	
IINY-DU-18C-SSIS-20200331	FT	1,3-Dinitrobenzene	0.0960	0.0380 U Q	0.0380 UJ	0.0380 UJ	C
IINY-DU-18C-SSIS-20200331	FT	2,4,6-Trinitrotoluene	0.0960	0.0960 U Q	0.0960 UJ	0.0960 UJ	C
IINY-DU-18C-SSIS-20200331	FT	2,4-Dinitrotoluene	0.0960	0.0380 U Q	0.0380 UJ	0.0380 UJ	C
IINY-DU-18C-SSIS-20200331	FT	2,6-Dinitrotoluene	0.0960	0.0380 U Q	0.0380 UJ	0.0380 UJ	C
IINY-DU-18C-SSIS-20200331	FT	2-Amino-4,6-dinitrotoluene	0.0960	0.0960 U M	0.0960 UJ	0.0960 U	
IINY-DU-18C-SSIS-20200331	FT	2-Nitrotoluene	0.190	0.0960 U	0.0960 UJ	0.0960 U	
IINY-DU-18C-SSIS-20200331	FT	3,5-Dinitroaniline	0.0960	0.0190 U	0.0190 UJ	0.0190 U	
IINY-DU-18C-SSIS-20200331	FT	3-Nitrotoluene	0.190	0.190 U Q	0.190 UJ	0.190 UJ	C
IINY-DU-18C-SSIS-20200331	FT	4-Amino-2,6-dinitrotoluene	0.0960	0.0960 U	0.0960 UJ	0.0960 U	
IINY-DU-18C-SSIS-20200331	FT	4-Nitrotoluene	0.190	0.0960 U Q	0.0960 UJ	0.0960 UJ	C
IINY-DU-18C-SSIS-20200331	FT	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0960 U Q M	0.0960 UJ	0.0960 UJ	I
IINY-DU-18C-SSIS-20200331	FT	Nitrobenzene	0.290	0.190 U M Q	0.190 UJ	0.190 UJ	C
IINY-DU-18C-SSIS-20200331	FT	Nitroglycerin	1.90	0.670 U M	0.670 UJ	0.670 U	
IINY-DU-18C-SSIS-20200331	FT	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0960	0.0670 U M	0.0670 UJ	0.0670 U	
IINY-DU-18C-SSIS-20200331	FT	Pentaerythritol tetranitrate	1.90	0.960 U	0.960 UJ	0.960 U	
IINY-DU-18C-SSIS-20200331	FT	Tetryl	0.190	0.0960 U Q	0.0960 UJ	0.0960 UJ	C
IINY-DU-19A-SBIS1-20200331	N	1,3,5-Trinitrobenzene	0.0960	0.0380 U	0.0380 UJ	0.0380 U	
IINY-DU-19A-SBIS1-20200331	N	1,3-Dinitrobenzene	0.0960	0.0380 U Q	0.0380 UJ	0.0380 UJ	C
IINY-DU-19A-SBIS1-20200331	N	2,4,6-Trinitrotoluene	0.0960	0.0960 U Q	0.0960 UJ	0.0960 UJ	C
IINY-DU-19A-SBIS1-20200331	N	2,4-Dinitrotoluene	0.0960	0.0380 U Q	0.0380 UJ	0.0380 UJ	C

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-19A-SBIS1-20200331	N	2,6-Dinitrotoluene	0.0960	0.0380 U Q	0.0380 UJ	0.0380 UJ	C
IINY-DU-19A-SBIS1-20200331	N	2-Amino-4,6-dinitrotoluene	0.0960	0.0960 U	0.0960 UJ	0.0960 U	
IINY-DU-19A-SBIS1-20200331	N	2-Nitrotoluene	0.190	0.0960 U	0.0960 UJ	0.0960 U	
IINY-DU-19A-SBIS1-20200331	N	3,5-Dinitroaniline	0.0960	0.0190 U	0.0190 UJ	0.0190 U	
IINY-DU-19A-SBIS1-20200331	N	3-Nitrotoluene	0.190	0.190 U Q	0.190 UJ	0.190 UJ	C
IINY-DU-19A-SBIS1-20200331	N	4-Amino-2,6-dinitrotoluene	0.0960	0.0960 U	0.0960 UJ	0.0960 U	
IINY-DU-19A-SBIS1-20200331	N	4-Nitrotoluene	0.190	0.0960 U Q	0.0960 UJ	0.0960 UJ	C
IINY-DU-19A-SBIS1-20200331	N	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0960 U	0.0960 UJ	0.0960 U	
IINY-DU-19A-SBIS1-20200331	N	Nitrobenzene	0.290	0.190 U Q	0.190 UJ	0.190 UJ	C
IINY-DU-19A-SBIS1-20200331	N	Nitroglycerin	1.90	0.670 U	0.670 UJ	0.670 U	
IINY-DU-19A-SBIS1-20200331	N	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0960	0.0670 U	0.0670 UJ	0.0670 U	
IINY-DU-19A-SBIS1-20200331	N	Pentaerythritol tetranitrate	1.90	0.960 U	0.960 UJ	0.960 U	
IINY-DU-19A-SBIS1-20200331	N	Tetryl	0.190	0.0960 U Q	0.0960 UJ	0.0960 UJ	C
IINY-DU-19A-SSIS-20200331	N	1,3,5-Trinitrobenzene	0.0990	0.0390 U	0.0390 UJ	0.0390 U	
IINY-DU-19A-SSIS-20200331	N	1,3-Dinitrobenzene	0.0990	0.0390 U Q	0.0390 UJ	0.0390 UJ	C
IINY-DU-19A-SSIS-20200331	N	2,4,6-Trinitrotoluene	0.0990	0.0990 U Q	0.0990 UJ	0.0990 UJ	C
IINY-DU-19A-SSIS-20200331	N	2,4-Dinitrotoluene	0.0990	0.0390 U Q	0.0390 UJ	0.0390 UJ	C
IINY-DU-19A-SSIS-20200331	N	2,6-Dinitrotoluene	0.0990	0.0390 U Q	0.0390 UJ	0.0390 UJ	C
IINY-DU-19A-SSIS-20200331	N	2-Amino-4,6-dinitrotoluene	0.0990	0.0990 U M	0.0990 UJ	0.0990 U	
IINY-DU-19A-SSIS-20200331	N	2-Nitrotoluene	0.200	0.0990 U	0.0990 UJ	0.0990 U	
IINY-DU-19A-SSIS-20200331	N	3,5-Dinitroaniline	0.0990	0.0200 U M J1	0.0200 UJ	0.0200 UJ	M
IINY-DU-19A-SSIS-20200331	N	3-Nitrotoluene	0.200	0.200 U Q	0.200 UJ	0.200 UJ	C
IINY-DU-19A-SSIS-20200331	N	4-Amino-2,6-dinitrotoluene	0.0990	0.0990 U	0.0990 UJ	0.0990 U	
IINY-DU-19A-SSIS-20200331	N	4-Nitrotoluene	0.200	0.0990 U Q	0.0990 UJ	0.0990 UJ	C
IINY-DU-19A-SSIS-20200331	N	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.200	0.0990 U	0.0990 UJ	0.0990 U	
IINY-DU-19A-SSIS-20200331	N	Nitrobenzene	0.300	0.200 U Q	0.200 UJ	0.200 UJ	C
IINY-DU-19A-SSIS-20200331	N	Nitroglycerin	2.00	0.690 U	0.690 UJ	0.690 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-19A-SSIS-20200331	N	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0990	0.0690 U	0.0690 UJ	0.0690 U	
IINY-DU-19A-SSIS-20200331	N	Pentaerythritol tetranitrate	2.00	0.990 U	0.990 UJ	0.990 U	
IINY-DU-19A-SSIS-20200331	N	Tetryl	0.200	0.0990 U Q	0.0990 UJ	0.0990 UJ	C
IINY-DU-19B-SBIS1-20200331	FD	1,3,5-Trinitrobenzene	0.0960	0.0380 U	0.0380 UJ	0.0380 U	
IINY-DU-19B-SBIS1-20200331	FD	1,3-Dinitrobenzene	0.0960	0.0380 U Q	0.0380 UJ	0.0380 UJ	C
IINY-DU-19B-SBIS1-20200331	FD	2,4,6-Trinitrotoluene	0.0960	0.0960 U Q	0.0960 UJ	0.0960 UJ	C
IINY-DU-19B-SBIS1-20200331	FD	2,4-Dinitrotoluene	0.0960	0.0380 U Q	0.0380 UJ	0.0380 UJ	C
IINY-DU-19B-SBIS1-20200331	FD	2,6-Dinitrotoluene	0.0960	0.0380 U Q	0.0380 UJ	0.0380 UJ	C
IINY-DU-19B-SBIS1-20200331	FD	2-Amino-4,6-dinitrotoluene	0.0960	0.0960 U	0.0960 UJ	0.0960 U	
IINY-DU-19B-SBIS1-20200331	FD	2-Nitrotoluene	0.190	0.0960 U	0.0960 UJ	0.0960 U	
IINY-DU-19B-SBIS1-20200331	FD	3,5-Dinitroaniline	0.0960	0.0190 U	0.0190 UJ	0.0190 U	
IINY-DU-19B-SBIS1-20200331	FD	3-Nitrotoluene	0.190	0.190 U Q	0.190 UJ	0.190 UJ	C
IINY-DU-19B-SBIS1-20200331	FD	4-Amino-2,6-dinitrotoluene	0.0960	0.0960 U	0.0960 UJ	0.0960 U	
IINY-DU-19B-SBIS1-20200331	FD	4-Nitrotoluene	0.190	0.0960 U Q	0.0960 UJ	0.0960 UJ	C
IINY-DU-19B-SBIS1-20200331	FD	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.190	0.0960 U	0.0960 UJ	0.0960 U	
IINY-DU-19B-SBIS1-20200331	FD	Nitrobenzene	0.290	0.190 U Q	0.190 UJ	0.190 UJ	C
IINY-DU-19B-SBIS1-20200331	FD	Nitroglycerin	1.90	0.670 U	0.670 UJ	0.670 U	
IINY-DU-19B-SBIS1-20200331	FD	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0960	0.0670 U	0.0670 UJ	0.0670 U	
IINY-DU-19B-SBIS1-20200331	FD	Pentaerythritol tetranitrate	1.90	0.960 U	0.960 UJ	0.960 U	
IINY-DU-19B-SBIS1-20200331	FD	Tetryl	0.190	0.0960 U Q	0.0960 UJ	0.0960 UJ	C
IINY-DU-19B-SSIS-20200331	FD	1,3,5-Trinitrobenzene	0.100	0.0400 U	0.0400 UJ	0.0400 U	
IINY-DU-19B-SSIS-20200331	FD	1,3-Dinitrobenzene	0.100	0.0400 U Q	0.0400 UJ	0.0400 UJ	C
IINY-DU-19B-SSIS-20200331	FD	2,4,6-Trinitrotoluene	0.100	0.100 U Q	0.100 UJ	0.100 UJ	C
IINY-DU-19B-SSIS-20200331	FD	2,4-Dinitrotoluene	0.100	0.0400 U Q	0.0400 UJ	0.0400 UJ	C
IINY-DU-19B-SSIS-20200331	FD	2,6-Dinitrotoluene	0.100	0.0400 U Q	0.0400 UJ	0.0400 UJ	C
IINY-DU-19B-SSIS-20200331	FD	2-Amino-4,6-dinitrotoluene	0.100	0.100 U M	0.100 UJ	0.100 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-19B-SSIS-20200331	FD	2-Nitrotoluene	0.200	0.100 U	0.100 UJ	0.100 U	
IINY-DU-19B-SSIS-20200331	FD	3,5-Dinitroaniline	0.100	0.0200 U	0.0200 UJ	0.0200 UJ	M
IINY-DU-19B-SSIS-20200331	FD	3-Nitrotoluene	0.200	0.200 U Q	0.200 UJ	0.200 UJ	C
IINY-DU-19B-SSIS-20200331	FD	4-Amino-2,6-dinitrotoluene	0.100	0.100 U	0.100 UJ	0.100 U	
IINY-DU-19B-SSIS-20200331	FD	4-Nitrotoluene	0.200	0.100 U Q	0.100 UJ	0.100 UJ	C
IINY-DU-19B-SSIS-20200331	FD	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.200	0.100 U	0.100 UJ	0.100 U	
IINY-DU-19B-SSIS-20200331	FD	Nitrobenzene	0.300	0.200 U M Q	0.200 UJ	0.200 UJ	C
IINY-DU-19B-SSIS-20200331	FD	Nitroglycerin	2.00	0.700 U	0.700 UJ	0.700 U	
IINY-DU-19B-SSIS-20200331	FD	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.100	0.0700 U	0.0700 UJ	0.0700 U	
IINY-DU-19B-SSIS-20200331	FD	Pentaerythritol tetranitrate	2.00	1.00 U	1.00 UJ	1.00 U	
IINY-DU-19B-SSIS-20200331	FD	Tetryl	0.200	0.100 U Q	0.100 UJ	0.100 UJ	C
IINY-DU-19C-SBIS1-20200331	FT	1,3,5-Trinitrobenzene	0.0990	0.0400 U	0.0400 UJ	0.0400 U	
IINY-DU-19C-SBIS1-20200331	FT	1,3-Dinitrobenzene	0.0990	0.0400 U Q	0.0400 UJ	0.0400 UJ	C
IINY-DU-19C-SBIS1-20200331	FT	2,4,6-Trinitrotoluene	0.0990	0.0990 U Q	0.0990 UJ	0.0990 UJ	C
IINY-DU-19C-SBIS1-20200331	FT	2,4-Dinitrotoluene	0.0990	0.0400 U Q	0.0400 UJ	0.0400 UJ	C
IINY-DU-19C-SBIS1-20200331	FT	2,6-Dinitrotoluene	0.0990	0.0400 U Q	0.0400 UJ	0.0400 UJ	C
IINY-DU-19C-SBIS1-20200331	FT	2-Amino-4,6-dinitrotoluene	0.0990	0.0990 U	0.0990 UJ	0.0990 U	
IINY-DU-19C-SBIS1-20200331	FT	2-Nitrotoluene	0.200	0.0990 U	0.0990 UJ	0.0990 U	
IINY-DU-19C-SBIS1-20200331	FT	3,5-Dinitroaniline	0.0990	0.0200 U	0.0200 UJ	0.0200 U	
IINY-DU-19C-SBIS1-20200331	FT	3-Nitrotoluene	0.200	0.200 U Q	0.200 UJ	0.200 UJ	C
IINY-DU-19C-SBIS1-20200331	FT	4-Amino-2,6-dinitrotoluene	0.0990	0.0990 U	0.0990 UJ	0.0990 U	
IINY-DU-19C-SBIS1-20200331	FT	4-Nitrotoluene	0.200	0.0990 U Q	0.0990 UJ	0.0990 UJ	C
IINY-DU-19C-SBIS1-20200331	FT	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.200	0.0990 U	0.0990 UJ	0.0990 U	
IINY-DU-19C-SBIS1-20200331	FT	Nitrobenzene	0.300	0.200 U Q	0.200 UJ	0.200 UJ	C
IINY-DU-19C-SBIS1-20200331	FT	Nitroglycerin	2.00	0.690 U	0.690 UJ	0.690 U	
IINY-DU-19C-SBIS1-20200331	FT	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0990	0.0690 U	0.0690 UJ	0.0690 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8330B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-19C-SBIS1-20200331	FT	Pentaerythritol tetranitrate	2.00	0.990 U	0.990 UJ	0.990 U	
IINY-DU-19C-SBIS1-20200331	FT	Tetryl	0.200	0.0990 U Q	0.0990 UJ	0.0990 UJ	C
IINY-DU-19C-SSIS-20200331	FT	1,3,5-Trinitrobenzene	0.0980	0.0390 U M	0.0390 UJ	0.0390 U	
IINY-DU-19C-SSIS-20200331	FT	1,3-Dinitrobenzene	0.0980	0.0390 U Q	0.0390 UJ	0.0390 UJ	C
IINY-DU-19C-SSIS-20200331	FT	2,4,6-Trinitrotoluene	0.0980	0.0980 U Q	0.0980 UJ	0.0980 UJ	C
IINY-DU-19C-SSIS-20200331	FT	2,4-Dinitrotoluene	0.0980	0.0390 U Q	0.0390 UJ	0.0390 UJ	C
IINY-DU-19C-SSIS-20200331	FT	2,6-Dinitrotoluene	0.0980	0.0390 U Q	0.0390 UJ	0.0390 UJ	C
IINY-DU-19C-SSIS-20200331	FT	2-Amino-4,6-dinitrotoluene	0.0980	0.0980 U M	0.0980 UJ	0.0980 U	
IINY-DU-19C-SSIS-20200331	FT	2-Nitrotoluene	0.200	0.0980 U	0.0980 UJ	0.0980 U	
IINY-DU-19C-SSIS-20200331	FT	3,5-Dinitroaniline	0.0980	0.0200 U	0.0200 UJ	0.0200 UJ	M
IINY-DU-19C-SSIS-20200331	FT	3-Nitrotoluene	0.200	0.200 U Q	0.200 UJ	0.200 UJ	C
IINY-DU-19C-SSIS-20200331	FT	4-Amino-2,6-dinitrotoluene	0.0980	0.0980 U	0.0980 UJ	0.0980 U	
IINY-DU-19C-SSIS-20200331	FT	4-Nitrotoluene	0.200	0.0980 U Q	0.0980 UJ	0.0980 UJ	C
IINY-DU-19C-SSIS-20200331	FT	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	0.200	0.0980 U	0.0980 UJ	0.0980 U	
IINY-DU-19C-SSIS-20200331	FT	Nitrobenzene	0.290	0.200 U M Q	0.200 UJ	0.200 UJ	C
IINY-DU-19C-SSIS-20200331	FT	Nitroglycerin	2.00	0.690 U	0.690 UJ	0.690 U	
IINY-DU-19C-SSIS-20200331	FT	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	0.0980	0.0690 U M	0.0690 UJ	0.0690 U	
IINY-DU-19C-SSIS-20200331	FT	Pentaerythritol tetranitrate	2.00	0.980 U	0.980 UJ	0.980 U	
IINY-DU-19C-SSIS-20200331	FT	Tetryl	0.200	0.0980 U Q	0.0980 UJ	0.0980 UJ	C

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
A	Serial dilution
C	LCS Recovery
D	MS RPD
H2	Prep Hold Time
I	Surrogate recovery outside project limits.
L	Lab Blank
M	MS Recovery
M2	Post Spike
P1	Column RPD
TR	Trace Level Detect
V2	CCV

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: BNASIMD (GC/MS-SIM Analysis by SW8270D)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			ADR report indicates prep hold time was exceeded. Samples were prepared within the 14 day hold time requirement. The qualifiers were removed.
Were all requested target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was instrument tuning completed every 12 hours during sample analysis?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Were Internal Standard retention times and area criteria within method requirements?	•			
Were internal standards spiked for every sample, standard, and QC sample?	•			
Were surrogate recoveries within project acceptance limits?		•		Multiple analytes recovered outside criteria. The affected samples required dilutions, and surrogate non-conformance occurred in both diluted and non-diluted analyses. Associated results were J or UJ qualified.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			LCSD provided for one batch, for which insufficient volume was available to perform an MS/MSD.
Was a MS/MSD pair prepared with each batch?		•		As noted above, insufficient volume was available to perform an MS/MSD for analysis batch 491753.

Review Questions

Method: BNASIMD (GC/MS-SIM Analysis by SW8270D)

Review Questions	Yes	No	NA	Comment
Were MS/MSD recoveries within project acceptance limits?		•		Several analytes recovered below the QC limits for the MS and MSD on the diluted sample IINY-DU-19A-SSIS-20200331. Acenaphthylene and Fluorene recovered below QC limits for the undiluted run of the same sample. All analytes except fluorene were present in the parent sample at a concentration more than 4x the spike, therefore data for these analytes were not qualified. Fluorene results for the triplicate samples from location IINY-DU-19 were J qualified.
Was the MS/MSD RPD within project acceptance limits?		•		2-Methylnaphthalene, acenaphthylene, and naphthalene exceeded the RPD limit. Results for these analytes in the triplicate samples from location IINY-DU-19 were J qualified.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM-Field Triplicates were collected. The % RSD ranged from 1-71.
Were QAPP specified laboratory PQLs achieved?	•			Required dilutions raised limits.
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Did the ICSA have any non-target interferents above the MDL?		•		
Were the ICSA/ICSAB recoveries within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Aluminum and Iron were detected above the MDL but less than 1/2 the LOQ. Sample results were more than 10x the blank detection, therefore no data were qualified.
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	A LCSD was not provided.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Aluminum, Calcium, Iron, and Magnesium recovered outside QC limits in the MS and MSD. Aluminum, Calcium, and Iron concentrations in the parent sample were more than 4x the spike concentration, therefore data for these analytes were not qualified. Magnesium data for the triplicate samples from location IINY-DU-19 were J qualified.
Was the MS/MSD RPD within project acceptance limits?	•			
Were the post spike recoveries within project acceptance limits?		•		Aluminum, Calcium, Iron, and Magnesium recovered outside QC limits in sample IINY-DU-19A-SSIS-20200331. All four were present in the parent sample at concentrations more than 4x the spike concentrations, therefore data were not qualified.
Were the serial dilution RPD values within project acceptance limits?		•		The %D for Calcium and Iron in sample IINY-DU-19A-SSIS-20200331, and Magnesium in sample INY-DU-19B-SBIS1-20200331 were outside QC limits. Results for the respective analytes in these two samples were J qualified.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)

Review Questions	Yes	No	NA	Comment
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM- Field Triplicates were collected. The % RSD range for TAL Metals is 0-131.
Were QAPP specified laboratory PQLs achieved?	•			Required dilutions raised limits.
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the system properly tuned based on method criteria?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?		•		Recoveries of several metals in LLICVs were outside QC limits.
Were CCVs run at the required frequency and within acceptance criteria?		•		Recoveries of several metals in LLCCVs were outside QC limits.
Were ICB/CCBs run at the required frequency and within acceptance criteria?		•		The CCB for analytical batch 280-493402 contained Lead greater than one-half the reporting limit. Associated samples were not re-analyzed because the sample results were greater than 10x the amount found in the CCB.
Did the ICSA have any non-target interferents above the MDL?		•		
Were the ICSA/ICSAB recoveries within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Lead was detected above the DL but less than 1/2 the LOQ in analysis batch 493375. In analysis batch 493402 lead was detected above the DL but less than the LOQ. Sample results were more than the LOQ and 10x the blank detection, therefore data were not qualified.
Were target analytes in the field blank less than MDL?			•	These are ISM-Field Triplicates were collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?		•		Insufficient sample volume was available to perform a MS/MSD/DUP associated with preparation batch 280-492997 and 280-493020. An LCS /LCSD was added.
Were MS/MSD recoveries within project acceptance limits?		•		Several metals recovered outside QC limits. Of these Copper, Zinc, Barium, Manganese, Lead, and Vanadium had concentrations in the parent sample more than 4x the spike concentration, and associated results were not qualified. Results for Arsenic, Beryllium, Chromium, Thallium, Antimony, and Nickel in the triplicate sample from location IINY-DU-19 were J qualified.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)

Review Questions	Yes	No	NA	Comment
Was the MS/MSD RPD within project acceptance limits?		•		Several RPDs were outside QC limits. Results for Arsenic, Beryllium, Selenium, Nickel, Zinc, Barium, Manganese, and Thallium in the triplicate sample from location IINY-DU-19 were J qualified.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM- Field Triplicates were collected. The % RSD range for TAL Metals is 0-131.
Were the post spike recoveries within project acceptance limits?		•		Barium and Manganese were outside QC limits for IINY-DU-19A-SSIS-20200331. Results are J qualified.
Were the serial dilution RPD values within project acceptance limits?		•		The %D for Vanadium for sample IINY-DU-18C-SSIS-20200331 was outside QC limits.
Were QAPP specified laboratory PQLs achieved?	•			Required dilutions raised limits.
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW7471B (Mercury in Soil (Manual Cold-Vapor Technique))				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?		•		A deviation from the Standard Operating Procedure occurred. Due to analyst error, CCV/CCB brackets were not run every ten samples. CCV/CCB was run at the beginning and end of run, according to source method.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Mercury recovered outside QC limits. The results for the triplicate sample from location IINY-DU-19 were J qualified.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM- Field Triplicates were collected. The % RSD range is 1-68.
Were QAPP specified laboratory PQLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW8082A (Polychlorinated Biphenyls (PCB))

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			The initial calibration curve analyzed in batch 280-492961 was outside acceptance criteria for surrogate DCB Decachlorobiphenyl on the front column. The DCB surrogate is reported from the back column only.(ICV 280-492961/10)
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?		•		
Were CCVs run at the required frequency and within acceptance criteria?		•		CCVs are over the %D criteria for PCB-1260 in batch 492961 and 493095; for PCB-1268 in batch 493242; and for PCB-1262 in batch 493362. Associated results were J qualified.
Were surrogate recoveries within project acceptance limits?		•		Surrogate recoveries were outside QC limits in samples IINY-DU-17A-SBIS1-20200331, IINY-DU-17B-SBIS1-20200331, IINY-DU-17C-SBIS1-20200331, IINY-DU-18C-SSIS-20200331, and IINY-DU-19C-SSIS-20200331. Evidence of matrix interference was present, e.g. viscous samples with significant amounts of sediment in the final extract vial. Associated results were J or UJ qualified.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	A LCSD was not provided.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Aroclor-1260 recovered below QC limits. The results for this analyte in the triplicate samples from location IINY-DU-19A were J qualified.
Was the MS/MSD RPD within project acceptance limits?	•			
Were column comparison differences with project acceptance limits?		•		Aroclor-1260 had RPDs outside QC limits for IINY-DU-19A-SSIS-20200331, IINY-DU-19B-SSIS-20200331, IINY-DU-19C-SSIS-20200331, IINY-DU-19B-SBIS1-20200331, and IINY-DU-17C-SBIS1-20200331. Results were J qualified.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM- Field Triplicates were not collected. The % RSD ranges from 4.2-65.2.
Were QAPP specified laboratory PQLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			

Review Questions

Method: SW8082A (Polychlorinated Biphenyls (PCB))				
Review Questions	Yes	No	NA	Comment
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW8330B (Nitroaromatics and Nitramines by HPLC)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			The ADR report indicates the prep hold time was not met. The samples were prepared within 14 days of collection. The qualifiers were removed.
Were all requested target analytes reported?	•			
Was a blank prepared and analyzed with each batch?	•			
Were target analytes in the blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS or LCS/LCSD pair analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?		•		Grinding LCS (LCSSRM) associated with preparation batch 280-491769 and analytical batch 280-491980 recovered outside of reporting limits for 1,3-Dinitrobenzene, TNT, 2,4-Dinitrotoluene, 2,6-Dinitrotoluene, 3-Nitrotoluene, 4-Nitrotoluene, Nitrobenzene, and Tetryl. As per the method, the entire client sample is ground initially, therefore, it is not possible to re-grind samples. Associated results were J or UJ qualified.
Was the LCS/LCSD RPD within project acceptance limits?			•	An LCSD was not provided.
Was a project specific MS or MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		3,5-Dinitroaniline recovered slightly below the QC criteria in the MS. Results for this analyte in the triplicate sample from location IINY-DU-19 were J or UJ qualified.
Was the MS/MSD RPD within project acceptance limits?	•			
Was a project-specific duplicate analyzed, and the RPD within QAPP acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM-Field Triplicates were collected. The % RSD was not calculated since all results were ND.
Were QAPP specified laboratory reporting limits achieved?	•			
Were surrogate recoveries within project acceptance limits?		•		Surrogates in several samples recovered outside QC limits. There was evidence of matrix interference. Associated samples were J or UJ qualified.
Were column comparison differences with project acceptance limits?		•		The RPD was outside QC limits for the Grinding LCS (sample LCSSRM 280-491769/5-A) for Nitroglycerin. No project sample data were qualified due to this exceedance.
Was the intial calibration within criteria?	•			
Was a second source check standard analyzed and within all applicable criteria?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			

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Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling
SDG:	280-135166-1_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Tim Reese
Contract Laboratory(ies):	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	EA Engineering, Science, and Technology, Inc., PBC.
Data Review Level:	S2BVEM
Primary Data Reviewer:	Tara Lamond, Data Manager
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	May 27, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	BNASIMD	SW6010C	SW6020A	SW7471B
IINY-BADU-1-SSIS-20200401	280-135166-4	Soil	Field Sample/N	X	X	X	X
IINY-BADU-2-SSIS-20200401	280-135166-5	Soil	Field Sample/N	X	X	X	X
IINY-BADU-3-SSIS-20200401	280-135166-6	Soil	Field Sample/N	X	X	X	X
IINY-BADU-4-SSIS-20200401	280-135166-7	Soil	Field Sample/N	X	X	X	X
IINY-BADU-5-SSIS-20200401	280-135166-8	Soil	Field Sample/N	X	X	X	X
IINY-BADU-6-SSIS-20200401	280-135166-9	Soil	Field Sample/N	X	X	X	X
IINY-BADU-7-SSIS-20200401	280-135166-10	Soil	Field Sample/N	X	X	X	X
IINY-BADU-8-SSIS-20200401	280-135166-11	Soil	Field Sample/N	X	X	X	X
IINY-DU-15A-SSIS-20200401	280-135166-1	Soil	Field Sample/N		X	X	X
IINY-DU-15B-SSIS-20200401	280-135166-2	Soil	Field Duplicate/FD		X	X	X
IINY-DU-15C-SSIS-20200401	280-135166-3	Soil	Field Triplicate/FT		X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-135166-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Field Duplicate RPD
- Field Triplicate RSD
- Lab Blank
- LCS Recovery
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 148 results (37.28%) out of the 397 results (sample and field QC samples) reported are qualified based on review and 1 results (0.25%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
BNASIMD	No additional comments; see Checklist for detail.
SW6010C	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW7471B	No additional comments; see Checklist for detail.

May 22, 2020

Reviewed by Tara Lamond, Data Manager, EA Engineering, Science, and Technology, Inc., PBC.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

May 27, 2020

Reviewed by Samantha Saalfield, Project Chemist, EA Engineering, Science, and Technology, Inc., PBC.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method BNASIMD, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-BADU-5-SSIS-20200401 (MS)/ 280-135166-8MS	Fluoranthene	-66.67	55 - 119	10 - 119	percent	J/X	M	Spike amount Insignificant
IINY-BADU-5-SSIS-20200401 (MS)/ 280-135166-8MS	Phenanthrene	-8.333	49 - 113	10 - 113	percent	J/X	M	Spike amount Insignificant
IINY-BADU-5-SSIS-20200401 (MS)/ 280-135166-8MS	Benzo (a)anthracene	125.0	54 - 122	10 - 122	percent	J/None	M	Spike amount Insignificant
IINY-BADU-5-SSIS-20200401 (MS)/ 280-135166-8MS	Benzo (b)fluoranthene	136.7	53 - 128	10 - 128	percent	J/None	M	Spike amount Insignificant
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Benzo (b)fluoranthene	-11.67	53 - 128	10 - 128	percent	J/X	M	Spike amount Insignificant
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Phenanthrene	-118.3	49 - 113	10 - 113	percent	J/X	M	Spike amount Insignificant
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Fluoranthene	-250.0	55 - 119	10 - 119	percent	J/X	M	Spike amount Insignificant
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Benzo(a)pyrene	-28.33	50 - 125	10 - 125	percent	J/X	M	Spike amount Insignificant
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Chrysene	-31.67	57 - 118	10 - 118	percent	J/X	M	Spike amount Insignificant
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Pyrene	-83.33	55 - 117	10 - 117	percent	J/X	M	Spike amount Insignificant
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Indeno(1,2,3-c,d)pyrene	18.33	49 - 130	10 - 130	percent	J/UJ	M	Spike amount Insignificant
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Benzo (a)anthracene	18.33	54 - 122	10 - 122	percent	J/UJ	M	Spike amount Insignificant
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Anthracene	31.67	50 - 114	10 - 114	percent	J/UJ	M	
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Fluorene	38.83	47 - 114	10 - 114	percent	J/UJ	M	
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Acenaphthene	42.33	44 - 111	10 - 111	percent	J/UJ	M	
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Benzo (k)fluoranthene	43.33	56 - 123	10 - 123	percent	J/UJ	M	Spike amount Insignificant

Quality Control Outliers for test method BNASIMD, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Benzo (g,h,i)perylene	5.000	49 - 127	10 - 127	percent	J/X	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-5-SSIS-20200401	N	Acenaphthene	0.0380	0.0490 H J1 D	0.0490 J	-	mg/kg	H2/M/I
IINY-BADU-5-SSIS-20200401	N	Anthracene	0.0380	0.120 H J1 D	0.120 J	-	mg/kg	H2/M/I
IINY-BADU-5-SSIS-20200401	N	Fluorene	0.0380	0.0650 H J1 D	0.0650 J	-	mg/kg	H2/M/I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method BNASIMD, Prep Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of extraction found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-BADU-1-SSIS-20200401 (N)/ 280-135166-4		25.94	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-BADU-1-SSIS-20200401 (N)/ 280-135166-4	Fluorene	25.94	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-BADU-2-SSIS-20200401 (N)/ 280-135166-5		25.92	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-BADU-2-SSIS-20200401 (N)/ 280-135166-5	Fluorene	25.92	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-BADU-3-SSIS-20200401 (N)/ 280-135166-6		25.90	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-BADU-3-SSIS-20200401 (N)/ 280-135166-6	Fluorene	25.90	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-BADU-4-SSIS-20200401 (N)/ 280-135166-7		25.87	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL

Quality Control Outliers for test method BNASIMD, Prep Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of extraction found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-BADU-4-SSIS-20200401 (N)/ 280-135166-7	Fluorene	25.87	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-BADU-5-SSIS-20200401 (N)/ 280-135166-8		26.01	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-BADU-5-SSIS-20200401 (N)/ 280-135166-8	Fluorene	26.01	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-BADU-5-SSIS-20200401 (N)/ 280-135166-8MS		26.01	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-BADU-5-SSIS-20200401 (N)/ 280-135166-8MSD		26.01	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-BADU-6-SSIS-20200401 (N)/ 280-135166-9		26.04	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-BADU-6-SSIS-20200401 (N)/ 280-135166-9	Fluorene	26.04	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-BADU-6-SSIS-20200401 (N)/ 280-135166-9		26.04	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-BADU-7-SSIS-20200401 (N)/ 280-135166-10		26.05	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-BADU-7-SSIS-20200401 (N)/ 280-135166-10	Fluorene	26.05	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-BADU-8-SSIS-20200401 (N)/ 280-135166-11		26.03	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL
IINY-BADU-8-SSIS-20200401 (N)/ 280-135166-11	Fluorene	26.03	< 14	< 28	days	J/UJ	H2	Prep Exceeds UWL

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-1-SSIS-20200401	N	1-Methylnaphthalene	0.0940	0.0280 J H D	0.0280 J	-	mg/kg	H2/TR
IINY-BADU-1-SSIS-20200401	N	2-Methylnaphthalene	0.0940	0.0220 J H D	0.0220 J	-	mg/kg	H2/TR
IINY-BADU-1-SSIS-20200401	N	Acenaphthene	0.0940	0.0970 Q H D	0.0970 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Acenaphthylene	0.0940	0.0500 J Q H	0.0500 J	-	mg/kg	H2/TR

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-1-SSIS-20200401	N	Anthracene	0.0940	0.120 Q H D	0.120 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Benzo(a)anthracene	0.0940	0.680 Q H D	0.680 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Benzo(a)pyrene	0.0940	0.790 Q H D	0.790 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Benzo(b)fluoranthene	0.0940	1.30 Q H D	1.30 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Benzo(g,h,i)perylene	0.0940	0.680 Q H D	0.680 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Benzo(k)fluoranthene	0.0940	0.460 Q H D	0.460 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Chrysene	0.0940	1.00 Q H D	1.00 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Dibenz(a,h)anthracene	0.0940	0.150 Q H D	0.150 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Fluoranthene	0.0940	2.20 Q H D	2.20 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.0940	0.740 Q H D	0.740 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Naphthalene	0.0940	0.0310 J H D	0.0310 J	-	mg/kg	H2/TR
IINY-BADU-1-SSIS-20200401	N	Phenanthrene	0.0940	1.10 Q H D	1.10 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Pyrene	0.0940	1.90 Q H D	1.90 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Fluorene	0.0940	0.100 Q H D	0.100 J	-	mg/kg	H2
IINY-BADU-2-SSIS-20200401	N	1-Methylnaphthalene	0.0360	0.0150 J Q H	0.0150 J	-	mg/kg	H2/I/TR
IINY-BADU-2-SSIS-20200401	N	2-Methylnaphthalene	0.0360	0.0150 J Q H	0.0150 J	-	mg/kg	H2/I/TR
IINY-BADU-2-SSIS-20200401	N	Acenaphthene	0.0360	0.0340 J Q H	0.0340 J	-	mg/kg	H2/I/TR
IINY-BADU-2-SSIS-20200401	N	Acenaphthylene	0.0360	0.0340 J Q H	0.0340 J	-	mg/kg	H2/I/TR
IINY-BADU-2-SSIS-20200401	N	Anthracene	0.0360	0.0490 Q H D	0.0490 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Benzo(a)anthracene	0.0360	0.210 Q H D	0.210 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Benzo(a)pyrene	0.0360	0.220 Q H D	0.220 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Benzo(b)fluoranthene	0.0360	0.380 Q H D	0.380 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Benzo(g,h,i)perylene	0.0360	0.180 Q H D	0.180 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Benzo(k)fluoranthene	0.0360	0.140 Q H D	0.140 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Chrysene	0.0360	0.310 Q H D	0.310 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Dibenz(a,h)anthracene	0.0360	0.0420 Q H D	0.0420 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Fluoranthene	0.0360	0.700 Q H D	0.700 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.0360	0.200 Q H D	0.200 J	-	mg/kg	H2/I

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-2-SSIS-20200401	N	Naphthalene	0.0360	0.0230 J Q H	0.0230 J	-	mg/kg	H2/I/TR
IINY-BADU-2-SSIS-20200401	N	Phenanthrene	0.0360	0.360 Q H D	0.360 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Pyrene	0.0360	0.600 Q H D	0.600 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Fluorene	0.0360	0.0870 Q H D	0.0870 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	1-Methylnaphthalene	0.0360	0.0120 J Q H	0.0120 J	-	mg/kg	H2/I/TR
IINY-BADU-3-SSIS-20200401	N	2-Methylnaphthalene	0.0360	0.0130 J Q H	0.0130 J	-	mg/kg	H2/I/TR
IINY-BADU-3-SSIS-20200401	N	Acenaphthene	0.0360	0.0240 J Q H	0.0240 J	-	mg/kg	H2/I/TR
IINY-BADU-3-SSIS-20200401	N	Acenaphthylene	0.0360	0.0280 J Q H	0.0280 J	-	mg/kg	H2/I/TR
IINY-BADU-3-SSIS-20200401	N	Anthracene	0.0360	0.0390 Q H D	0.0390 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Benzo(a)anthracene	0.0360	0.170 Q H D	0.170 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Benzo(a)pyrene	0.0360	0.190 Q H D	0.190 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Benzo(b)fluoranthene	0.0360	0.310 Q H D	0.310 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Benzo(g,h,i)perylene	0.0360	0.150 Q H D	0.150 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Benzo(k)fluoranthene	0.0360	0.110 Q H D	0.110 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Chrysene	0.0360	0.250 Q H D	0.250 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Dibenz(a,h)anthracene	0.0360	0.0360 Q H D	0.0360 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Fluoranthene	0.0360	0.540 Q H D	0.540 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.0360	0.170 Q H D	0.170 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Naphthalene	0.0360	0.0170 J Q H	0.0170 J	-	mg/kg	H2/I/TR
IINY-BADU-3-SSIS-20200401	N	Phenanthrene	0.0360	0.280 Q H D	0.280 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Pyrene	0.0360	0.460 Q H D	0.460 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Fluorene	0.0360	0.0560 Q H D	0.0560 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	1-Methylnaphthalene	0.0400	0.00990 J Q H	0.00990 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	2-Methylnaphthalene	0.0400	0.0110 J Q H	0.0110 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	Acenaphthene	0.0400	0.0210 J Q H	0.0210 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	Acenaphthylene	0.0400	0.0250 J Q H	0.0250 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	Anthracene	0.0400	0.0280 J Q H	0.0280 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	Benzo(a)anthracene	0.0400	0.100 Q H D	0.100 J	-	mg/kg	H2/I

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-4-SSIS-20200401	N	Benzo(a)pyrene	0.0400	0.120 Q H D	0.120 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Benzo(b)fluoranthene	0.0400	0.190 Q H D	0.190 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Benzo(g,h,i)perylene	0.0400	0.0910 Q H D	0.0910 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Benzo(k)fluoranthene	0.0400	0.0740 Q H D	0.0740 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Chrysene	0.0400	0.160 Q H D	0.160 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Dibenz(a,h)anthracene	0.0400	0.0270 U Q H	0.0270 X		mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Fluoranthene	0.0400	0.310 Q H D	0.310 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Fluorene	0.0400	0.0600 Q H D	0.0600 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.0400	0.100 Q H D	0.100 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Naphthalene	0.0400	0.0170 J Q H	0.0170 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	Phenanthrene	0.0400	0.170 Q H D	0.170 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Pyrene	0.0400	0.270 Q H D	0.270 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Fluorene	0.0380	0.0650 H J1 D	0.0650 J	-	mg/kg	H2/M/I
IINY-BADU-5-SSIS-20200401	N	1-Methylnaphthalene	0.0380	0.0180 J H D	0.0180 J	-	mg/kg	H2/I/TR
IINY-BADU-5-SSIS-20200401	N	2-Methylnaphthalene	0.0380	0.0170 J H D	0.0170 J	-	mg/kg	H2/I/TR
IINY-BADU-5-SSIS-20200401	N	Acenaphthene	0.0380	0.0490 H J1 D	0.0490 J	-	mg/kg	H2/M/I
IINY-BADU-5-SSIS-20200401	N	Acenaphthylene	0.0380	0.0810 H D	0.0810 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Anthracene	0.0380	0.120 H J1 D	0.120 J	-	mg/kg	H2/M/I
IINY-BADU-5-SSIS-20200401	N	Benzo(a)anthracene	0.0380	0.510 Q H D	0.510 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Benzo(a)pyrene	0.0380	0.520 Q H D	0.520 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Benzo(b)fluoranthene	0.0380	0.730 Q J1 H	0.730 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Benzo(g,h,i)perylene	0.0380	0.390 Q H D	0.390 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Benzo(k)fluoranthene	0.0380	0.270 Q H D	0.270 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Chrysene	0.0380	0.620 Q H D	0.620 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Dibenz(a,h)anthracene	0.0380	0.0920 Q H D	0.0920 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Fluoranthene	0.0380	1.30 H J1 D	1.30 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.0380	0.420 Q H D	0.420 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Naphthalene	0.0380	0.0220 J H D	0.0220 J	-	mg/kg	H2/I/TR

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-5-SSIS-20200401	N	Phenanthrene	0.0380	0.580 H J1 D	0.580 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Pyrene	0.0380	1.10 H J1 D	1.10 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Fluorene	0.0360	0.0610 Q H D	0.0610 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	1-Methylnaphthalene	0.0360	0.0150 J Q H	0.0150 J	-	mg/kg	H2/I/TR
IINY-BADU-6-SSIS-20200401	N	2-Methylnaphthalene	0.0360	0.0120 J Q H	0.0120 J	-	mg/kg	H2/I/TR
IINY-BADU-6-SSIS-20200401	N	Acenaphthene	0.0360	0.0720 Q H D	0.0720 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Acenaphthylene	0.0360	0.0280 J Q H	0.0280 J	-	mg/kg	H2/I/TR
IINY-BADU-6-SSIS-20200401	N	Anthracene	0.0360	0.0940 Q H D	0.0940 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Benzo(a)anthracene	0.0360	0.680 Q H D	0.680 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Benzo(a)pyrene	0.0360	0.690 Q H D	0.690 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Benzo(b)fluoranthene	0.0360	1.10 Q H D	1.10 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Benzo(g,h,i)perylene	0.0360	0.520 Q H D	0.520 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Benzo(k)fluoranthene	0.0360	0.410 Q H D	0.410 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Chrysene	0.0360	0.900 Q H D	0.900 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Dibenz(a,h)anthracene	0.0360	0.130 Q H D	0.130 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Fluoranthene	0.360	1.90 D H Q	1.90 J	-	mg/kg	H2
IINY-BADU-6-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.0360	0.580 Q H D	0.580 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Naphthalene	0.0360	0.0170 J Q H	0.0170 J	-	mg/kg	H2/I/TR
IINY-BADU-6-SSIS-20200401	N	Phenanthrene	0.0360	0.860 Q H D	0.860 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Pyrene	0.360	1.50 D H Q	1.50 J	-	mg/kg	H2
IINY-BADU-7-SSIS-20200401	N	1-Methylnaphthalene	0.0100	0.00530 J H	0.00530 J	-	mg/kg	H2/I/TR
IINY-BADU-7-SSIS-20200401	N	2-Methylnaphthalene	0.0100	0.00520 J H	0.00520 J	-	mg/kg	H2/I/TR
IINY-BADU-7-SSIS-20200401	N	Acenaphthene	0.0100	0.00810 J Q H	0.00810 J	-	mg/kg	H2/I/TR
IINY-BADU-7-SSIS-20200401	N	Acenaphthylene	0.0100	0.0130 Q H	0.0130 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Anthracene	0.0100	0.0150 Q H	0.0150 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Benzo(a)anthracene	0.0100	0.0670 Q H	0.0670 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Benzo(a)pyrene	0.0100	0.0630 Q H	0.0630 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Benzo(b)fluoranthene	0.0100	0.110 Q H	0.110 J	-	mg/kg	H2/I

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-7-SSIS-20200401	N	Benzo(g,h,i)perylene	0.0100	0.0490 Q H	0.0490 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Benzo(k)fluoranthene	0.0100	0.0390 Q H	0.0390 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Chrysene	0.0100	0.0930 Q H	0.0930 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Dibenz(a,h)anthracene	0.0100	0.0130 Q H	0.0130 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Fluoranthene	0.0100	0.190 Q H	0.190 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.0100	0.0530 Q H	0.0530 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Naphthalene	0.0100	0.00740 J H	0.00740 J	-	mg/kg	H2/I/TR
IINY-BADU-7-SSIS-20200401	N	Phenanthrene	0.0100	0.0900 Q H	0.0900 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Pyrene	0.0100	0.160 Q H	0.160 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Fluorene	0.0100	0.0100 Q H M	0.0100 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	1-Methylnaphthalene	0.00940	0.00390 J H	0.00390 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	2-Methylnaphthalene	0.00940	0.00390 J H	0.00390 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Acenaphthene	0.00940	0.00480 J H	0.00480 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Acenaphthylene	0.00940	0.00900 J H	0.00900 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Anthracene	0.00940	0.00840 J H	0.00840 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Benzo(a)anthracene	0.00940	0.0430 Q H	0.0430 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Benzo(a)pyrene	0.00940	0.0450 Q H	0.0450 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Benzo(b)fluoranthene	0.00940	0.0720 Q H	0.0720 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Benzo(g,h,i)perylene	0.00940	0.0350 Q H	0.0350 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Benzo(k)fluoranthene	0.00940	0.0280 Q H	0.0280 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Chrysene	0.00940	0.0610 Q H	0.0610 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Dibenz(a,h)anthracene	0.00940	0.00630 U Q H	0.00630 UJ		mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Fluoranthene	0.00940	0.120 H	0.120 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.00940	0.0370 Q H	0.0370 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Naphthalene	0.00940	0.00630 J H	0.00630 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Phenanthrene	0.00940	0.0610 H	0.0610 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Pyrene	0.00940	0.110 H	0.110 J	-	mg/kg	H2/I

Qualified Results associated with the Prep Hold Time for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-8-SSIS-20200401	N	Fluorene	0.00940	0.00580 J H M	0.00580 J	-	mg/kg	H2/I/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method BNASIMD, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-BADU-1-SSIS-20200401 (N)/ 280-135166-4	2-Fluorobiphenyl	30.00	46 - 115	10 - 115	percent	J/UJ	I	Diluted Out
IINY-BADU-1-SSIS-20200401 (N)/ 280-135166-4	2-Methylnaphthalene-d10	32.00	41 - 100	10 - 100	percent	J/UJ	I	Diluted Out
IINY-BADU-1-SSIS-20200401 (N)/ 280-135166-4	Terphenyl-d14	34.00	58 - 133	10 - 133	percent	J/UJ	I	Diluted Out
IINY-BADU-1-SSIS-20200401 (N)/ 280-135166-4	Fluoranthene-d10	39.00	55 - 101	10 - 101	percent	J/UJ	I	Diluted Out
IINY-BADU-2-SSIS-20200401 (N)/ 280-135166-5	Nitrobenzene-d5	0.000	44 - 125	10 - 125	percent	J/X	I	
IINY-BADU-2-SSIS-20200401 (N)/ 280-135166-5	Fluoranthene-d10	44.00	55 - 101	10 - 101	percent	J/UJ	I	
IINY-BADU-2-SSIS-20200401 (N)/ 280-135166-5	Terphenyl-d14	44.00	58 - 133	10 - 133	percent	J/UJ	I	
IINY-BADU-2-SSIS-20200401 (N)/ 280-135166-5	2-Fluorobiphenyl	45.00	46 - 115	10 - 115	percent	J/UJ	I	
IINY-BADU-3-SSIS-20200401 (N)/ 280-135166-6	Nitrobenzene-d5	0.000	44 - 125	10 - 125	percent	J/X	I	
IINY-BADU-3-SSIS-20200401 (N)/ 280-135166-6	Fluoranthene-d10	36.00	55 - 101	10 - 101	percent	J/UJ	I	
IINY-BADU-3-SSIS-20200401 (N)/ 280-135166-6	2-Methylnaphthalene-d10	38.00	41 - 100	10 - 100	percent	J/UJ	I	
IINY-BADU-3-SSIS-20200401 (N)/ 280-135166-6	Terphenyl-d14	42.00	58 - 133	10 - 133	percent	J/UJ	I	
IINY-BADU-3-SSIS-20200401 (N)/ 280-135166-6	2-Fluorobiphenyl	43.00	46 - 115	10 - 115	percent	J/UJ	I	
IINY-BADU-4-SSIS-20200401 (N)/ 280-135166-7	Nitrobenzene-d5	0.000	44 - 125	10 - 125	percent	J/X	I	
IINY-BADU-4-SSIS-20200401 (N)/ 280-135166-7	Fluoranthene-d10	34.00	55 - 101	10 - 101	percent	J/UJ	I	

Quality Control Outliers for test method BNASIMD, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-BADU-4-SSIS-20200401 (N)/ 280-135166-7	2-Fluorobiphenyl	36.00	46 - 115	10 - 115	percent	J/UJ	I	
IINY-BADU-4-SSIS-20200401 (N)/ 280-135166-7	2-Methylnaphthalene-d10	38.00	41 - 100	10 - 100	percent	J/UJ	I	
IINY-BADU-4-SSIS-20200401 (N)/ 280-135166-7	Terphenyl-d14	38.00	58 - 133	10 - 133	percent	J/UJ	I	
IINY-BADU-5-SSIS-20200401 (N)/ 280-135166-8	Fluoranthene-d10	52.00	55 - 101	10 - 101	percent	J/UJ	I	
IINY-BADU-5-SSIS-20200401 (N)/ 280-135166-8	Terphenyl-d14	55.00	58 - 133	10 - 133	percent	J/UJ	I	
IINY-BADU-5-SSIS-20200401 (MS)/ 280-135166-8MS	Terphenyl-d14	54.00	58 - 133	10 - 133	percent	J/UJ	I	
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Fluoranthene-d10	49.00	55 - 101	10 - 101	percent	J/UJ	I	
IINY-BADU-6-SSIS-20200401 (N)/ 280-135166-9	2-Methylnaphthalene-d10	35.00	41 - 100	10 - 100	percent	J/UJ	I	
IINY-BADU-6-SSIS-20200401 (N)/ 280-135166-9	Nitrobenzene-d5	36.00	44 - 125	10 - 125	percent	J/UJ	I	
IINY-BADU-6-SSIS-20200401 (N)/ 280-135166-9	2-Fluorobiphenyl	36.00	46 - 115	10 - 115	percent	J/UJ	I	
IINY-BADU-6-SSIS-20200401 (N)/ 280-135166-9	Fluoranthene-d10	37.00	55 - 101	10 - 101	percent	J/UJ	I	
IINY-BADU-6-SSIS-20200401 (N)/ 280-135166-9	Terphenyl-d14	39.00	58 - 133	10 - 133	percent	J/UJ	I	
IINY-BADU-6-SSIS-20200401 (N)/ 280-135166-9	Nitrobenzene-d5	0.000	44 - 125	10 - 125	percent	J/X	I	Diluted Out
IINY-BADU-6-SSIS-20200401 (N)/ 280-135166-9	2-Fluorobiphenyl	0.000	46 - 115	10 - 115	percent	J/X	I	Diluted Out
IINY-BADU-6-SSIS-20200401 (N)/ 280-135166-9	Terphenyl-d14	0.000	58 - 133	10 - 133	percent	J/X	I	Diluted Out
IINY-BADU-6-SSIS-20200401 (N)/ 280-135166-9	Fluoranthene-d10	39.00	55 - 101	10 - 101	percent	J/UJ	I	Diluted Out
IINY-BADU-7-SSIS-20200401 (N)/ 280-135166-10	Fluoranthene-d10	39.00	55 - 101	10 - 101	percent	J/UJ	I	
IINY-BADU-7-SSIS-20200401 (N)/ 280-135166-10	2-Fluorobiphenyl	42.00	46 - 115	10 - 115	percent	J/UJ	I	

Quality Control Outliers for test method BNASIMD, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-BADU-7-SSIS-20200401 (N)/ 280-135166-10	Terphenyl-d14	47.00	58 - 133	10 - 133	percent	J/UJ	I	
IINY-BADU-8-SSIS-20200401 (N)/ 280-135166-11	Fluoranthene-d10	47.00	55 - 101	10 - 101	percent	J/UJ	I	
IINY-BADU-8-SSIS-20200401 (N)/ 280-135166-11	Terphenyl-d14	52.00	58 - 133	10 - 133	percent	J/UJ	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-2-SSIS-20200401	N	1-Methylnaphthalene	0.0360	0.0150 J Q H	0.0150 J	-	mg/kg	H2/I/TR
IINY-BADU-2-SSIS-20200401	N	2-Methylnaphthalene	0.0360	0.0150 J Q H	0.0150 J	-	mg/kg	H2/I/TR
IINY-BADU-2-SSIS-20200401	N	Acenaphthene	0.0360	0.0340 J Q H	0.0340 J	-	mg/kg	H2/I/TR
IINY-BADU-2-SSIS-20200401	N	Acenaphthylene	0.0360	0.0340 J Q H	0.0340 J	-	mg/kg	H2/I/TR
IINY-BADU-2-SSIS-20200401	N	Anthracene	0.0360	0.0490 Q H D	0.0490 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Benzo(a)anthracene	0.0360	0.210 Q H D	0.210 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Benzo(a)pyrene	0.0360	0.220 Q H D	0.220 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Benzo(b)fluoranthene	0.0360	0.380 Q H D	0.380 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Benzo(g,h,i)perylene	0.0360	0.180 Q H D	0.180 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Benzo(k)fluoranthene	0.0360	0.140 Q H D	0.140 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Chrysene	0.0360	0.310 Q H D	0.310 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Dibenz(a,h)anthracene	0.0360	0.0420 Q H D	0.0420 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Fluoranthene	0.0360	0.700 Q H D	0.700 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Fluorene	0.0360	0.0870 Q H D	0.0870 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.0360	0.200 Q H D	0.200 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Naphthalene	0.0360	0.0230 J Q H	0.0230 J	-	mg/kg	H2/I/TR
IINY-BADU-2-SSIS-20200401	N	Phenanthrene	0.0360	0.360 Q H D	0.360 J	-	mg/kg	H2/I

Qualified Results associated with the Surrogate for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-2-SSIS-20200401	N	Pyrene	0.0360	0.600 Q H D	0.600 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	1-Methylnaphthalene	0.0360	0.0120 J Q H	0.0120 J	-	mg/kg	H2/I/TR
IINY-BADU-3-SSIS-20200401	N	2-Methylnaphthalene	0.0360	0.0130 J Q H	0.0130 J	-	mg/kg	H2/I/TR
IINY-BADU-3-SSIS-20200401	N	Acenaphthene	0.0360	0.0240 J Q H	0.0240 J	-	mg/kg	H2/I/TR
IINY-BADU-3-SSIS-20200401	N	Acenaphthylene	0.0360	0.0280 J Q H	0.0280 J	-	mg/kg	H2/I/TR
IINY-BADU-3-SSIS-20200401	N	Anthracene	0.0360	0.0390 Q H D	0.0390 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Benzo(a)anthracene	0.0360	0.170 Q H D	0.170 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Benzo(a)pyrene	0.0360	0.190 Q H D	0.190 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Benzo(b)fluoranthene	0.0360	0.310 Q H D	0.310 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Benzo(g,h,i)perylene	0.0360	0.150 Q H D	0.150 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Benzo(k)fluoranthene	0.0360	0.110 Q H D	0.110 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Chrysene	0.0360	0.250 Q H D	0.250 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Dibenz(a,h)anthracene	0.0360	0.0360 Q H D	0.0360 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Fluoranthene	0.0360	0.540 Q H D	0.540 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Fluorene	0.0360	0.0560 Q H D	0.0560 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.0360	0.170 Q H D	0.170 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Naphthalene	0.0360	0.0170 J Q H	0.0170 J	-	mg/kg	H2/I/TR
IINY-BADU-3-SSIS-20200401	N	Phenanthrene	0.0360	0.280 Q H D	0.280 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Pyrene	0.0360	0.460 Q H D	0.460 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	1-Methylnaphthalene	0.0400	0.00990 J Q H	0.00990 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	2-Methylnaphthalene	0.0400	0.0110 J Q H	0.0110 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	Acenaphthene	0.0400	0.0210 J Q H	0.0210 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	Acenaphthylene	0.0400	0.0250 J Q H	0.0250 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	Anthracene	0.0400	0.0280 J Q H	0.0280 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	Benzo(a)anthracene	0.0400	0.100 Q H D	0.100 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Benzo(a)pyrene	0.0400	0.120 Q H D	0.120 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Benzo(b)fluoranthene	0.0400	0.190 Q H D	0.190 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Benzo(g,h,i)perylene	0.0400	0.0910 Q H D	0.0910 J	-	mg/kg	H2/I

Qualified Results associated with the Surrogate for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-4-SSIS-20200401	N	Benzo(k)fluoranthene	0.0400	0.0740 Q H D	0.0740 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Chrysene	0.0400	0.160 Q H D	0.160 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Dibenz(a,h)anthracene	0.0400	0.0270 U Q H	0.0270 X		mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Fluoranthene	0.0400	0.310 Q H D	0.310 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Fluorene	0.0400	0.0600 Q H D	0.0600 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.0400	0.100 Q H D	0.100 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Naphthalene	0.0400	0.0170 J Q H	0.0170 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	Phenanthrene	0.0400	0.170 Q H D	0.170 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Pyrene	0.0400	0.270 Q H D	0.270 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	1-Methylnaphthalene	0.0380	0.0180 J H D	0.0180 J	-	mg/kg	H2/I/TR
IINY-BADU-5-SSIS-20200401	N	2-Methylnaphthalene	0.0380	0.0170 J H D	0.0170 J	-	mg/kg	H2/I/TR
IINY-BADU-5-SSIS-20200401	N	Acenaphthene	0.0380	0.0490 H J1 D	0.0490 J	-	mg/kg	H2/M/I
IINY-BADU-5-SSIS-20200401	N	Acenaphthylene	0.0380	0.0810 H D	0.0810 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Anthracene	0.0380	0.120 H J1 D	0.120 J	-	mg/kg	H2/M/I
IINY-BADU-5-SSIS-20200401	N	Benzo(a)anthracene	0.0380	0.510 Q H D	0.510 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Benzo(a)pyrene	0.0380	0.520 Q H D	0.520 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Benzo(b)fluoranthene	0.0380	0.730 Q J1 H	0.730 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Benzo(g,h,i)perylene	0.0380	0.390 Q H D	0.390 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Benzo(k)fluoranthene	0.0380	0.270 Q H D	0.270 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Chrysene	0.0380	0.620 Q H D	0.620 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Dibenz(a,h)anthracene	0.0380	0.0920 Q H D	0.0920 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Fluoranthene	0.0380	1.30 H J1 D	1.30 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Fluorene	0.0380	0.0650 H J1 D	0.0650 J	-	mg/kg	H2/M/I
IINY-BADU-5-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.0380	0.420 Q H D	0.420 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Naphthalene	0.0380	0.0220 J H D	0.0220 J	-	mg/kg	H2/I/TR
IINY-BADU-5-SSIS-20200401	N	Phenanthrene	0.0380	0.580 H J1 D	0.580 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Pyrene	0.0380	1.10 H J1 D	1.10 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	1-Methylnaphthalene	0.0360	0.0150 J Q H	0.0150 J	-	mg/kg	H2/I/TR

Qualified Results associated with the Surrogate for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-6-SSIS-20200401	N	2-Methylnaphthalene	0.0360	0.0120 J Q H	0.0120 J	-	mg/kg	H2/I/TR
IINY-BADU-6-SSIS-20200401	N	Acenaphthene	0.0360	0.0720 Q H D	0.0720 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Acenaphthylene	0.0360	0.0280 J Q H	0.0280 J	-	mg/kg	H2/I/TR
IINY-BADU-6-SSIS-20200401	N	Anthracene	0.0360	0.0940 Q H D	0.0940 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Benzo(a)anthracene	0.0360	0.680 Q H D	0.680 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Benzo(a)pyrene	0.0360	0.690 Q H D	0.690 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Benzo(b)fluoranthene	0.0360	1.10 Q H D	1.10 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Benzo(g,h,i)perylene	0.0360	0.520 Q H D	0.520 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Benzo(k)fluoranthene	0.0360	0.410 Q H D	0.410 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Chrysene	0.0360	0.900 Q H D	0.900 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Dibenz(a,h)anthracene	0.0360	0.130 Q H D	0.130 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Fluorene	0.0360	0.0610 Q H D	0.0610 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.0360	0.580 Q H D	0.580 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Naphthalene	0.0360	0.0170 J Q H	0.0170 J	-	mg/kg	H2/I/TR
IINY-BADU-6-SSIS-20200401	N	Phenanthrene	0.0360	0.860 Q H D	0.860 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	1-Methylnaphthalene	0.0100	0.00530 J H	0.00530 J	-	mg/kg	H2/I/TR
IINY-BADU-7-SSIS-20200401	N	2-Methylnaphthalene	0.0100	0.00520 J H	0.00520 J	-	mg/kg	H2/I/TR
IINY-BADU-7-SSIS-20200401	N	Acenaphthene	0.0100	0.00810 J Q H	0.00810 J	-	mg/kg	H2/I/TR
IINY-BADU-7-SSIS-20200401	N	Acenaphthylene	0.0100	0.0130 Q H	0.0130 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Anthracene	0.0100	0.0150 Q H	0.0150 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Benzo(a)anthracene	0.0100	0.0670 Q H	0.0670 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Benzo(a)pyrene	0.0100	0.0630 Q H	0.0630 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Benzo(b)fluoranthene	0.0100	0.110 Q H	0.110 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Benzo(g,h,i)perylene	0.0100	0.0490 Q H	0.0490 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Benzo(k)fluoranthene	0.0100	0.0390 Q H	0.0390 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Chrysene	0.0100	0.0930 Q H	0.0930 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Dibenz(a,h)anthracene	0.0100	0.0130 Q H	0.0130 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Fluoranthene	0.0100	0.190 Q H	0.190 J	-	mg/kg	H2/I

Qualified Results associated with the Surrogate for BNASIMD

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-7-SSIS-20200401	N	Fluorene	0.0100	0.0100 Q H M	0.0100 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.0100	0.0530 Q H	0.0530 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Naphthalene	0.0100	0.00740 J H	0.00740 J	-	mg/kg	H2/I/TR
IINY-BADU-7-SSIS-20200401	N	Phenanthrene	0.0100	0.0900 Q H	0.0900 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Pyrene	0.0100	0.160 Q H	0.160 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	1-Methylnaphthalene	0.00940	0.00390 J H	0.00390 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	2-Methylnaphthalene	0.00940	0.00390 J H	0.00390 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Acenaphthene	0.00940	0.00480 J H	0.00480 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Acenaphthylene	0.00940	0.00900 J H	0.00900 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Anthracene	0.00940	0.00840 J H	0.00840 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Benzo(a)anthracene	0.00940	0.0430 Q H	0.0430 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Benzo(a)pyrene	0.00940	0.0450 Q H	0.0450 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Benzo(b)fluoranthene	0.00940	0.0720 Q H	0.0720 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Benzo(g,h,i)perylene	0.00940	0.0350 Q H	0.0350 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Benzo(k)fluoranthene	0.00940	0.0280 Q H	0.0280 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Chrysene	0.00940	0.0610 Q H	0.0610 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Dibenz(a,h)anthracene	0.00940	0.00630 U Q H	0.00630 UJ		mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Fluoranthene	0.00940	0.120 H	0.120 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Fluorene	0.00940	0.00580 J H M	0.00580 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.00940	0.0370 Q H	0.0370 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Naphthalene	0.00940	0.00630 J H	0.00630 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Phenanthrene	0.00940	0.0610 H	0.0610 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Pyrene	0.00940	0.110 H	0.110 J	-	mg/kg	H2/I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6010C, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-BADU-5-SSIS-20200401 (MS)/ 280-135166-8MS	Iron	220.0	81 - 118	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-BADU-5-SSIS-20200401 (MS)/ 280-135166-8MS	Aluminum	620.0	74 - 119	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-BADU-5-SSIS-20200401 (MS)/ 280-135166-8MS	Sodium	81.46	83 - 118	30 - 125	percent	J/UJ	M	
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Iron	200.0	81 - 118	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Aluminum	600.0	74 - 119	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Sodium	80.87	83 - 118	30 - 125	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW6010C

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-5-SSIS-20200401	N	Sodium	500	63.0 J J1	63.0 J	-	mg/kg	M/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6020A, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-490964/1-A (LB)/ MB 280-490964/1-A	Lead	0.02640	< 0.018	< 0.39	mg/kg	U/None	L	
MB 280-490964/1-A (LB)/ MB 280-490964/1-A	Manganese	0.1170	< 0.093	< 0.96	mg/kg	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6020A, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-BADU-5-SSIS-20200401 (MS)/ 280-135166-8MS	Barium	121.0	86 - 116	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-BADU-5-SSIS-20200401 (MS)/ 280-135166-8MS	Chromium	139.0	83 - 119	30 - 125	percent	J/None	M	
IINY-BADU-5-SSIS-20200401 (MS)/ 280-135166-8MS	Vanadium	157.0	82 - 116	30 - 125	percent	J/None	M	
IINY-BADU-5-SSIS-20200401 (MS)/ 280-135166-8MS	Manganese	-20.00	85 - 116	30 - 125	percent	J/X	M	Spike amount Insignificant
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Barium	127.0	86 - 116	30 - 125	percent	J/None	M	Spike amount Insignificant
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Chromium	133.0	83 - 119	30 - 125	percent	J/None	M	
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Vanadium	153.0	82 - 116	30 - 125	percent	J/None	M	
IINY-BADU-5-SSIS-20200401 (SD)/ 280-135166-8MSD	Manganese	10.00	85 - 116	30 - 125	percent	J/X	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW6020A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-5-SSIS-20200401	N	Chromium	0.590	22.0 J1	22.0 J	+	mg/kg	M
IINY-BADU-5-SSIS-20200401	N	Vanadium	0.490	37.0 J1	37.0 J	+	mg/kg	M/M2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-1-SSIS-20200401	N	1-Methylnaphthalene	0.0940	0.0280 J H D	0.0280 J	-	mg/kg	H2/TR
IINY-BADU-1-SSIS-20200401	N	2-Methylnaphthalene	0.0940	0.0220 J H D	0.0220 J	-	mg/kg	H2/TR
IINY-BADU-1-SSIS-20200401	N	Acenaphthene	0.0940	0.0970 Q H D	0.0970 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Acenaphthylene	0.0940	0.0500 J Q H	0.0500 J	-	mg/kg	H2/TR
IINY-BADU-1-SSIS-20200401	N	Anthracene	0.0940	0.120 Q H D	0.120 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Benzo(a)anthracene	0.0940	0.680 Q H D	0.680 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Benzo(a)pyrene	0.0940	0.790 Q H D	0.790 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Benzo(b)fluoranthene	0.0940	1.30 Q H D	1.30 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Benzo(g,h,i)perylene	0.0940	0.680 Q H D	0.680 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Benzo(k)fluoranthene	0.0940	0.460 Q H D	0.460 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Chrysene	0.0940	1.00 Q H D	1.00 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Dibenz(a,h)anthracene	0.0940	0.150 Q H D	0.150 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Fluoranthene	0.0940	2.20 Q H D	2.20 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.0940	0.740 Q H D	0.740 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Naphthalene	0.0940	0.0310 J H D	0.0310 J	-	mg/kg	H2/TR
IINY-BADU-1-SSIS-20200401	N	Phenanthrene	0.0940	1.10 Q H D	1.10 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Pyrene	0.0940	1.90 Q H D	1.90 J	-	mg/kg	H2
IINY-BADU-1-SSIS-20200401	N	Fluorene	0.0940	0.100 Q H D	0.100 J	-	mg/kg	H2
IINY-BADU-2-SSIS-20200401	N	1-Methylnaphthalene	0.0360	0.0150 J Q H	0.0150 J	-	mg/kg	H2/I/TR
IINY-BADU-2-SSIS-20200401	N	2-Methylnaphthalene	0.0360	0.0150 J Q H	0.0150 J	-	mg/kg	H2/I/TR
IINY-BADU-2-SSIS-20200401	N	Acenaphthene	0.0360	0.0340 J Q H	0.0340 J	-	mg/kg	H2/I/TR
IINY-BADU-2-SSIS-20200401	N	Acenaphthylene	0.0360	0.0340 J Q H	0.0340 J	-	mg/kg	H2/I/TR
IINY-BADU-2-SSIS-20200401	N	Anthracene	0.0360	0.0490 Q H D	0.0490 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Benzo(a)anthracene	0.0360	0.210 Q H D	0.210 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Benzo(a)pyrene	0.0360	0.220 Q H D	0.220 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Benzo(b)fluoranthene	0.0360	0.380 Q H D	0.380 J	-	mg/kg	H2/I

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-2-SSIS-20200401	N	Benzo(g,h,i)perylene	0.0360	0.180 Q H D	0.180 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Benzo(k)fluoranthene	0.0360	0.140 Q H D	0.140 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Chrysene	0.0360	0.310 Q H D	0.310 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Dibenz(a,h)anthracene	0.0360	0.0420 Q H D	0.0420 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Fluoranthene	0.0360	0.700 Q H D	0.700 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Fluorene	0.0360	0.0870 Q H D	0.0870 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.0360	0.200 Q H D	0.200 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Naphthalene	0.0360	0.0230 J Q H	0.0230 J	-	mg/kg	H2/I/TR
IINY-BADU-2-SSIS-20200401	N	Phenanthrene	0.0360	0.360 Q H D	0.360 J	-	mg/kg	H2/I
IINY-BADU-2-SSIS-20200401	N	Pyrene	0.0360	0.600 Q H D	0.600 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	1-Methylnaphthalene	0.0360	0.0120 J Q H	0.0120 J	-	mg/kg	H2/I/TR
IINY-BADU-3-SSIS-20200401	N	2-Methylnaphthalene	0.0360	0.0130 J Q H	0.0130 J	-	mg/kg	H2/I/TR
IINY-BADU-3-SSIS-20200401	N	Acenaphthene	0.0360	0.0240 J Q H	0.0240 J	-	mg/kg	H2/I/TR
IINY-BADU-3-SSIS-20200401	N	Acenaphthylene	0.0360	0.0280 J Q H	0.0280 J	-	mg/kg	H2/I/TR
IINY-BADU-3-SSIS-20200401	N	Anthracene	0.0360	0.0390 Q H D	0.0390 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Benzo(a)anthracene	0.0360	0.170 Q H D	0.170 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Benzo(a)pyrene	0.0360	0.190 Q H D	0.190 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Benzo(b)fluoranthene	0.0360	0.310 Q H D	0.310 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Benzo(g,h,i)perylene	0.0360	0.150 Q H D	0.150 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Benzo(k)fluoranthene	0.0360	0.110 Q H D	0.110 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Chrysene	0.0360	0.250 Q H D	0.250 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Dibenz(a,h)anthracene	0.0360	0.0360 Q H D	0.0360 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Fluoranthene	0.0360	0.540 Q H D	0.540 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Fluorene	0.0360	0.0560 Q H D	0.0560 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.0360	0.170 Q H D	0.170 J	-	mg/kg	H2/I
IINY-BADU-3-SSIS-20200401	N	Naphthalene	0.0360	0.0170 J Q H	0.0170 J	-	mg/kg	H2/I/TR
IINY-BADU-3-SSIS-20200401	N	Phenanthrene	0.0360	0.280 Q H D	0.280 J	-	mg/kg	H2/I

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-3-SSIS-20200401	N	Pyrene	0.0360	0.460 Q H D	0.460 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	1-Methylnaphthalene	0.0400	0.00990 J Q H	0.00990 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	2-Methylnaphthalene	0.0400	0.0110 J Q H	0.0110 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	Acenaphthene	0.0400	0.0210 J Q H	0.0210 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	Acenaphthylene	0.0400	0.0250 J Q H	0.0250 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	Anthracene	0.0400	0.0280 J Q H	0.0280 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	Benzo(a)anthracene	0.0400	0.100 Q H D	0.100 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Benzo(a)pyrene	0.0400	0.120 Q H D	0.120 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Benzo(b)fluoranthene	0.0400	0.190 Q H D	0.190 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Benzo(g,h,i)perylene	0.0400	0.0910 Q H D	0.0910 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Benzo(k)fluoranthene	0.0400	0.0740 Q H D	0.0740 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Chrysene	0.0400	0.160 Q H D	0.160 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Dibenz(a,h)anthracene	0.0400	0.0270 U Q H	0.0270 X		mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Fluoranthene	0.0400	0.310 Q H D	0.310 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Fluorene	0.0400	0.0600 Q H D	0.0600 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.0400	0.100 Q H D	0.100 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Naphthalene	0.0400	0.0170 J Q H	0.0170 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	Phenanthrene	0.0400	0.170 Q H D	0.170 J	-	mg/kg	H2/I
IINY-BADU-4-SSIS-20200401	N	Pyrene	0.0400	0.270 Q H D	0.270 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Fluorene	0.0380	0.0650 H J1 D	0.0650 J	-	mg/kg	H2/M/I
IINY-BADU-5-SSIS-20200401	N	1-Methylnaphthalene	0.0380	0.0180 J H D	0.0180 J	-	mg/kg	H2/I/TR
IINY-BADU-5-SSIS-20200401	N	2-Methylnaphthalene	0.0380	0.0170 J H D	0.0170 J	-	mg/kg	H2/I/TR
IINY-BADU-5-SSIS-20200401	N	Acenaphthene	0.0380	0.0490 H J1 D	0.0490 J	-	mg/kg	H2/M/I
IINY-BADU-5-SSIS-20200401	N	Acenaphthylene	0.0380	0.0810 H D	0.0810 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Anthracene	0.0380	0.120 H J1 D	0.120 J	-	mg/kg	H2/M/I
IINY-BADU-5-SSIS-20200401	N	Benzo(a)anthracene	0.0380	0.510 Q H D	0.510 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Benzo(a)pyrene	0.0380	0.520 Q H D	0.520 J	-	mg/kg	H2/I

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-5-SSIS-20200401	N	Benzo(b)fluoranthene	0.0380	0.730 Q J1 H	0.730 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Benzo(g,h,i)perylene	0.0380	0.390 Q H D	0.390 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Benzo(k)fluoranthene	0.0380	0.270 Q H D	0.270 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Chrysene	0.0380	0.620 Q H D	0.620 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Dibenz(a,h)anthracene	0.0380	0.0920 Q H D	0.0920 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Fluoranthene	0.0380	1.30 H J1 D	1.30 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.0380	0.420 Q H D	0.420 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Naphthalene	0.0380	0.0220 J H D	0.0220 J	-	mg/kg	H2/I/TR
IINY-BADU-5-SSIS-20200401	N	Phenanthrene	0.0380	0.580 H J1 D	0.580 J	-	mg/kg	H2/I
IINY-BADU-5-SSIS-20200401	N	Pyrene	0.0380	1.10 H J1 D	1.10 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	1-Methylnaphthalene	0.0360	0.0150 J Q H	0.0150 J	-	mg/kg	H2/I/TR
IINY-BADU-6-SSIS-20200401	N	2-Methylnaphthalene	0.0360	0.0120 J Q H	0.0120 J	-	mg/kg	H2/I/TR
IINY-BADU-6-SSIS-20200401	N	Acenaphthene	0.0360	0.0720 Q H D	0.0720 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Acenaphthylene	0.0360	0.0280 J Q H	0.0280 J	-	mg/kg	H2/I/TR
IINY-BADU-6-SSIS-20200401	N	Anthracene	0.0360	0.0940 Q H D	0.0940 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Benzo(a)anthracene	0.0360	0.680 Q H D	0.680 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Benzo(a)pyrene	0.0360	0.690 Q H D	0.690 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Benzo(b)fluoranthene	0.0360	1.10 Q H D	1.10 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Benzo(g,h,i)perylene	0.0360	0.520 Q H D	0.520 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Benzo(k)fluoranthene	0.0360	0.410 Q H D	0.410 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Chrysene	0.0360	0.900 Q H D	0.900 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Dibenz(a,h)anthracene	0.0360	0.130 Q H D	0.130 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Fluoranthene	0.360	1.90 D H Q	1.90 J	-	mg/kg	H2
IINY-BADU-6-SSIS-20200401	N	Fluorene	0.0360	0.0610 Q H D	0.0610 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.0360	0.580 Q H D	0.580 J	-	mg/kg	H2/I
IINY-BADU-6-SSIS-20200401	N	Naphthalene	0.0360	0.0170 J Q H	0.0170 J	-	mg/kg	H2/I/TR
IINY-BADU-6-SSIS-20200401	N	Phenanthrene	0.0360	0.860 Q H D	0.860 J	-	mg/kg	H2/I

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-6-SSIS-20200401	N	Pyrene	0.360	1.50 D H Q	1.50 J	-	mg/kg	H2
IINY-BADU-7-SSIS-20200401	N	1-Methylnaphthalene	0.0100	0.00530 J H	0.00530 J	-	mg/kg	H2/I/TR
IINY-BADU-7-SSIS-20200401	N	2-Methylnaphthalene	0.0100	0.00520 J H	0.00520 J	-	mg/kg	H2/I/TR
IINY-BADU-7-SSIS-20200401	N	Acenaphthene	0.0100	0.00810 J Q H	0.00810 J	-	mg/kg	H2/I/TR
IINY-BADU-7-SSIS-20200401	N	Acenaphthylene	0.0100	0.0130 Q H	0.0130 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Anthracene	0.0100	0.0150 Q H	0.0150 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Benzo(a)anthracene	0.0100	0.0670 Q H	0.0670 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Benzo(a)pyrene	0.0100	0.0630 Q H	0.0630 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Benzo(b)fluoranthene	0.0100	0.110 Q H	0.110 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Benzo(g,h,i)perylene	0.0100	0.0490 Q H	0.0490 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Benzo(k)fluoranthene	0.0100	0.0390 Q H	0.0390 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Chrysene	0.0100	0.0930 Q H	0.0930 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Dibenz(a,h)anthracene	0.0100	0.0130 Q H	0.0130 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Fluoranthene	0.0100	0.190 Q H	0.190 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.0100	0.0530 Q H	0.0530 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Naphthalene	0.0100	0.00740 J H	0.00740 J	-	mg/kg	H2/I/TR
IINY-BADU-7-SSIS-20200401	N	Phenanthrene	0.0100	0.0900 Q H	0.0900 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Pyrene	0.0100	0.160 Q H	0.160 J	-	mg/kg	H2/I
IINY-BADU-7-SSIS-20200401	N	Fluorene	0.0100	0.0100 Q H M	0.0100 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	1-Methylnaphthalene	0.00940	0.00390 J H	0.00390 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	2-Methylnaphthalene	0.00940	0.00390 J H	0.00390 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Acenaphthene	0.00940	0.00480 J H	0.00480 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Acenaphthylene	0.00940	0.00900 J H	0.00900 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Anthracene	0.00940	0.00840 J H	0.00840 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Benzo(a)anthracene	0.00940	0.0430 Q H	0.0430 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Benzo(a)pyrene	0.00940	0.0450 Q H	0.0450 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Benzo(b)fluoranthene	0.00940	0.0720 Q H	0.0720 J	-	mg/kg	H2/I

Table of All Qualified Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-8-SSIS-20200401	N	Benzo(g,h,i)perylene	0.00940	0.0350 Q H	0.0350 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Benzo(k)fluoranthene	0.00940	0.0280 Q H	0.0280 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Chrysene	0.00940	0.0610 Q H	0.0610 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Dibenz(a,h)anthracene	0.00940	0.00630 U Q H	0.00630 UJ		mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Fluoranthene	0.00940	0.120 H	0.120 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Indeno(1,2,3-c,d)pyrene	0.00940	0.0370 Q H	0.0370 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Naphthalene	0.00940	0.00630 J H	0.00630 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Phenanthrene	0.00940	0.0610 H	0.0610 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Pyrene	0.00940	0.110 H	0.110 J	-	mg/kg	H2/I
IINY-BADU-8-SSIS-20200401	N	Fluorene	0.00940	0.00580 J H M	0.00580 J	-	mg/kg	H2/I/TR

Test Method: SW6010C	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-5-SSIS-20200401	N	Sodium	500	63.0 J J1	63.0 J	-	mg/kg	M/TR

Test Method: SW6020A	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-5-SSIS-20200401	N	Chromium	0.590	22.0 J1	22.0 J	+	mg/kg	M
IINY-BADU-5-SSIS-20200401	N	Vanadium	0.490	37.0 J1	37.0 J	+	mg/kg	M/M2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: BNASIMD Extraction Method: SW3546

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-1-SSIS-20200401	N	1-Methylnaphthalene	0.0940	0.0280 J H D	0.0280 J	-	mg/kg	H2/TR
IINY-BADU-1-SSIS-20200401	N	2-Methylnaphthalene	0.0940	0.0220 J H D	0.0220 J	-	mg/kg	H2/TR
IINY-BADU-1-SSIS-20200401	N	Acenaphthylene	0.0940	0.0500 J Q H	0.0500 J	-	mg/kg	H2/TR
IINY-BADU-1-SSIS-20200401	N	Naphthalene	0.0940	0.0310 J H D	0.0310 J	-	mg/kg	H2/TR
IINY-BADU-2-SSIS-20200401	N	1-Methylnaphthalene	0.0360	0.0150 J Q H	0.0150 J	-	mg/kg	H2/I/TR
IINY-BADU-2-SSIS-20200401	N	2-Methylnaphthalene	0.0360	0.0150 J Q H	0.0150 J	-	mg/kg	H2/I/TR
IINY-BADU-2-SSIS-20200401	N	Acenaphthene	0.0360	0.0340 J Q H	0.0340 J	-	mg/kg	H2/I/TR
IINY-BADU-2-SSIS-20200401	N	Acenaphthylene	0.0360	0.0340 J Q H	0.0340 J	-	mg/kg	H2/I/TR
IINY-BADU-2-SSIS-20200401	N	Naphthalene	0.0360	0.0230 J Q H	0.0230 J	-	mg/kg	H2/I/TR
IINY-BADU-3-SSIS-20200401	N	1-Methylnaphthalene	0.0360	0.0120 J Q H	0.0120 J	-	mg/kg	H2/I/TR
IINY-BADU-3-SSIS-20200401	N	2-Methylnaphthalene	0.0360	0.0130 J Q H	0.0130 J	-	mg/kg	H2/I/TR
IINY-BADU-3-SSIS-20200401	N	Acenaphthene	0.0360	0.0240 J Q H	0.0240 J	-	mg/kg	H2/I/TR
IINY-BADU-3-SSIS-20200401	N	Acenaphthylene	0.0360	0.0280 J Q H	0.0280 J	-	mg/kg	H2/I/TR
IINY-BADU-3-SSIS-20200401	N	Naphthalene	0.0360	0.0170 J Q H	0.0170 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	1-Methylnaphthalene	0.0400	0.00990 J Q H	0.00990 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	2-Methylnaphthalene	0.0400	0.0110 J Q H	0.0110 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	Acenaphthene	0.0400	0.0210 J Q H	0.0210 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	Acenaphthylene	0.0400	0.0250 J Q H	0.0250 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	Anthracene	0.0400	0.0280 J Q H	0.0280 J	-	mg/kg	H2/I/TR
IINY-BADU-4-SSIS-20200401	N	Naphthalene	0.0400	0.0170 J Q H	0.0170 J	-	mg/kg	H2/I/TR
IINY-BADU-5-SSIS-20200401	N	1-Methylnaphthalene	0.0380	0.0180 J H D	0.0180 J	-	mg/kg	H2/I/TR
IINY-BADU-5-SSIS-20200401	N	2-Methylnaphthalene	0.0380	0.0170 J H D	0.0170 J	-	mg/kg	H2/I/TR
IINY-BADU-5-SSIS-20200401	N	Naphthalene	0.0380	0.0220 J H D	0.0220 J	-	mg/kg	H2/I/TR
IINY-BADU-6-SSIS-20200401	N	1-Methylnaphthalene	0.0360	0.0150 J Q H	0.0150 J	-	mg/kg	H2/I/TR
IINY-BADU-6-SSIS-20200401	N	2-Methylnaphthalene	0.0360	0.0120 J Q H	0.0120 J	-	mg/kg	H2/I/TR
IINY-BADU-6-SSIS-20200401	N	Acenaphthylene	0.0360	0.0280 J Q H	0.0280 J	-	mg/kg	H2/I/TR
IINY-BADU-6-SSIS-20200401	N	Naphthalene	0.0360	0.0170 J Q H	0.0170 J	-	mg/kg	H2/I/TR

Table of All Trace Results

Test Method: BNASIMD	Extraction Method: SW3546							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-7-SSIS-20200401	N	1-Methylnaphthalene	0.0100	0.00530 J H	0.00530 J	-	mg/kg	H2/I/TR
IINY-BADU-7-SSIS-20200401	N	2-Methylnaphthalene	0.0100	0.00520 J H	0.00520 J	-	mg/kg	H2/I/TR
IINY-BADU-7-SSIS-20200401	N	Acenaphthene	0.0100	0.00810 J Q H	0.00810 J	-	mg/kg	H2/I/TR
IINY-BADU-7-SSIS-20200401	N	Naphthalene	0.0100	0.00740 J H	0.00740 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	1-Methylnaphthalene	0.00940	0.00390 J H	0.00390 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	2-Methylnaphthalene	0.00940	0.00390 J H	0.00390 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Acenaphthene	0.00940	0.00480 J H	0.00480 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Acenaphthylene	0.00940	0.00900 J H	0.00900 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Anthracene	0.00940	0.00840 J H	0.00840 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Fluorene	0.00940	0.00580 J H M	0.00580 J	-	mg/kg	H2/I/TR
IINY-BADU-8-SSIS-20200401	N	Naphthalene	0.00940	0.00630 J H	0.00630 J	-	mg/kg	H2/I/TR

Test Method: SW6010C	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-1-SSIS-20200401	N	Sodium	500	52.0 J	52.0 J		mg/kg	TR
IINY-BADU-2-SSIS-20200401	N	Sodium	490	38.0 J	38.0 J		mg/kg	TR
IINY-BADU-3-SSIS-20200401	N	Sodium	490	34.0 J	34.0 J		mg/kg	TR
IINY-BADU-4-SSIS-20200401	N	Sodium	490	36.0 J	36.0 J		mg/kg	TR
IINY-BADU-5-SSIS-20200401	N	Sodium	500	63.0 J J1	63.0 J	-	mg/kg	M/TR
IINY-BADU-6-SSIS-20200401	N	Sodium	500	44.0 J	44.0 J		mg/kg	TR
IINY-BADU-7-SSIS-20200401	N	Sodium	500	36.0 J	36.0 J		mg/kg	TR
IINY-BADU-8-SSIS-20200401	N	Sodium	490	47.0 J	47.0 J		mg/kg	TR
IINY-DU-15A-SSIS-20200401	N	Sodium	500	75.0 J	75.0 J		mg/kg	TR
IINY-DU-15B-SSIS-20200401	FD	Sodium	500	81.0 J	81.0 J		mg/kg	TR
IINY-DU-15C-SSIS-20200401	FT	Sodium	480	77.0 J	77.0 J		mg/kg	TR

Test Method: SW6020A	Extraction Method: SW3050B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-1-SSIS-20200401	N	Copper	25.0	11.0 J D	11.0 J		mg/kg	TR

Table of All Trace Results

Test Method: SW6020A Extraction Method: SW3050B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-BADU-2-SSIS-20200401	N	Copper	25.0	8.50 J D	8.50 J		mg/kg	TR
IINY-BADU-3-SSIS-20200401	N	Copper	25.0	7.00 J D	7.00 J		mg/kg	TR
IINY-BADU-3-SSIS-20200401	N	Thallium	0.0990	0.0820 J	0.0820 J		mg/kg	TR
IINY-BADU-3-SSIS-20200401	N	Zinc	25.0	21.0 J D	21.0 J		mg/kg	TR
IINY-BADU-4-SSIS-20200401	N	Beryllium	0.0980	0.0570 J	0.0570 J		mg/kg	TR
IINY-BADU-4-SSIS-20200401	N	Copper	25.0	4.90 J D	4.90 J		mg/kg	TR
IINY-BADU-4-SSIS-20200401	N	Thallium	0.0980	0.0430 J	0.0430 J		mg/kg	TR
IINY-BADU-6-SSIS-20200401	N	Copper	24.0	21.0 J D	21.0 J		mg/kg	TR
IINY-BADU-7-SSIS-20200401	N	Copper	25.0	16.0 J D	16.0 J		mg/kg	TR
IINY-DU-15A-SSIS-20200401	N	Copper	120	30.0 J D	30.0 J		mg/kg	TR
IINY-DU-15A-SSIS-20200401	N	Silver	0.0930	0.0790 J	0.0790 J		mg/kg	TR
IINY-DU-15B-SSIS-20200401	FD	Copper	120	31.0 J D	31.0 J		mg/kg	TR
IINY-DU-15C-SSIS-20200401	FT	Copper	120	33.0 J D	33.0 J		mg/kg	TR
IINY-DU-15C-SSIS-20200401	FT	Selenium	0.490	0.470 J	0.470 J		mg/kg	TR
IINY-DU-15C-SSIS-20200401	FT	Silver	0.0910	0.0730 J	0.0730 J		mg/kg	TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW6010C

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-BADU-5-SSIS-20200401	N	Magnesium	30.0	2100 J1	2100	2100 J	M2/A

Modified Qualifiers for test method SW6020A

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-BADU-5-SSIS-20200401	N	Vanadium	0.490	37.0 J1	37.0 J	37.0 J	M/M2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
A	Serial dilution
H2	Prep Hold Time
I	Surrogate recovery outside project limits.
L	Lab Blank
M	MS Recovery
M2	Post Spike
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: BNASIMD (GC/MS-SIM Analysis by SW8270D)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?		•		Samples missed holding time due to ISM prep. Data were J or UJ qualified.
Were all requested target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was instrument tuning completed every 12 hours during sample analysis?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Were Internal Standard retention times and area criteria within method requirements?	•			
Were internal standards spiked for every sample, standard, and QC sample?	•			
Were surrogate recoveries within project acceptance limits?		•		All samples had surrogates outside acceptance criteria. In some case surrogates were diluted out by 10-40x dilutions. Data for samples run with less than 5x dilution were in most cases J or UJ qualified. One non-detect result (Dibenz (a,h)anthracene in IINY-BADU-4-SSIS-20200401) was X qualified due to 0% surrogate recovery.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	A LCSD was not provided.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Several analytes recovered outside QC limits. Benzo[a]anthracene, Benzo[a]pyrene, Benzo [b]fluoranthene, Benzo[g,h,i]perylene, Benzo [k]fluoranthene, Chrysene, Fluoranthene, Indeno [1,2,3-cd]pyrene, Phenanthrene, and Pyrene had concentrations in the parent sample more than 4x the spike concentration. Results for acenaphthene, anthracene, and fluorene in sample IINY-BADU-5-SSIS-20200401 were J qualified.
Was the MS/MSD RPD within project acceptance limits?	•			

Review Questions

Method: BNASIMD (GC/MS-SIM Analysis by SW8270D)

Review Questions	Yes	No	NA	Comment
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	
Were QAPP specified laboratory PQLs achieved?	•			Required dilutions raised limits.
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Did the ICSA have any non-target interferents above the MDL?		•		
Were the ICSA/ICSAB recoveries within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	A LCSD was not provided.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Iron, Aluminum, and Sodium recovered outside QC limits. Aluminum and Iron were present in the parent sample at concentrations more than 4x the spike concentration, therefore data were not qualified for these metals. The sodium result was J qualified for sample IINY-BADU-5-SSIS-20200401.
Was the MS/MSD RPD within project acceptance limits?	•			
Were the post spike recoveries within project acceptance limits?		•		Aluminum, Iron, and Magnesium were outside QC limits. Aluminum and Iron were present in the parent sample at concentrations greater than 4x the spike concentration. The magnesium result for sample IINY-BADU-5-SSIS-20200401 was J qualified.
Were the serial dilution RPD values within project acceptance limits?		•		The %D for Magnesium was outside QC limits. The magnesium result for sample IINY-BADU-5-SSIS-20200401 was J qualified.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM-Field Triplicates were collected. The % RSD range for TAL Metals is 0-46.
Were QAPP specified laboratory PQLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)

Review Questions	Yes	No	NA	Comment
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the system properly tuned based on method criteria?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?		•		LLCCVs for Barium, Cadmium, Antimony, Zinc, were outside QC limits.
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Did the ICSA have any non-target interferents above the MDL?		•		
Were the ICSA/ICSAB recoveries within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		MB 280-490964/1-A associated with analysis batch 494739 had detections of Lead and Manganese that were above the method detection limit but below 1/2the LOQ. Associated results were greater than the LOQ and 10x the blank detection, so data were not qualified.
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	An LCSD was not provided.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Barium, Chromium, Vanadium, and Manganese recovered outside QC limits. Barium and Manganese had concentrations in the original sample greater than 4x the spike concentration. Chromium and vanadium results for sample IINY-BADU-5-SSIS-20200401 were J qualified.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM-Field Triplicates were collected. The % RSD range for TAL Metals is 0-46.
Were the post spike recoveries within project acceptance limits?		•		Vanadium recovered outside QC limits. The vanadium result for sample IINY-BADU-5-SSIS-20200401 was J qualified.
Were the serial dilution RPD values within project acceptance limits?	•			
Were QAPP specified laboratory PQLs achieved?	•			Required dilutions raised limits.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)

Review Questions	Yes	No	NA	Comment
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

Review Questions

Method: SW7471B (Mercury in Soil (Manual Cold-Vapor Technique))				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Were the required minimum levels of calibration standards used in the initial calibration?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	A LCSD was not provided.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	These are ISM-Field Triplicates were collected. The % RSD is 35.
Were QAPP specified laboratory PQLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

US Army Corps of Engineers ®

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling
SDG:	SN2805
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Tim Reese
Contract Laboratory(ies):	Katahdin Analytical Services, Westbrook, ME
Data Review Contractor:	EA Engineering, Science, and Technology, Inc., PBC
Data Review Level:	S2BVEM
Primary Data Reviewer:	Tara Lamond, Data Manager
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	May 27, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	WBLACK
IINY-SD01-20200407	SN2805-1	Soil	Field Sample/N	X
IINY-SD02-20200407	SN2805-2	Soil	Field Sample/N	X
IINY-SD03-20200407	SN2805-3	Soil	Field Sample/N	X
IINY-SD04-20200407	SN2805-4	Soil	Field Sample/N	X
IINY-SD05-20200407	SN2805-5	Soil	Field Sample/N	X
IINY-SD06-20200407	SN2805-6	Soil	Field Sample/N	X
IINY-SD07-20200407	SN2805-7	Soil	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Katahdin Analytical Services, Westbrook, ME and were reported under sample delivery group (SDG) SN2805. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Lab Blank
- Lab Replicate RPD
- LCS Recovery
- LCS RPD
- Prep Hold Time
- Test Hold Time

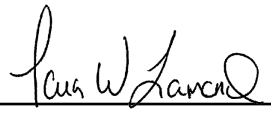
Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 0 results (0.00%) out of the 7 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

All quality control criteria were met except for the RPD between duplicate analysis for sample IINY-SD02-20200407. The TOC result was "J" qualified for this sample.

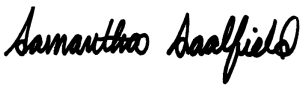
Analytical Method	Data Reviewer Comment
WBLACK	No additional comments; see Checklist for detail.



May 21, 2020

Reviewed by Tara Lamond, Data Manager, EA Engineering, Science, and Technology, Inc., PBC

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



May 27, 2020

Reviewed by Samantha Saalfield, Project Chemist, EA Engineering, Science, and Technology, Inc., PBC

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

No Outliers were associated with this sample delivery group.

Qualified Results

No results associated with this sample delivery group required qualification.

Table of All Trace Results

Test Method: WBLACK Extraction Method: NONE

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-SD06-20200407	N	Total Organic Carbon	1000	960 J	960 J		mg/kg	TR

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: WBLACK (Walkley-Black Method, Organic Carbon (TOC))				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?			•	
Were the required minimum levels of calibration standards used in the initial calibration?			•	
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?			•	
Were all reported analytes for the ICV within the required criteria?			•	
Were CCVs run at the required frequency and within acceptance criteria?			•	
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes in the field blank less than MDL?			•	A field blank was not collected.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?		•		A lab duplicate was provided.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	The RPD for the lab duplicate was within acceptance limits.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	
Were QAPP specified laboratory PQLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?	•			
Were any data rejected during the verification process?		•		

C2
Phase II Data Validation Reports

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Data Validation Report for 280-161283-1_52_2a_FUDSChem

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling Phase II
SDG:	280-161283-1_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Mike McGuire
Contract Laboratory(ies):	Eurofins Lancaster Laboratories Environmental, LLC, Lancaster, PA
Data Review Contractor:	EA Engineering, Science, and Technology
Data Review Level:	S2BVEM
Primary Data Reviewer:	Christopher Ma, Chemist
Second Reviewer:	Samantha Saalfield, Senior Chemist
Date Submitted:	July 20, 2022

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	AVS	SW6010D
IINY-IHRS-SED-01-041922	280-161283-8	Solid	Field Sample/N	X	X
IINY-IHRS-SED-02-041922	280-161283-9	Solid	Field Sample/N	X	X
IINY-IHRS-SED-03-041922	280-161283-10	Solid	Field Sample/N	X	X
IINY-RRDS-FD1-041922	280-161283-4	Solid	Field Duplicate/FD	X	X
IINY-RRDS-SED-01-041922	280-161283-1	Solid	Field Sample/N	X	X
IINY-RRDS-SED-02-041922	280-161283-2	Solid	Field Sample/N	X	X
IINY-RRDS-SED-03-041922	280-161283-3	Solid	Field Sample/N	X	X
IINY-TWS-SED-01-041922	280-161283-5	Solid	Field Sample/N	X	X
IINY-TWS-SED-02-041922	280-161283-6	Solid	Field Sample/N	X	X
IINY-TWS-SED-03-041922	280-161283-7	Solid	Field Sample/N	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Eurofins Lancaster Laboratories Environmental, LLC, Lancaster, PA and were reported under sample delivery group (SDG) 280-161283-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Field Duplicate RPD
- Lab Blank
- Lab Replicate RPD
- LCS Recovery
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 21 results (35.00%) out of the 60 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency (X qualifier). Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

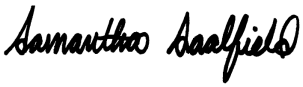
Narrative Comments

Analytical Method	Data Reviewer Comment
AVS	No additional comments; see Checklist for detail.
SW6010D	No additional comments; see Checklist for detail.

July 11, 2022

Reviewed by Christopher Ma, Chemist, EA Engineering, Science, and Technology

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of the reported sample results and method quality control data between the two deliverables.



Reviewed by Samantha Saalfield, Senior Chemist, EA Engineering, Science, and Technology

July 22, 2022

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method AVS, Test Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of analysis found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-IHRS-SED-01-041922 (N)		8.210	< 7	< 14	days	J/UJ	H1	Test Exceeds UWL
IINY-IHRS-SED-02-041922 (N)		8.200	< 7	< 14	days	J/UJ	H1	Test Exceeds UWL
IINY-IHRS-SED-03-041922 (N)		8.210	< 7	< 14	days	J/UJ	H1	Test Exceeds UWL
IINY-RRDS-FD1-041922 (FD)		8.330	< 7	< 14	days	J/UJ	H1	Test Exceeds UWL
IINY-RRDS-SED-01-041922 (N)		13.10	< 7	< 14	days	J/UJ	H1	Test Exceeds UWL
IINY-RRDS-SED-02-041922 (N)		13.10	< 7	< 14	days	J/UJ	H1	Test Exceeds UWL
IINY-RRDS-SED-03-041922 (N)		13.09	< 7	< 14	days	J/UJ	H1	Test Exceeds UWL
IINY-TWS-SED-01-041922 (N)		13.07	< 7	< 14	days	J/UJ	H1	Test Exceeds UWL
IINY-TWS-SED-02-041922 (N)		13.07	< 7	< 14	days	J/UJ	H1	Test Exceeds UWL
IINY-TWS-SED-03-041922 (N)		13.07	< 7	< 14	days	J/UJ	H1	Test Exceeds UWL

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Test Hold Time for AVS

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-IHRS-SED-01-041922 280-161283-8	N	Acid Volatile Sulfide	0.670	0.430 U	0.430 UJ		umoles/g	H1
IINY-IHRS-SED-02-041922 280-161283-9	N	Acid Volatile Sulfide	0.700	0.440 U	0.440 UJ		umoles/g	H1
IINY-IHRS-SED-03-041922 280-161283-10	N	Acid Volatile Sulfide	0.780	0.490 U	0.490 UJ		umoles/g	H1
IINY-RRDS-FD1-041922 280-161283-4	FD	Acid Volatile Sulfide	1.80	1.20 U	1.20 UJ		umoles/g	H1
IINY-RRDS-SED-01-041922 280-161283-1	N	Acid Volatile Sulfide	1.50	0.950 U	0.950 UJ		umoles/g	H1
IINY-RRDS-SED-02-041922 280-161283-2	N	Acid Volatile Sulfide	1.70	1.10 U	1.10 UJ		umoles/g	H1
IINY-RRDS-SED-03-041922 280-161283-3	N	Acid Volatile Sulfide	1.90	1.20 U	1.20 UJ		umoles/g	H1
IINY-TWS-SED-01-041922 280-161283-5	N	Acid Volatile Sulfide	1.40	0.860 U	0.860 UJ		umoles/g	H1
IINY-TWS-SED-02-041922 280-161283-6	N	Acid Volatile Sulfide	0.860	0.550 U	0.550 UJ		umoles/g	H1

Qualified Results associated with the Test Hold Time for AVS

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-TWS-SED-03-041922 280-161283-7	N	Acid Volatile Sulfide	1.50	0.930 U	0.930 UJ		umoles/g	H1

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6010D, Field Duplicate RPD

Field duplicate analyses are performed in order to assess sample collection/laboratory precision for each sample matrix. Summary forms were evaluated and compared to electronic data deliverables. Field duplicate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-RRDS-FD1-041922 (N)	Nickel	71.19	< 50	< 50	rpd	J/None	D3	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Field Duplicate RPD for SW6010D

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-RRDS-FD1-041922 280-161283-4	FD	Nickel	0.0170	0.380 J1	0.380 J	-	umoles/ g	D3/M2
IINY-RRDS-SED-03-041922 280-161283-3	N	Nickel	0.0170	0.800	0.800 J		umoles/ g	D3

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6010D, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-TWS-SED-01-MS-041922 (MS)	Cadmium	72.00	82 - 113	10 - 113	percent	J/UJ	M	
IINY-TWS-SED-01-MS-041922 (MS)	Copper	74.00	81 - 117	10 - 117	percent	J/UJ	M	
IINY-TWS-SED-01-MS-041922 (MS)	Lead	50.00	81 - 112	10 - 112	percent	J/UJ	M	Spike amount Insignificant
IINY-TWS-SED-01-MS-041922 (MS)	Nickel	77.00	83 - 113	10 - 113	percent	J/UJ	M	
IINY-TWS-SED-01-MS-041922 (MS)	Zinc	80.00	82 - 113	10 - 113	percent	J/UJ	M	
IINY-TWS-SED-01-MSD-041922 (SD)	Cadmium	78.00	82 - 113	10 - 113	percent	J/UJ	M	
IINY-TWS-SED-01-MSD-041922 (SD)	Lead	158.0	81 - 112	10 - 112	percent	J/None	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW6010D

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-TWS-SED-01-041922 280-161283-5	N	Cadmium	0.00440	0.00230 J J1	0.00230 J	-	umoles/ g	M/TR
IINY-TWS-SED-01-041922 280-161283-5	N	Copper	0.0310	0.170 J1	0.170 J	-	umoles/ g	M
IINY-TWS-SED-01-041922 280-161283-5	N	Nickel	0.0170	0.0490 J1	0.0490 J	-	umoles/ g	M
IINY-TWS-SED-01-041922 280-161283-5	N	Zinc	0.0300	0.640 J1	0.640 J	-	umoles/ g	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: AVS		Extraction Method: NONE						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-IHRS-SED-01-041922 280-161283-8	N	Acid Volatile Sulfide	0.670	0.430 U	0.430 UJ		umoles/g	H1
IINY-IHRS-SED-02-041922 280-161283-9	N	Acid Volatile Sulfide	0.700	0.440 U	0.440 UJ		umoles/g	H1
IINY-IHRS-SED-03-041922 280-161283-10	N	Acid Volatile Sulfide	0.780	0.490 U	0.490 UJ		umoles/g	H1
IINY-RRDS-FD1-041922 280-161283-4	FD	Acid Volatile Sulfide	1.80	1.20 U	1.20 UJ		umoles/g	H1
IINY-RRDS-SED-01-041922 280-161283-1	N	Acid Volatile Sulfide	1.50	0.950 U	0.950 UJ		umoles/g	H1
IINY-RRDS-SED-02-041922 280-161283-2	N	Acid Volatile Sulfide	1.70	1.10 U	1.10 UJ		umoles/g	H1
IINY-RRDS-SED-03-041922 280-161283-3	N	Acid Volatile Sulfide	1.90	1.20 U	1.20 UJ		umoles/g	H1
IINY-TWS-SED-01-041922 280-161283-5	N	Acid Volatile Sulfide	1.40	0.860 U	0.860 UJ		umoles/g	H1
IINY-TWS-SED-02-041922 280-161283-6	N	Acid Volatile Sulfide	0.860	0.550 U	0.550 UJ		umoles/g	H1
IINY-TWS-SED-03-041922 280-161283-7	N	Acid Volatile Sulfide	1.50	0.930 U	0.930 UJ		umoles/g	H1

Test Method: SW6010D		Extraction Method: AVS						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-RRDS-FD1-041922 280-161283-4	FD	Nickel	0.0170	0.380 J1	0.380 J	-	umoles/g	D3/M2
IINY-RRDS-FD1-041922 280-161283-4	FD	Zinc	0.0300	0.710 J1	0.710 J	-	umoles/g	M2
IINY-RRDS-SED-01-041922 280-161283-1	N	Copper	0.0310	0.120	0.120 J		umoles/g	A
IINY-RRDS-SED-01-041922 280-161283-1	N	Lead	0.00710	0.0610	0.0610 J		umoles/g	A
IINY-RRDS-SED-01-041922 280-161283-1	N	Nickel	0.0170	0.0300	0.0300 J		umoles/g	A
IINY-RRDS-SED-01-041922 280-161283-1	N	Zinc	0.0300	0.280 J1	0.280 J	-	umoles/g	M2/A
IINY-RRDS-SED-03-041922 280-161283-3	N	Nickel	0.0170	0.800	0.800 J		umoles/g	D3
IINY-TWS-SED-01-041922 280-161283-5	N	Cadmium	0.00440	0.00230 J J1	0.00230 J	-	umoles/g	M/TR
IINY-TWS-SED-01-041922 280-161283-5	N	Copper	0.0310	0.170 J1	0.170 J	-	umoles/g	M
IINY-TWS-SED-01-041922 280-161283-5	N	Nickel	0.0170	0.0490 J1	0.0490 J	-	umoles/g	M

Table of All Qualified Results

Test Method: SW6010D		Extraction Method: AVS						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-TWS-SED-01-041922 280-161283-5	N	Zinc	0.0300	0.640 J1	0.640 J	-	umoles/g	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW6010D

FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-RRDS-FD1-041922 280-161283-4	FD	Nickel	0.0170	0.380 J1	0.380 J	0.380 J	D3/M2
IINY-RRDS-FD1-041922 280-161283-4	FD	Zinc	0.0300	0.710 J1	0.710	0.710 J	M2
IINY-RRDS-SED-01-041922 280-161283-1	N	Copper	0.0310	0.120	0.120	0.120 J	A
IINY-RRDS-SED-01-041922 280-161283-1	N	Lead	0.00710	0.0610	0.0610	0.0610 J	A
IINY-RRDS-SED-01-041922 280-161283-1	N	Nickel	0.0170	0.0300	0.0300	0.0300 J	A
IINY-RRDS-SED-01-041922 280-161283-1	N	Zinc	0.0300	0.280 J1	0.280	0.280 J	M2/A

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
A	Serial dilution
D3	Field Duplicate RPD
H1	Test Hold Time
M	MS Recovery
M2	Post Spike
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

Bias

-	The result may be biased low
+	The result may be biased high

Note - The bias field is a separate field; however, it is an integral part of the final flag (qualifier) on the sample result

Review Questions

Method: AVS (EPA Draft Method for the Determination of Acid Volatile Sulfide and Simultaneously Extractable Metals in Sediment)				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?	•			
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?		•		AVS extractions were performed outside the 7-day hold time. Results were flagged with the J/UJ qualifier.
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		An LCS was prepared and analyzed with each batch. Since an MS/MSD pair and a laboratory replicate sample were included with the analysis batch, a LCSD was not prepared..
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	An LCSD was not prepared, since an MS/MSD pair and laboratory duplicate were prepared with prep/analysis batches.
Was a MS/MSD pair prepared with each batch?		•		One MS/MSD was prepared, in accordance with the QAPP requirement of 1 MS/MSD per 20 samples.
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	ISM samples were not included in this SDG.
Were surrogate recoveries within project acceptance limits?			•	Surrogates are not necessary for the AVS method.
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			AVS was not detected in the field duplicate pair of IINY-RRDS-SED-03-041922 and duplicate IINY-RDS-FD1-041922.
Were reported sample concentrations within calibration range?	•			

Review Questions

Method: AVS (EPA Draft Method for the Determination of Acid Volatile Sulfide and Simultaneously Extractable Metals in Sediment)				
Review Questions	Yes	No	NA	Comment
Were Instrument Performace Checks (Degradation Checks) performed and within acceptace criteria?			•	Instrument performance checks are not required b the AVS method.
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?		•		ICV is not required for the AVS method.
Were CCVs run at the required frequency and within project acceptance criteria?	•			
Were internal standard retention times and area criteria within method requirements?			•	Internal standards not required for the AVS method.
Were internal standards spiked for every sample, standard, and QC sample?			•	Internal standards not required for the AVS method.
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Was a Cleanup Procedure required (Cleanup Recovery Checks) verified and within acceptance limits?	•			
Was a Second Column/Detector used and the column difference within acceptance limits?			•	A second column/detector was not required for the AVS method.
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?			•	The sulfide method is not included in the QSM. Note that although the laboratory is DoD accredited for analysis of sulfide, it is not accredited for the AVS extraction.
Were any data recommended for exclusion in the data validation process?		•		

Review Questions

Method: SW6010D (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?	•			
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required .
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		An LCS was prepared and analyzed with each batch. Since an MS/MSD pair and a laboratory replicate sample were included with the analysis batch, a LCSD was not prepared.
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Since an MS/MSD pair and a laboratory replicate sample were included with the analysis batch, a LCSD was not required.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		The %recoveries for the metals in the MS/MSD prepared with project sample IINY-TWS-SED-01-041922 were below QC limits. The parent sample results have been flagged with a J qualifier with negative bias, except for lead because the concentration in the sample was more than 4 times the spike.
Was the MS/MSD RPD within project acceptance limits?	•			
Were Post Spike (PS) recoveries within project acceptance limits?		•		The post digestion spike %recoveries for zinc in the spike prepared with sample IINY-RRDS-SED-01-041922 and for nickel and zinc in the spike prepared with duplicate IINY-RRDS-FD1-041922 were below QC limits. The associated results in the parent samples have been flagged with J qualifiers with negative bias.

Review Questions

Method: SW6010D (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Was a Dilution Test/Serial Dilution performed and within project acceptance critiera?		•		The serial dilution performed on sample IINY-RRDS-SED-01-041922 had % differences exceeding the criterion of 10% and results for the parent sample were flagged with J qualifiers. Another serial dilution was performed on duplicate IINY-RRDS-FD1-041922, with % differences below 10%.
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	No ISM samples were included with this SDG.
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?		•		The parent/field duplicate RPD for the analysis of nickel for parent sample IINY-RRDS-SED-03-041922 and associated field duplicate IINY-RDS-FD1-041922 was above QC limits. The associated sample results have been flagged with the J qualifier.
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?	•			
Were Interference Check Solutions (ICS) or Spectral Interference Checks (SIC) performed at the requried frequency and within project acceptance limits?	•			
Were internal standard recoveries within project acceptance limits?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?			•	Although the laboratory is accredited for the Method 6010D analysis, it is not accredited for the AVS extraction. No deviations were noted.
Were any data recommended for exclusion in the data validation process?		•		

Data Validation Report for IONA-1

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling Phase II
SDG:	IONA-1
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Mike McGuire
Contract Laboratory(ies):	Katahdin Analytical Services, Scarborough, ME
Data Review Contractor:	EA Engineering Science and Technology, Inc
Data Review Level:	S2BVEM
Primary Data Reviewer:	Christopher Ma, Chemist
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	July 28, 2022

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	WBLACK
IINY-DU-04A-SSIS-041822	SP2007-11	Solid	Field Sample/N	X
IINY-DU-04B-SSIS-041822	SP2007-12	Solid	Field Duplicate/FD	X
IINY-DU-04C-SSIS-041822	SP2007-13	Solid	Field Triplicate/FT	X
IINY-DU-07A-SSIS-041822	SP2007-14	Solid	Field Sample/N	X
IINY-DU-07B-SSIS-041822	SP2007-15	Solid	Field Duplicate/FD	X
IINY-DU-07C-SSIS-041822	SP2007-16	Solid	Field Triplicate/FT	X
IINY-DU-09A-SSIS-041822	SP2007-17	Solid	Field Sample/N	X
IINY-DU-09B-SSIS-041822	SP2007-18	Solid	Field Duplicate/FD	X
IINY-DU-09C-SSIS-041822	SP2007-19	Solid	Field Triplicate/FT	X
IINY-DU-11A-SSIS-041822	SP2007-20	Solid	Field Sample/N	X
IINY-DU-11B-SSIS-041822	SP2007-22	Solid	Field Duplicate/FD	X
IINY-DU-13A-SSIS-041822	SP2007-23	Solid	Field Sample/N	X
IINY-DU-13B-SSIS-041822	SP2007-24	Solid	Field Duplicate/FD	X
IINY-DU-13C-SSIS-041822	SP2007-25	Solid	Field Triplicate/FT	X
IINY-DU-17A-SSIS-041922	SP2007-29	Solid	Field Sample/N	X
IINY-DU-17B-SSIS-041922	SP2007-30	Solid	Field Duplicate/FD	X
IINY-DU-17C-SSIS-041922	SP2007-31	Solid	Field Triplicate/FT	X
IINY-DU-18A-SSIS-041922	SP2144-2	Solid	Field Sample/N	X
IINY-DU-18B-SSIS-041922	SP2144-3	Solid	Field Duplicate/FD	X

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	WBLACK
IINY-DU-18C-SSIS-041922	SP2144-1	Solid	Field Triplicate/FT	X
IINY-DU-19A-SSIS-041922	SP2007-32	Solid	Field Sample/N	X
IINY-DU-19B-SSIS-041922	SP2007-33	Solid	Field Duplicate/FD	X
IINY-DU-19C-SSIS-041922	SP2007-34	Solid	Field Triplicate/FT	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Katahdin Analytical Services, Scarborough, ME and were reported under sample delivery group (SDG) IONA-1. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Field Duplicate RPD
- Field Triplicate RSD
- Lab Blank
- LCS Recovery
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 1 results (4.35%) out of the 23 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency (X qualifier). Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

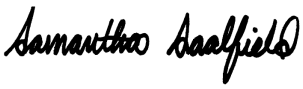
This DVR for SDG "IONA-1" addresses the Total Organic Carbon results for the samples included in SDG 280-161296-1.

Analytical Method	Data Reviewer Comment
WBLACK	No additional comments; see Checklist for detail.

July 15, 2022

Reviewed by Christopher Ma, Chemist, EA Engineering Science and Technology, Inc

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of the reported sample results and method quality control data between the two deliverables.



Reviewed by Samantha Saalfield, Project Chemist, EA Engineering Science and Technology, Inc

July 28, 2022

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method WBLACK, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-19C-SSIS-041922 (MS)	Total Organic Carbon	157.0	75 - 125	75 - 125	percent	J/None	M	
IINY-DU-19C-SSIS-041922 (SD)	Total Organic Carbon	157.0	75 - 125	75 - 125	percent	J/None	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for WBLACK

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19C-SSIS-041922 SP2007-34	FT	Total Organic Carbon	1000	25000	25000 J	+	mg/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: WBLACK		**Extraction Method: NONE**						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-19C-SSIS-041922 SP2007-34	FT	Total Organic Carbon	1000	25000	25000 J	+	mg/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions	
Code	Definition
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions	
Flag	Definition
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

Bias	
-	The result may be biased low
+	The result may be biased high
Note - The bias field is a separate field; however, it is an integral part of the final flag (qualifier) on the sample result	

Review Questions

Method: WBLACK (Walkley-Black Method, Organic Carbon (TOC))				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			No volume was received for IINY-DU-11C-SSIS-041822.
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?	•			
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			No quantitation limit goals were specified for TOC in the QAPP. However, MDL/LOD/LOQ were consistent with those presented in the QAPP.
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		An LCS was prepared and analyzed. Since an MS/MSD pair was included with the analysis batch, a LCSD was not required.
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Since an MS/MSD pair wasincluded with the analysis batch, a LCSD was not required.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		The MS/MSD %Rs for project sample IINY-DU-19C-SSIS-041922 were above QC limits. The associated project sample result has been flagged with a J qualifier with positive bias.
Was the MS/MSD RPD within project acceptance limits?	•			
Were Post Spike (PS) recoveries within project acceptance limits?			•	
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?		•		Each field sample included a related duplicate/triplicate sample set, except for IINY-DU-11 which only had a duplicate.
Were reported sample concentrations within calibration range?			•	
Was the Calibration within project acceptance criteria?			•	

Review Questions

Method: WBLACK (Walkley-Black Method, Organic Carbon (TOC))				
Review Questions	Yes	No	NA	Comment
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?			•	
Were CCVs run at the required frequency and within project acceptance criteria?			•	
Were ICB/CCBs run at the required frequency and within acceptance criteria?			•	
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?			•	
Were internal standard recoveries within project acceptance limits?			•	
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			The Case Narrative notes that results were calculated using 100% total solids, and that the 9 -11 gram sample aliquots provided had to be subsampled prior to analysis due to high carbon content.
Were DoD QSM corrective actions followed if deviations were noted?			•	TOC by Walkley Black is not included in the DoD QSM.
Were any data recommended for exclusion in the data validation process?		•		

Data Validation Report for 280-161297-1_52_2a_FUDSChem

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling Phase II
SDG:	280-161297-1_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Mike McGuire
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	EA Engineering, Science, and Technology
Data Review Level:	S2BVEM
Primary Data Reviewer:	Christopher Ma, Chemist
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	July 28, 2022

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW6010C	SW6020A	SW7471B
IINY-IHRS-DU-01A-SEDIS-041922	280-161297-1	Solid	Field Sample/N	X	X	X
IINY-IHRS-DU-01B-SEDIS-041922	280-161297-2	Solid	Field Duplicate/FD	X	X	X
IINY-IHRS-DU-01C-SEDIS-041922	280-161297-3	Solid	Field Triplicate/FT	X	X	X
IINY-RRDS-DU-01A-SEDIS-041922	280-161297-4	Solid	Field Sample/N	X	X	X
IINY-RRDS-DU-01B-SEDIS-041922	280-161297-5	Solid	Field Duplicate/FD	X	X	X
IINY-RRDS-DU-01C-SEDIS-041922	280-161297-6	Solid	Field Triplicate/FT	X	X	X
IINY-TWS-DU-01A-SEDIS-041922	280-161297-7	Solid	Field Sample/N	X	X	X
IINY-TWS-DU-01B-SEDIS-041922	280-161297-8	Solid	Field Duplicate/FD	X	X	X
IINY-TWS-DU-01C-SEDIS-041922	280-161297-9	Solid	Field Triplicate/FT	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 280-161297-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Field Duplicate RPD
- Field Triplicate RSD
- Lab Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 11 results (6.43%) out of the 171 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency (X qualifier). Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

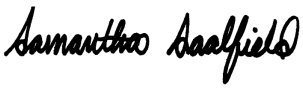
Narrative Comments

Analytical Method	Data Reviewer Comment
SW6010C	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW7471B	No additional comments; see Checklist for detail.

July 07, 2022

Reviewed by Christopher Ma, Chemist, EA Engineering, Science, and Technology

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of the reported sample results and method quality control data between the two deliverables.



Reviewed by Samantha Saalfield, Project Chemist, EA Engineering, Science, and Technology

July 28, 2022

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW6010C, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-573845/1-A (LB)	Iron	17.70	< 8.3	< 80	mg/kg	U/None*	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

*Blank flags displayed in the above table identify qualification of the sample result when it is less than or equal to the LOQ/RL. Sample results above the LOQ will be qualified based on the validation type such as J+ at the sample result.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6010C, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-IHRS-DU-01A-SEDIS-041922 (MS)	Aluminum	166.0	74 - 119	10 - 125	percent	J/None	M	Spike amount Insignificant
IINY-IHRS-DU-01A-SEDIS-041922 (SD)	Aluminum	13.00	74 - 119	10 - 125	percent	J/UJ	M	Spike amount Insignificant
IINY-IHRS-DU-01A-SEDIS-041922 (MS)	Iron	-3400	81 - 118	10 - 125	percent	J/X	M	Spike amount Insignificant
IINY-IHRS-DU-01A-SEDIS-041922 (SD)	Iron	-4300	81 - 118	10 - 125	percent	J/X	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6020A, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-573842/1-A (LB)	Lead	0.03870	< 0.036	< 0.8	mg/kg	U/None*	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

*Blank flags displayed in the above table identify qualification of the sample result when it is less than or equal to the LOQ/RL. Sample results above the LOQ will be qualified based on the validation type such as J+ at the sample result.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6020A, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-IHRS-DU-01A-SEDIS-041922 (MS)	Antimony	-139.0	72 - 124	10 - 125	percent	J/X	M	Spike amount Insignificant
IINY-IHRS-DU-01A-SEDIS-041922 (SD)	Antimony	-38.00	72 - 124	10 - 125	percent	J/X	M	Spike amount Insignificant
IINY-IHRS-DU-01A-SEDIS-041922 (MS)	Arsenic	58.00	82 - 118	10 - 125	percent	J/UJ	M	
IINY-IHRS-DU-01A-SEDIS-041922 (SD)	Arsenic	78.00	82 - 118	10 - 125	percent	J/UJ	M	
IINY-IHRS-DU-01A-SEDIS-041922 (MS)	Barium	-221.0	86 - 116	10 - 125	percent	J/X	M	Spike amount Insignificant
IINY-IHRS-DU-01A-SEDIS-041922 (SD)	Barium	1263	86 - 116	10 - 125	percent	J/None	M	Spike amount Insignificant
IINY-IHRS-DU-01A-SEDIS-041922 (MS)	Chromium	-79.00	83 - 119	10 - 125	percent	J/X	M	Spike amount Insignificant
IINY-IHRS-DU-01A-SEDIS-041922 (SD)	Chromium	244.0	83 - 119	10 - 125	percent	J/None	M	Spike amount Insignificant
IINY-IHRS-DU-01A-SEDIS-041922 (MS)	Copper	2700	84 - 119	10 - 125	percent	J/None	M	Spike amount Insignificant
IINY-IHRS-DU-01A-SEDIS-041922 (SD)	Copper	-2850	84 - 119	10 - 125	percent	J/X	M	Spike amount Insignificant
IINY-IHRS-DU-01A-SEDIS-041922 (MS)	Lead	-11850	84 - 118	10 - 125	percent	J/X	M	Spike amount Insignificant
IINY-IHRS-DU-01A-SEDIS-041922 (SD)	Lead	1800	84 - 118	10 - 125	percent	J/None	M	Spike amount Insignificant
IINY-IHRS-DU-01A-SEDIS-041922 (MS)	Manganese	-1540	85 - 116	10 - 125	percent	J/X	M	Spike amount Insignificant
IINY-IHRS-DU-01A-SEDIS-041922 (SD)	Manganese	-1255	85 - 116	10 - 125	percent	J/X	M	Spike amount Insignificant
IINY-IHRS-DU-01A-SEDIS-041922 (MS)	Selenium	74.00	80 - 119	10 - 125	percent	J/UJ	M	
IINY-IHRS-DU-01A-SEDIS-041922 (SD)	Selenium	63.00	80 - 119	10 - 125	percent	J/UJ	M	
IINY-IHRS-DU-01A-SEDIS-041922 (MS)	Silver	71.00	83 - 118	10 - 125	percent	J/UJ	M	
IINY-IHRS-DU-01A-SEDIS-041922 (SD)	Silver	74.00	83 - 118	10 - 125	percent	J/UJ	M	
IINY-IHRS-DU-01A-SEDIS-041922 (MS)	Vanadium	68.00	82 - 116	10 - 125	percent	J/UJ	M	
IINY-IHRS-DU-01A-SEDIS-041922 (SD)	Vanadium	76.00	82 - 116	10 - 125	percent	J/UJ	M	
IINY-IHRS-DU-01A-SEDIS-041922 (MS)	Zinc	-2250	82 - 119	10 - 125	percent	J/X	M	Spike amount Insignificant
IINY-IHRS-DU-01A-SEDIS-041922 (SD)	Zinc	-2850	82 - 119	10 - 125	percent	J/X	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW6020A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Arsenic	0.890	35.0 J1	35.0 J	-	mg/kg	M
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Selenium	0.740	0.590 U J1	0.590 UJ		mg/kg	M/D
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Silver	0.200	1.00 J1	1.00 J	-	mg/kg	M
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Vanadium	0.740	37.0 J1	37.0 J	-	mg/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6020A, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-IHRS-DU-01A-SEDIS-041922 (SD)	Barium	54.22	< 20	< 20	rpd	J/UJ	D	
IINY-IHRS-DU-01A-SEDIS-041922 (SD)	Chromium	40.91	< 20	< 20	rpd	J/UJ	D	
IINY-IHRS-DU-01A-SEDIS-041922 (SD)	Copper	24.21	< 20	< 20	rpd	J/UJ	D	
IINY-IHRS-DU-01A-SEDIS-041922 (SD)	Lead	40.78	< 20	< 20	rpd	J/UJ	D	
IINY-IHRS-DU-01A-SEDIS-041922 (SD)	Selenium	35.59	< 20	< 20	rpd	J/UJ	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS RPD for SW6020A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Barium	30.0	370 D J1 Q	370 J		mg/kg	D
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Chromium	0.890	120 J1	120 J		mg/kg	D
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Copper	180	4600 J1 D	4600 J		mg/kg	D
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Lead	30.0	7700 J1 D	7700 J		mg/kg	D/M2
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Selenium	0.740	0.590 U J1	0.590 UJ		mg/kg	M/D

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: SW6010C		Extraction Method: SW3050B						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Aluminum	46.0	6900 J1	6900 J		mg/kg	A
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Iron	740	180000 D J1	180000 J		mg/kg	A

Test Method: SW6020A		Extraction Method: SW3050B						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Antimony	0.390	110 J1	110 J		mg/kg	A
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Arsenic	0.890	35.0 J1	35.0 J	-	mg/kg	M
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Barium	30.0	370 D J1 Q	370 J		mg/kg	D
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Chromium	0.890	120 J1	120 J		mg/kg	D
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Copper	180	4600 J1 D	4600 J		mg/kg	D
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Lead	30.0	7700 J1 D	7700 J		mg/kg	D/M2
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Selenium	0.740	0.590 U J1	0.590 UJ		mg/kg	M/D
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Silver	0.200	1.00 J1	1.00 J	-	mg/kg	M
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Vanadium	0.740	37.0 J1	37.0 J	-	mg/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW6010C							
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Aluminum	46.0	6900 J1	6900	6900 J	A
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Iron	740	180000 D J1	180000	180000 J	A

Modified Qualifiers for test method SW6020A							
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Antimony	0.390	110 J1	110	110 J	A
IINY-IHRS-DU-01A-SEDIS-041922 280-161297-1	N	Lead	30.0	7700 J1 D	7700 J	7700 J	D/M2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
A	Serial dilution
D	MS RPD
L	Lab Blank
M	MS Recovery
M2	Post Spike
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

Bias

-	The result may be biased low
+	The result may be biased high

Note - The bias field is a separate field; however, it is an integral part of the final flag (qualifier) on the sample result

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?		•		Suffix -041922 was not included at end of sample names on the COC and was added by the laboratory as requested.
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?	•			
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?		•		Iron was detected in a method blank. The associated sample results were greater than 5x the method blank detection; therefore no qualification was necessary.
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		Prep batch 573845 included a LCS and a MS/MSD pair, but did not include a LCSD.
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Prep batch 573845 included a LCS and a MS/MSD pair, but did not include a LCSD. An LCSD is not required per the QAPP.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		A MS/MSD was performed on sample IINY-IHRS-DU-01A-SEDIS-041922. Recoveries were outside acceptance limits, but the parent sample results were greater than 4x the spike concentration
Was the MS/MSD RPD within project acceptance limits?	•			
Were Post Spike (PS) recoveries within project acceptance limits?		•		A PS was performed on sample IINY-IHRS-DU-01A-SEDIS-041922. Recoveries were outside acceptance limits. Results were qualified based on serial dilution also outside QC limits (see next item).
Was a Dilution Test/Serial Dilution performed and within project acceptance critiera?		•		A serial dilution was performed on sample IINY-IHRS-DU-01A-SEDIS-041922, and the % difference for aluminum and iron were above QC limits, at 29% and 15%. Associated results were flagged with a J qualifier.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?		•		
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			Each field sample included a related duplicate/triplicate sample set.
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?	•			
Were Interference Check Solutions (ICS) or Spectral Interference Checks (SIC) performed at the requried frequency and within project acceptance limits?	•			
Were internal standard recoveries within project acceptance limits?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?			•	No DoD QSM deviations were noted.
Were any data recommended for exclusion in the data validation process?		•		

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?		•		Suffix -041922 was not included at end of sample names on the COC and was added by the laboratory as requested.
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?	•			
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?		•		Lead was detected in a method blank. The associated sample results were greater than 10x the method blank detection; therefore, no qualification was necessary.
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		Prep batches 573580 and 573842 each included a LCS and a MS/MSD pair, but did not include a LCSD.
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Prep batches 573580 and 573842 each included a LCS and a MS/MSD pair, but did not include a LCSD.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		The %Rs were within QC limits, or the sample result was greater than 4x the spike concentration, with the following exceptions. The %Rs for the MS/MSD prepared with project sample IINY-IHRS-DU-01A-SEDIS-041922 were below QC limits for arsenic, selenium, silver, and vanadium. The associated sample results have been flagged with the J or UJ qualifier.
Was the MS/MSD RPD within project acceptance limits?		•		The RPDs for the MS/MSD prepared with project sample IINY-IHRS-DU-01A-SEDIS-041922 were above QC limits for barium, chromium, copper, lead, and selenium. The associated sample results have been flagged with the J or UJ qualifier.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)

Review Questions	Yes	No	NA	Comment
Were Post Spike (PS) recoveries within project acceptance limits?		•		The the PS performed on sample IINY-IHRS-DU-01A-SEDIS-041922 had an %R outside QC limits for lead. The lead result was flagged with the J qualifier.
Was a Dilution Test/Serial Dilution performed and within project acceptance critiera?		•		A serial dilution was performed on sample IINY-IHRS-DU-01A-SEDIS-041922. Antimony had a % difference (11%) exceeding acceptance criteria. The antimony result was flagged with the J qualifier.
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?		•		
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			Each field sample included a related duplicate/triplicate sample set.
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?	•			
Were Interference Check Solutions (ICS) or Spectral Interference Checks (SIC) performed at the requried frequency and within project acceptance limits?		•		Barium was detected in ICSA at concentrations greater than 1/2 LOQ. The vendor acknowledges that barium is a trace impurity in the standard. No data were qualified.
Were internal standard recoveries within project acceptance limits?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			In addition to the items on this checklist, the Case Narrative notes that low-level CCVs (CCVLs, separate from the LLCCVs) had %Rs above QC limits for barium, beryllium, and manganese. The associated results were greater than 10 times the CCVL concentrations. No data were qualified based on CCVLs.
Were DoD QSM corrective actions followed if deviations were noted?			•	No DoD QSM deviations were noted.
Were any data recommended for exclusion in the data validation process?		•		

Review Questions

Method: SW7471B (Mercury in Soil (Manual Cold-Vapor Technique))

Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?		•		Suffix -041922 was not included at end of sample names on the COC and was added by the laboratory as requested.
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?	•			
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?		•		Prep batch 574308 did not include a MS/MSD pair.
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?		•		
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			Each field sample included a related duplicate/triplicate sample set.
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			

Review Questions

Method: SW7471B (Mercury in Soil (Manual Cold-Vapor Technique))				
Review Questions	Yes	No	NA	Comment
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?			•	Separate LLCCVs were not required.
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?			•	No DoD QSM deviations were noted.
Were any data recommended for exclusion in the data validation process?		•		

Data Validation Report for SP2022

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling Phase II
SDG:	SP2022
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Mike McGuire
Contract Laboratory(ies):	Katahdin Analytical Services, Scarborough, ME
Data Review Contractor:	EA Engineering Science and Technology, Inc
Data Review Level:	S2BVEM
Primary Data Reviewer:	Christopher Ma, Chemist
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	July 28, 2022

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	WBLACK
IINY-IHRS-DU-01A-SEDIS-041922	SP2022-1	Solid	Field Sample/N	X
IINY-IHRS-DU-01B-SEDIS-041922	SP2022-3	Solid	Field Duplicate/FD	X
IINY-IHRS-DU-01C-SEDIS-041922	SP2022-4	Solid	Field Triplicate/FT	X
IINY-RRDS-DU-01A-SEDIS-041922	SP2022-5	Solid	Field Sample/N	X
IINY-RRDS-DU-01B-SEDIS-041922	SP2022-6	Solid	Field Duplicate/FD	X
IINY-RRDS-DU-01C-SEDIS-041922	SP2022-7	Solid	Field Triplicate/FT	X
IINY-TWS-DU-01A-SEDIS-041922	SP2022-8	Solid	Field Sample/N	X
IINY-TWS-DU-01B-SEDIS-041922	SP2022-9	Solid	Field Duplicate/FD	X
IINY-TWS-DU-01C-SEDIS-041922	SP2022-10	Solid	Field Triplicate/FT	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Katahdin Analytical Services, Scarborough, ME and were reported under sample delivery group (SDG) SP2022. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Field Duplicate RPD
- Field Triplicate RSD
- Lab Blank
- LCS Recovery
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 0 results (0.00%) out of the 9 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency (X qualifier). Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

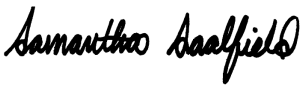
This DVR for SDG "SP2022" addresses the Total Organic Carbon results for the samples included in SDG 280-161297-1.

Analytical Method	Data Reviewer Comment
WBLACK	No additional comments; see Checklist for detail.

July 16, 2022

Reviewed by Christopher Ma, Chemist, EA Engineering Science and Technology, Inc

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of the reported sample results and method quality control data between the two deliverables.



Reviewed by Samantha Saalfield, Project Chemist, EA Engineering Science and Technology, Inc

July 28, 2022

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

No Outliers were associated with this sample delivery group.

Qualified Results

No results associated with this sample delivery group required qualification.

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
TR	Trace Level Detect

There are no Flag Code definitions to display.

Bias

-	The result may be biased low

+	The result may be biased high

Note - The bias field is a separate field; however, it is an integral part of the final flag (qualifier) on the sample result

Review Questions

Method: WBLACK (Walkley-Black Method, Organic Carbon (TOC))				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?	•			
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			No quantitation limit goals were specified for TOC in the QAPP. However, MDL/LOD/LOQ were consistent with those presented in the QAPP.
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		An LCS was prepared and analyzed. Since an MS/MSD pair was included with the analysis batch, a LCSD was not required.
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Since an MS/MSD pair was included with the analysis batch, a LCSD was not required.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
Were Post Spike (PS) recoveries within project acceptance limits?			•	PS not applicable to Walkley Black.
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			Each field sample included a related duplicate/triplicate sample set.
Were reported sample concentrations within calibration range?			•	
Was the Calibration within project acceptance criteria?			•	
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?			•	
Were CCVs run at the required frequency and within project acceptance criteria?			•	

Review Questions

Method: WBLACK (Walkley-Black Method, Organic Carbon (TOC))				
Review Questions	Yes	No	NA	Comment
Were ICB/CCBs run at the required frequency and within acceptance criteria?			•	
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?			•	
Were internal standard recoveries within project acceptance limits?			•	
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			The Case Narrative notes that results were calculated using 100% total solids, and that the 9 -11 gram sample aliquots provided had to be subsampled prior to analysis due to high carbon content.
Were DoD QSM corrective actions followed if deviations were noted?			•	TOC by Walkley Black is not included in the DoD QSM.
Were any data recommended for exclusion in the data validation process?		•		

Data Validation Report for 280-161368-1_52_2a_FUDSChem

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling Phase II
SDG:	280-161368-1_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Mike McGuire
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	EA Engineering, Science, and Technology
Data Review Level:	S2BVEM
Primary Data Reviewer:	Christopher Ma, Chemist
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	July 26, 2022

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW6010C - Dissolved	SW6020A - Dissolved	SW7470A - Dissolved
IINY-IHRS-SW-01-041922	280-161368-1	Water	Field Sample/N	X	X	X
IINY-IHRS-SW-02-041922	280-161368-2	Water	Field Sample/N	X	X	X
IINY-IHRS-SW-03-041922	280-161368-3	Water	Field Sample/N	X	X	X
IINY-IHRS-SW-04-041922	280-161368-4	Water	Field Sample/N	X	X	X
IINY-IHRS-SW-05-041922	280-161368-6	Water	Field Sample/N	X	X	X
IINY-IHRS-SW-06-041922	280-161368-7	Water	Field Sample/N	X	X	X
IINY-IHRS-SW-07-041922	280-161368-8	Water	Field Sample/N	X	X	X
IINY-IHRS-SW-08-041922	280-161368-9	Water	Field Sample/N	X	X	X
IINY-IHRS-SW-09-041922	280-161368-10	Water	Field Sample/N	X	X	X
IINY-IHRS-SW-10-041922	280-161368-11	Water	Field Sample/N	X	X	X
IINY-IHRS-SW-11-041922	280-161368-12	Water	Field Sample/N	X	X	X
IINY-IHRS-SW-12-041922	280-161368-13	Water	Field Sample/N	X	X	X
IINY-IHRS-SW-13-041922	280-161368-14	Water	Field Sample/N	X	X	X
IINY-IHRS-SW-14-041922	280-161368-15	Water	Field Sample/N	X	X	X
IINY-IHRS-SW-15-041922	280-161368-16	Water	Field Sample/N	X	X	X
IINY-IHRS-SW-16-041922	280-161368-17	Water	Field Sample/N	X	X	X
IINY-IHRS-SW-17-041922	280-161368-18	Water	Field Sample/N	X	X	X
IINY-IHRS-SW-18-041922	280-161368-19	Water	Field Sample/N	X	X	X
IINY-IHRS-SW-19-041922	280-161368-20	Water	Field Sample/N	X	X	X

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW6010C - Dissolved	SW6020A - Dissolved	SW7470A - Dissolved
IINY-IHRS-SW-20-041922	280-161368-21	Water	Field Sample/N	X	X	X
IINY-IHRS-SW-FD1-041922	280-161368-5	Water	Field Duplicate/FD	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 280-161368-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Field Duplicate RPD
- Lab Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 25 results (5.18%) out of the 483 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency (X qualifier). Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

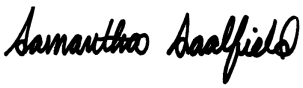
Narrative Comments

Analytical Method	Data Reviewer Comment
SW6010C	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW7470A	No additional comments; see Checklist for detail.

July 26, 2022

Reviewed by Christopher Ma, Chemist, EA Engineering, Science, and Technology

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of the reported sample results and method quality control data between the two deliverables.



Reviewed by Samantha Saalfield, Project Chemist, EA Engineering, Science, and Technology

July 28, 2022

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW6010C, Dissolved, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-573022/1-A (LB)	Calcium	78.70	< 24	< 200	ug/l	U/None*	L	
MB 280-573022/1-A (LB)	Iron	29.90	< 9.1	< 100	ug/l	U/None*	L	
MB 280-573022/1-A (LB)	Magnesium	11.60	< 4.2	< 200	ug/l	U/None*	L	
MB 280-573022/1-A (LB)	Sodium	735.0	< 97	< 1000	ug/l	U/None*	L	
MB 280-573581/1-A (LB)	Calcium	24.20	< 24	< 200	ug/l	U/None*	L	
MB 280-573581/1-A (LB)	Iron	11.60	< 9.1	< 100	ug/l	U/None*	L	
MB 280-573581/1-A (LB)	Magnesium	16.40	< 4.2	< 200	ug/l	U/None*	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

*Blank flags displayed in the above table identify qualification of the sample result when it is less than or equal to the LOQ/RL. Sample results above the LOQ will be qualified based on the validation type such as J+ at the sample result.

Qualified Results associated with the Lab Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-IHRS-SW-01-041922 280-161368-1	N	Iron	100	79.0 J	100 U		ug/l	L
IINY-IHRS-SW-02-041922 280-161368-2	N	Iron	100	25.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-03-041922 280-161368-3	N	Iron	100	31.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-04-041922 280-161368-4	N	Iron	100	24.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-05-041922 280-161368-6	N	Iron	100	42.0 J	100 U		ug/l	L
IINY-IHRS-SW-06-041922 280-161368-7	N	Iron	100	60.0 J	100 U		ug/l	L
IINY-IHRS-SW-07-041922 280-161368-8	N	Iron	100	30.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-08-041922 280-161368-9	N	Iron	100	42.0 J	100 U		ug/l	L
IINY-IHRS-SW-09-041922 280-161368-10	N	Iron	100	29.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-10-041922 280-161368-11	N	Iron	100	34.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-11-041922 280-161368-12	N	Iron	100	25.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-12-041922 280-161368-13	N	Iron	100	25.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-13-041922 280-161368-14	N	Iron	100	26.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-14-041922 280-161368-15	N	Iron	100	39.0 J	100 U		ug/l	L
IINY-IHRS-SW-15-041922 280-161368-16	N	Iron	100	29.0 J	34.0 U		ug/l	L

Qualified Results associated with the Lab Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-IHRS-SW-16-041922 280-161368-17	N	Iron	100	33.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-17-041922 280-161368-18	N	Iron	100	38.0 J	100 U		ug/l	L
IINY-IHRS-SW-18-041922 280-161368-19	N	Iron	100	35.0 J	100 U		ug/l	L
IINY-IHRS-SW-19-041922 280-161368-20	N	Iron	100	28.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-FD1-041922 280-161368-5	FD	Iron	100	38.0 J	100 U		ug/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6020A, Dissolved, Field Duplicate RPD

Field duplicate analyses are performed in order to assess sample collection/laboratory precision for each sample matrix. Summary forms were evaluated and compared to electronic data deliverables. Field duplicate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-IHRS-SW-FD1-041922 (N)	Copper	2.100	< 2	< 2	ug/l	J/UJ	D3	5XRL

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Field Duplicate RPD for SW6020A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-IHRS-SW-04-041922 280-161368-4	N	Copper	2.00	4.40	4.40 J		ug/l	D3
IINY-IHRS-SW-FD1-041922 280-161368-5	FD	Copper	2.00	2.30	2.30 J		ug/l	D3

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6020A, Dissolved, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-573274/1-A (LB)	Beryllium	0.2500	< 0.08	< 1	ug/l	U/None*	L	
MB 280-573274/1-A (LB)	Cobalt	0.1050	< 0.092	< 1	ug/l	U/None*	L	
MB 280-573274/1-A (LB)	Lead	0.3040	< 0.18	< 3	ug/l	U/None*	L	
MB 280-573274/1-A (LB)	Manganese	0.6610	< 0.31	< 3.5	ug/l	U/None*	L	
MB 280-573312/1-A (LB)	Beryllium	0.1410	< 0.08	< 1	ug/l	U/None*	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

*Blank flags displayed in the above table identify qualification of the sample result when it is less than or equal to the LOQ/RL. Sample results above the LOQ will be qualified based on the validation type such as J+ at the sample result.

Qualified Results associated with the Lab Blank for SW6020A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-IHRS-SW-01-041922 280-161368-1	N	Lead	3.00	2.80 J	3.00 U		ug/l	L
IINY-IHRS-SW-02-041922 280-161368-2	N	Beryllium	1.00	0.180 J	0.300 U		ug/l	L
IINY-IHRS-SW-FD1-041922 280-161368-5	FD	Beryllium	1.00	0.610 J	1.00 U		ug/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: SW6010C		Extraction Method: FLDFLT						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-IHRS-SW-01-041922 280-161368-1	N	Iron	100	79.0 J	100 U		ug/l	L
IINY-IHRS-SW-02-041922 280-161368-2	N	Iron	100	25.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-03-041922 280-161368-3	N	Iron	100	31.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-04-041922 280-161368-4	N	Iron	100	24.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-05-041922 280-161368-6	N	Iron	100	42.0 J	100 U		ug/l	L
IINY-IHRS-SW-06-041922 280-161368-7	N	Iron	100	60.0 J	100 U		ug/l	L
IINY-IHRS-SW-07-041922 280-161368-8	N	Iron	100	30.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-08-041922 280-161368-9	N	Iron	100	42.0 J	100 U		ug/l	L
IINY-IHRS-SW-09-041922 280-161368-10	N	Iron	100	29.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-10-041922 280-161368-11	N	Iron	100	34.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-11-041922 280-161368-12	N	Iron	100	25.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-12-041922 280-161368-13	N	Iron	100	25.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-13-041922 280-161368-14	N	Iron	100	26.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-14-041922 280-161368-15	N	Iron	100	39.0 J	100 U		ug/l	L
IINY-IHRS-SW-15-041922 280-161368-16	N	Iron	100	29.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-16-041922 280-161368-17	N	Iron	100	33.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-17-041922 280-161368-18	N	Iron	100	38.0 J	100 U		ug/l	L
IINY-IHRS-SW-18-041922 280-161368-19	N	Iron	100	35.0 J	100 U		ug/l	L
IINY-IHRS-SW-19-041922 280-161368-20	N	Iron	100	28.0 J	34.0 U		ug/l	L
IINY-IHRS-SW-FD1-041922 280-161368-5	FD	Iron	100	38.0 J	100 U		ug/l	L

Test Method: SW6020A		Extraction Method: FLDFLT						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-IHRS-SW-01-041922 280-161368-1	N	Lead	3.00	2.80 J	3.00 U		ug/l	L
IINY-IHRS-SW-02-041922 280-161368-2	N	Beryllium	1.00	0.180 J	0.300 U		ug/l	L
IINY-IHRS-SW-04-041922 280-161368-4	N	Copper	2.00	4.40	4.40 J		ug/l	D3

Table of All Qualified Results

Test Method: SW6020A		Extraction Method: FLDFLT						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-IHRS-SW-FD1-041922 280-161368-5	FD	Beryllium	1.00	0.610 J	1.00 U		ug/l	L
IINY-IHRS-SW-FD1-041922 280-161368-5	FD	Copper	2.00	2.30	2.30 J		ug/l	D3

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions	
Code	Definition
D3	Field Duplicate RPD
L	Lab Blank
TR	Trace Level Detect

Flag Code and Definitions	
Flag	Definition
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
U	Undetected: The analyte was analyzed for, but not detected.

Bias	
-	The result may be biased low
+	The result may be biased high
Note - The bias field is a separate field; however, it is an integral part of the final flag (qualifier) on the sample result	

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?			•	Only water samples were included with this SDG.
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blank samples were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?		•		Calcium, iron, magnesium, and sodium were detected in method blanks. Associated sample results for iron were less than the LOQ and were qualified U. Associated sample results for calcium, magnesium, and sodium were greater than the LOQ and more than 5x the blank detections and were not qualified.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
Were Post Spike (PS) recoveries within project acceptance limits?			•	Post Spike was not required as MS/MSD recoveries were within acceptance limits.
Was a Dilution Test/Serial Dilution performed and within project acceptance critiera?			•	Dilution test was not required as MS/MSD recoveries were within acceptance limits.
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			One field duplicate was included with 20 project samples. Parent sample IINY-IHRS-SW-04-041922 is associated with field duplicate sample IINY-IHRS-SW-FD1-041922. Parent/field duplicate RPDs were in control.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?	•			
Were Interference Check Solutions (ICS) or Spectral Interference Checks (SIC) performed at the requried frequency and within project acceptance limits?	•			
Were internal standard recoveries within project acceptance limits?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			In addition to the items on this checklist, the Case Narrative notes that a low-level CCV (CCVL, separate from the LLCCV) had %R above QC limits for sodium. No data were qualified based on CCVLs. The associated results were greater than 10 times the CCVL concentrations. No data were qualified based on CCVLs.
Were DoD QSM corrective actions followed if deviations were noted?			•	No DoD QSM corrective actions/deviations were noted.
Were any data recommended for exclusion in the data validation process?		•		

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?			•	Only water samples were included with this SDG.
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?		•		Beryllium, cobalt, lead, and manganese were detected in method blank samples. The associated sample results which were less than the LOQ were qualified U.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
Were Post Spike (PS) recoveries within project acceptance limits?	•			
Was a Dilution Test/Serial Dilution performed and within project acceptance critiera?	•			
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?		•		One field duplicate was included with 20 project samples. Parent sample IINY-IHRS-SW-04-041922 is associated with field duplicate sample IINY-IHRS-SW-FD1-041922. Parent/field duplicate RPDs were in control with the exception of copper (63%). The copper results were flagged J.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?	•			
Were Interference Check Solutions (ICS) or Spectral Interference Checks (SIC) performed at the requried frequency and within project acceptance limits?		•		Barium was detected in ICSA at concentrations greater than 1/2 LOQ. The vendor acknowledges that barium is a trace impurity in the standard. No data were qualified.
Were internal standard recoveries within project acceptance limits?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			In addition to the items on this checklist, the Case Narrative notes that low-level CCVs (CCVLs, separate from the LLCCVs) had %Rs above QC limits for manganese. The associated results were greater than 10 times the CCVL concentrations. No data were qualified based on CCVLs.
Were DoD QSM corrective actions followed if deviations were noted?			•	No DoD QSM deviations were noted.
Were any data recommended for exclusion in the data validation process?		•		

Review Questions

Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique))

Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?			•	Only water samples were included with this SDG.
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			One field duplicate was included with 20 project samples. Parent sample IINY-IHRS-SW-04-041922 is associated with field duplicate sample IINY-IHRS-SW-FD1-041922. Mercury was not detected in the parent or duplicate.
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			

Review Questions

Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique))

Review Questions	Yes	No	NA	Comment
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?			•	Separate LLCCVs were not required.
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?			•	No DoD QSM deviations were noted.
Were any data recommended for exclusion in the data validation process?		•		

Data Validation Report for 280-161296-2_52_2a_FUDSChem

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling Phase II
SDG:	280-161296-2_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Mike McGuire
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Corpus Christi, TX
Data Review Contractor:	EA Engineering Science and Technology, Inc
Data Review Level:	S2BVEM
Primary Data Reviewer:	Tara Lamond, Data Manager
Second Reviewer:	Samantha Saalfield, Senior Scientist
Date Submitted:	November 14, 2022

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW9081
IINY-DU-04A-SSIS-041822	280-161296-1	Solid	Field Sample/N	X
IINY-DU-04B-SSIS-041822	280-161296-2	Solid	Field Duplicate/FD	X
IINY-DU-04C-SSIS-041822	280-161296-3	Solid	Field Triplicate/FT	X
IINY-DU-07A-SSIS-041822	280-161296-4	Solid	Field Sample/N	X
IINY-DU-07B-SSIS-041822	280-161296-5	Solid	Field Duplicate/FD	X
IINY-DU-07C-SSIS-041822	280-161296-6	Solid	Field Triplicate/FT	X
IINY-DU-09A-SSIS-041822	280-161296-7	Solid	Field Sample/N	X
IINY-DU-09B-SSIS-041822	280-161296-8	Solid	Field Duplicate/FD	X
IINY-DU-09C-SSIS-041822	280-161296-9	Solid	Field Triplicate/FT	X
IINY-DU-11A-SSIS-041822	280-161296-10	Solid	Field Sample/N	X
IINY-DU-11B-SSIS-041822	280-161296-11	Solid	Field Duplicate/FD	X
IINY-DU-13A-SSIS-041822	280-161296-13	Solid	Field Sample/N	X
IINY-DU-13B-SSIS-041822	280-161296-14	Solid	Field Duplicate/FD	X
IINY-DU-13C-SSIS-041822	280-161296-15	Solid	Field Triplicate/FT	X
IINY-DU-17A-SSIS-041922	280-161296-19	Solid	Field Sample/N	X
IINY-DU-17B-SSIS-041922	280-161296-20	Solid	Field Duplicate/FD	X
IINY-DU-17C-SSIS-041922	280-161296-21	Solid	Field Triplicate/FT	X
IINY-DU-18A-SSIS-041922	280-161296-17	Solid	Field Sample/N	X
IINY-DU-18B-SSIS-041922	280-161296-18	Solid	Field Duplicate/FD	X

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW9081
IINY-DU-18C-SSIS-041922	280-161296-16	Solid	Field Triplicate/FT	X
IINY-DU-19A-SSIS-041922	280-161296-22	Solid	Field Sample/N	X
IINY-DU-19B-SSIS-041922	280-161296-23	Solid	Field Duplicate/FD	X
IINY-DU-19C-SSIS-041922	280-161296-24	Solid	Field Triplicate/FT	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Eurofins Environment Testing TestAmerica, Corpus Christi, TX and were reported under sample delivery group (SDG) 280-161296-2_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Field Duplicate RPD
- Field Triplicate RSD
- Lab Blank
- Lab Replicate RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 23 results (100.00%) out of the 23 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency (X qualifier). Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW9081	The re-run of the CEC samples were questionable due to the ISM sample prep (drying of samples changing results). Therefore all sample results were J qualifed as estimated concentrations.

November 10, 2022

Reviewed by Tara Lamond, Data Manager, EA Engineering Science and Technology, Inc

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of the reported sample results and method quality control data between the two deliverables.

December 14, 2022

Reviewed by Samantha Saalfield, Senior Scientist, EA Engineering Science and Technology, Inc

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW9081, Lab Replicate RPD

The objective of duplicate sample (LR) analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Laboratory duplicate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-DU-04A-SSIS-041822 (LR)	Cation-Exchange Capacity	35.71	< 20	< 20	rpd	J/None	D1	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Lab Replicate RPD for SW9081

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-04A-SSIS-041822 280-161296-1	N	Cation-Exchange Capacity	0.0500	33.0	33.0 J		meq/100 g	D1/P
IINY-DU-04B-SSIS-041822 280-161296-2	FD	Cation-Exchange Capacity	0.0500	33.0	33.0 J		meq/100 g	D1/P
IINY-DU-04C-SSIS-041822 280-161296-3	FT	Cation-Exchange Capacity	0.0500	34.0	34.0 J		meq/100 g	D1/P

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: SW9081		Extraction Method: METHOD						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DU-04A-SSIS-041822 280-161296-1	N	Cation-Exchange Capacity	0.0500	33.0	33.0 J		meq/100 g	D1/P
IINY-DU-04B-SSIS-041822 280-161296-2	FD	Cation-Exchange Capacity	0.0500	33.0	33.0 J		meq/100 g	D1/P
IINY-DU-04C-SSIS-041822 280-161296-3	FT	Cation-Exchange Capacity	0.0500	34.0	34.0 J		meq/100 g	D1/P
IINY-DU-07A-SSIS-041822 280-161296-4	N	Cation-Exchange Capacity	0.0500	24.0	24.0 J		meq/100 g	P
IINY-DU-07B-SSIS-041822 280-161296-5	FD	Cation-Exchange Capacity	0.0500	25.0	25.0 J		meq/100 g	P
IINY-DU-07C-SSIS-041822 280-161296-6	FT	Cation-Exchange Capacity	0.0500	24.0	24.0 J		meq/100 g	P
IINY-DU-09A-SSIS-041822 280-161296-7	N	Cation-Exchange Capacity	0.0500	27.0	27.0 J		meq/100 g	P
IINY-DU-09B-SSIS-041822 280-161296-8	FD	Cation-Exchange Capacity	0.0500	28.0	28.0 J		meq/100 g	P
IINY-DU-09C-SSIS-041822 280-161296-9	FT	Cation-Exchange Capacity	0.0500	28.0	28.0 J		meq/100 g	P
IINY-DU-11A-SSIS-041822 280-161296-10	N	Cation-Exchange Capacity	0.0500	23.0	23.0 J		meq/100 g	P
IINY-DU-11B-SSIS-041822 280-161296-11	FD	Cation-Exchange Capacity	0.0500	25.0	25.0 J		meq/100 g	P
IINY-DU-13A-SSIS-041822 280-161296-13	N	Cation-Exchange Capacity	0.0500	32.0	32.0 J		meq/100 g	P
IINY-DU-13B-SSIS-041822 280-161296-14	FD	Cation-Exchange Capacity	0.0500	26.0	26.0 J		meq/100 g	P
IINY-DU-13C-SSIS-041822 280-161296-15	FT	Cation-Exchange Capacity	0.0500	39.0	39.0 J		meq/100 g	P
IINY-DU-17A-SSIS-041922 280-161296-19	N	Cation-Exchange Capacity	0.0500	41.0	41.0 J		meq/100 g	P
IINY-DU-17B-SSIS-041922 280-161296-20	FD	Cation-Exchange Capacity	0.0500	38.0	38.0 J		meq/100 g	P
IINY-DU-17C-SSIS-041922 280-161296-21	FT	Cation-Exchange Capacity	0.0500	26.0	26.0 J		meq/100 g	P
IINY-DU-18A-SSIS-041922 280-161296-17	N	Cation-Exchange Capacity	0.0500	91.0	91.0 J		meq/100 g	P
IINY-DU-18B-SSIS-041922 280-161296-18	FD	Cation-Exchange Capacity	0.0500	39.0	39.0 J		meq/100 g	P
IINY-DU-18C-SSIS-041922 280-161296-16	FT	Cation-Exchange Capacity	0.0500	30.0	30.0 J		meq/100 g	P
IINY-DU-19A-SSIS-041922 280-161296-22	N	Cation-Exchange Capacity	0.0500	33.0	33.0 J		meq/100 g	P
IINY-DU-19B-SSIS-041922 280-161296-23	FD	Cation-Exchange Capacity	0.0500	31.0	31.0 J		meq/100 g	P
IINY-DU-19C-SSIS-041922 280-161296-24	FT	Cation-Exchange Capacity	0.0500	34.0	34.0 J		meq/100 g	P

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW9081

FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DU-04A-SSIS-041822 280-161296-1	N	Cation-Exchange Capacity	0.0500	33.0	33.0 J	33.0 J	D1/P
IINY-DU-04B-SSIS-041822 280-161296-2	FD	Cation-Exchange Capacity	0.0500	33.0	33.0 J	33.0 J	D1/P
IINY-DU-04C-SSIS-041822 280-161296-3	FT	Cation-Exchange Capacity	0.0500	34.0	34.0 J	34.0 J	D1/P
IINY-DU-07A-SSIS-041822 280-161296-4	N	Cation-Exchange Capacity	0.0500	24.0	24.0	24.0 J	P
IINY-DU-07B-SSIS-041822 280-161296-5	FD	Cation-Exchange Capacity	0.0500	25.0	25.0	25.0 J	P
IINY-DU-07C-SSIS-041822 280-161296-6	FT	Cation-Exchange Capacity	0.0500	24.0	24.0	24.0 J	P
IINY-DU-09A-SSIS-041822 280-161296-7	N	Cation-Exchange Capacity	0.0500	27.0	27.0	27.0 J	P
IINY-DU-09B-SSIS-041822 280-161296-8	FD	Cation-Exchange Capacity	0.0500	28.0	28.0	28.0 J	P
IINY-DU-09C-SSIS-041822 280-161296-9	FT	Cation-Exchange Capacity	0.0500	28.0	28.0	28.0 J	P
IINY-DU-11A-SSIS-041822 280-161296-10	N	Cation-Exchange Capacity	0.0500	23.0	23.0	23.0 J	P
IINY-DU-11B-SSIS-041822 280-161296-11	FD	Cation-Exchange Capacity	0.0500	25.0	25.0	25.0 J	P
IINY-DU-13A-SSIS-041822 280-161296-13	N	Cation-Exchange Capacity	0.0500	32.0	32.0	32.0 J	P
IINY-DU-13B-SSIS-041822 280-161296-14	FD	Cation-Exchange Capacity	0.0500	26.0	26.0	26.0 J	P
IINY-DU-13C-SSIS-041822 280-161296-15	FT	Cation-Exchange Capacity	0.0500	39.0	39.0	39.0 J	P
IINY-DU-17A-SSIS-041922 280-161296-19	N	Cation-Exchange Capacity	0.0500	41.0	41.0	41.0 J	P
IINY-DU-17B-SSIS-041922 280-161296-20	FD	Cation-Exchange Capacity	0.0500	38.0	38.0	38.0 J	P
IINY-DU-17C-SSIS-041922 280-161296-21	FT	Cation-Exchange Capacity	0.0500	26.0	26.0	26.0 J	P
IINY-DU-18A-SSIS-041922 280-161296-17	N	Cation-Exchange Capacity	0.0500	91.0	91.0	91.0 J	P
IINY-DU-18B-SSIS-041922 280-161296-18	FD	Cation-Exchange Capacity	0.0500	39.0	39.0	39.0 J	P
IINY-DU-18C-SSIS-041922 280-161296-16	FT	Cation-Exchange Capacity	0.0500	30.0	30.0	30.0 J	P
IINY-DU-19A-SSIS-041922 280-161296-22	N	Cation-Exchange Capacity	0.0500	33.0	33.0	33.0 J	P
IINY-DU-19B-SSIS-041922 280-161296-23	FD	Cation-Exchange Capacity	0.0500	31.0	31.0	31.0 J	P
IINY-DU-19C-SSIS-041922 280-161296-24	FT	Cation-Exchange Capacity	0.0500	34.0	34.0	34.0 J	P

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
D1	Lab Replicate RPD
P	Sample preservation/collection requirement not met.

Flag Code and Definitions

Flag	Definition
J	Estimated Value
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a tentative identification.
NJ	The analyte has been tentatively identified or presumptively as present and the associated numerical value was the estimated concentration in the sample.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
X	Result may require rejection; PDT attention required

Bias

-	The result may be biased low
+	The result may be biased high

Note - The bias field is a separate field; however, it is an integral part of the final flag (qualifier) on the sample result

Review Questions

Method: SW9081 (Cation-Exchange Capacity of Soils (Sodium Acetate))				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on the COCs match the sample labels?	•			No volume was received for IINY-DU-11C-SSIS-041822.
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) documented?	•			
Were sample results reported with percent moisture correction if required?			•	
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?			•	LCS/LCSDs were not required for this method.
Were LCS/LCSD recoveries within project acceptance limits?			•	LCS/LCSDs were not required for this method.
Was the LCS/LCSD RPD within project acceptance limits?			•	LCS/LCSDs were not required for this method.
Was a MS/MSD pair prepared with each batch?			•	MS/MSDs were not required for this method.
Were MS/MSD recoveries within project acceptance limits?			•	MS/MSDs were not required for this method.
Was the MS/MSD RPD within project acceptance limits?			•	MS/MSDs were not required for this method.
Were Post Spike (PS) recoveries within project acceptance limits?			•	A PS was not required for this method.
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?		•		Laboratory duplicates were analyzed per the QAPP. The laboratory duplicate that was performed on sample IINY-DU-04A-SSIS-041822 had a RPD of 35.71% which was above QC limits. Samples IINY-DU-04A-SSIS-041822, IINY-DU-04B-SSIS-041822, and IINY-DU-04C-SSIS-041822 were J qualified.
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			

Review Questions

Method: SW9081 (Cation-Exchange Capacity of Soils (Sodium Acetate))

Review Questions	Yes	No	NA	Comment
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?	•			
Were internal standard recoveries within project acceptance limits?			•	Internal standards are not required by the method.
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?			•	CEC is not included in the QSM.
Were any data recommended for exclusion in the data validation process?		•		

Data Validation Report for 280-161371-1_52_2a_FUDSChem

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling Phase II
SDG:	280-161371-1_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Mike McGuire
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	EA Engineering, Science, and Technology
Data Review Level:	S2BVEM
Primary Data Reviewer:	Christopher Ma, Chemist
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	August 24, 2022

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW6010C - Dissolved	SW6020A - Dissolved	SW7470A - Dissolved
IINY-DUMP-SW-01-041922	280-161371-1	Water	Field Sample/N	X	X	X
IINY-DUMP-SW-02-041922	280-161371-2	Water	Field Sample/N	X	X	X
IINY-DUMP-SW-03-041922	280-161371-3	Water	Field Sample/N	X	X	X
IINY-DUMP-SW-04-041922	280-161371-4	Water	Field Sample/N	X	X	X
IINY-DUMP-SW-05-041922	280-161371-5	Water	Field Sample/N	X	X	X
IINY-DUMP-SW-06-041922	280-161371-6	Water	Field Sample/N	X	X	X
IINY-DUMP-SW-07-041922	280-161371-7	Water	Field Sample/N	X	X	X
IINY-DUMP-SW-08-041922	280-161371-8	Water	Field Sample/N	X	X	X
IINY-DUMP-SW-09-041922	280-161371-9	Water	Field Sample/N	X	X	X
IINY-DUMP-SW-10-041922	280-161371-10	Water	Field Sample/N	X	X	X
IINY-DUMP-SW-11-041922	280-161371-11	Water	Field Sample/N	X	X	X
IINY-DUMP-SW-12-041922	280-161371-12	Water	Field Sample/N	X	X	X
IINY-DUMP-SW-13-041922	280-161371-13	Water	Field Sample/N	X	X	X
IINY-DUMP-SW-14-041922	280-161371-14	Water	Field Sample/N	X	X	X
IINY-DUMP-SW-15-041922	280-161371-15	Water	Field Sample/N	X	X	X
IINY-DUMP-SW-16-041922	280-161371-16	Water	Field Sample/N	X	X	X
IINY-DUMP-SW-17-041922	280-161371-17	Water	Field Sample/N	X	X	X
IINY-DUMP-SW-18-041922	280-161371-18	Water	Field Sample/N	X	X	X
IINY-DUMP-SW-19-041922	280-161371-19	Water	Field Sample/N	X	X	X

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW6010C - Dissolved	SW6020A - Dissolved	SW7470A - Dissolved
IINY-DUMP-SW-20-041922	280-161371-20	Water	Field Sample/N	X	X	X
IINY-DUMP-SW-FD1-041922	280-161371-21	Water	Field Duplicate/FD	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 280-161371-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Field Duplicate RPD
- Lab Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 25 results (5.18%) out of the 483 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency (X qualifier). Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW6010C	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW7470A	No additional comments; see Checklist for detail.

July 26, 2022

Reviewed by Christopher Ma, Chemist, EA Engineering, Science, and Technology

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of the reported sample results and method quality control data between the two deliverables.

Reviewed by Samantha Saalfield, Project Chemist, EA Engineering, Science, and Technology

August 24, 2022

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW6010C, Dissolved, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-573581/1-A (LB)	Calcium	24.20	< 24	< 200	ug/l	U/None*	L	
MB 280-573581/1-A (LB)	Iron	11.60	< 9.1	< 100	ug/l	U/None*	L	
MB 280-573581/1-A (LB)	Magnesium	16.40	< 4.2	< 200	ug/l	U/None*	L	
MB 280-573688/1-A (LB)	Calcium	24.30	< 24	< 200	ug/l	U/None*	L	
MB 280-573688/1-A (LB)	Iron	26.50	< 9.1	< 100	ug/l	U/None*	L	
MB 280-573688/1-A (LB)	Magnesium	4.590	< 4.2	< 200	ug/l	U/None*	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

*Blank flags displayed in the above table identify qualification of the sample result when it is less than or equal to the LOQ/RL. Sample results above the LOQ will be qualified based on the validation type such as J+ at the sample result.

Qualified Results associated with the Lab Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DUMP-SW-01-041922 280-161371-1	N	Iron	100	36.0 J	100 U		ug/l	L
IINY-DUMP-SW-02-041922 280-161371-2	N	Iron	100	80.0 J	100 U		ug/l	L
IINY-DUMP-SW-03-041922 280-161371-3	N	Iron	100	51.0 J	100 U		ug/l	L
IINY-DUMP-SW-04-041922 280-161371-4	N	Iron	100	33.0 J	34.0 U		ug/l	L
IINY-DUMP-SW-05-041922 280-161371-5	N	Iron	100	82.0 J	100 U		ug/l	L
IINY-DUMP-SW-06-041922 280-161371-6	N	Iron	100	58.0 J	100 U		ug/l	L
IINY-DUMP-SW-07-041922 280-161371-7	N	Iron	100	90.0 J	100 U		ug/l	L
IINY-DUMP-SW-08-041922 280-161371-8	N	Iron	100	59.0 J	100 U		ug/l	L
IINY-DUMP-SW-09-041922 280-161371-9	N	Iron	100	41.0 J	100 U		ug/l	L
IINY-DUMP-SW-10-041922 280-161371-10	N	Iron	100	78.0 J	100 U		ug/l	L
IINY-DUMP-SW-11-041922 280-161371-11	N	Iron	100	75.0 J	100 U		ug/l	L

Qualified Results associated with the Lab Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DUMP-SW-12-041922 280-161371-12	N	Iron	100	51.0 J	100 U		ug/l	L
IINY-DUMP-SW-13-041922 280-161371-13	N	Iron	100	39.0 J	100 U		ug/l	L
IINY-DUMP-SW-14-041922 280-161371-14	N	Iron	100	41.0 J	100 U		ug/l	L
IINY-DUMP-SW-15-041922 280-161371-15	N	Iron	100	42.0 J	100 U		ug/l	L
IINY-DUMP-SW-16-041922 280-161371-16	N	Iron	100	58.0 J	100 U		ug/l	L
IINY-DUMP-SW-17-041922 280-161371-17	N	Iron	100	48.0 J	100 U		ug/l	L
IINY-DUMP-SW-18-041922 280-161371-18	N	Iron	100	45.0 J	100 U		ug/l	L
IINY-DUMP-SW-19-041922 280-161371-19	N	Iron	100	36.0 J	100 U		ug/l	L
IINY-DUMP-SW-20-041922 280-161371-20	N	Iron	100	55.0 J	100 U		ug/l	L
IINY-DUMP-SW-FD1-041922 280-161371-21	FD	Iron	100	39.0 J	100 U		ug/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: SW6010C		Extraction Method: FLDFLT						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DUMP-SW-01-041922 280-161371-1	N	Iron	100	36.0 J	100 U		ug/l	L
IINY-DUMP-SW-02-041922 280-161371-2	N	Iron	100	80.0 J	100 U		ug/l	L
IINY-DUMP-SW-03-041922 280-161371-3	N	Iron	100	51.0 J	100 U		ug/l	L
IINY-DUMP-SW-04-041922 280-161371-4	N	Iron	100	33.0 J	34.0 U		ug/l	L
IINY-DUMP-SW-05-041922 280-161371-5	N	Iron	100	82.0 J	100 U		ug/l	L
IINY-DUMP-SW-06-041922 280-161371-6	N	Iron	100	58.0 J	100 U		ug/l	L
IINY-DUMP-SW-07-041922 280-161371-7	N	Iron	100	90.0 J	100 U		ug/l	L
IINY-DUMP-SW-08-041922 280-161371-8	N	Iron	100	59.0 J	100 U		ug/l	L
IINY-DUMP-SW-09-041922 280-161371-9	N	Iron	100	41.0 J	100 U		ug/l	L
IINY-DUMP-SW-10-041922 280-161371-10	N	Iron	100	78.0 J	100 U		ug/l	L
IINY-DUMP-SW-11-041922 280-161371-11	N	Iron	100	75.0 J	100 U		ug/l	L
IINY-DUMP-SW-12-041922 280-161371-12	N	Iron	100	51.0 J	100 U		ug/l	L
IINY-DUMP-SW-13-041922 280-161371-13	N	Iron	100	39.0 J	100 U		ug/l	L
IINY-DUMP-SW-14-041922 280-161371-14	N	Iron	100	41.0 J	100 U		ug/l	L
IINY-DUMP-SW-15-041922 280-161371-15	N	Iron	100	42.0 J	100 U		ug/l	L
IINY-DUMP-SW-16-041922 280-161371-16	N	Iron	100	58.0 J	100 U		ug/l	L
IINY-DUMP-SW-17-041922 280-161371-17	N	Iron	100	48.0 J	100 U		ug/l	L
IINY-DUMP-SW-18-041922 280-161371-18	N	Calcium	200	17000	17000 J		ug/l	A
IINY-DUMP-SW-18-041922 280-161371-18	N	Iron	100	45.0 J	100 U		ug/l	L
IINY-DUMP-SW-19-041922 280-161371-19	N	Iron	100	36.0 J	100 U		ug/l	L
IINY-DUMP-SW-20-041922 280-161371-20	N	Iron	100	55.0 J	100 U		ug/l	L
IINY-DUMP-SW-FD1-041922 280-161371-21	FD	Iron	100	39.0 J	100 U		ug/l	L

Test Method: SW6020A		Extraction Method: FLDFLT						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DUMP-SW-01-041922 280-161371-1	N	Silver	5.00	0.0430 J	0.100 U		ug/l	L

Table of All Qualified Results

Test Method: SW6020A		Extraction Method: FLDFLT						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DUMP-SW-19-041922 280-161371-19	N	Silver	5.00	0.0760 J	0.100 U		ug/l	L
IINY-DUMP-SW-20-041922 280-161371-20	N	Silver	5.00	0.0370 J	0.100 U		ug/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW6010C, Dissolved

FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DUMP-SW-18-041922 280-161371-18	N	Calcium	200	17000	17000	17000 J	A

Modified Qualifiers for test method SW6020A, Dissolved

FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DUMP-SW-01-041922 280-161371-1	N	Silver	5.00	0.0430 J	0.0430 J	0.100 U	L
IINY-DUMP-SW-19-041922 280-161371-19	N	Silver	5.00	0.0760 J	0.0760 J	0.100 U	L
IINY-DUMP-SW-20-041922 280-161371-20	N	Silver	5.00	0.0370 J	0.0370 J	0.100 U	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
A	Serial dilution
L	Lab Blank
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
J	Estimated Value
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a tentative identification.
NJ	The analyte has been tentatively identified or presumptively as present and the associated numerical value was the estimated concentration in the sample.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
X	Result may require rejection; PDT attention required

Bias

-	The result may be biased low
+	The result may be biased high

Note - The bias field is a separate field; however, it is an integral part of the final flag (qualifier) on the sample result

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?			•	Only water samples were included with this SDG.
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?		•		Calcium, iron, and magnesium were detected in method blanks. Associated sample results for iron less than the LOQ were qualified U. Associated sample results for calcium and magnesium were greater than the LOQ and more than 5x the blank detections and were not qualified.
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		While a LCS/LCSD pair was included with prep batch 573581, prep batch 573688 included an MS/MSD pair and an LCS but not an LCSD. LCSD is not required per the QAPP.
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?		•		Prep batch 573688/analysis batch 574025 included an MS/MSD pair while prep batch 573581/analysis batch 573869 did not include an MS/MSD pair. One MS/MSD pair was collected for the 20 field samples per the QAPP.
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
Were Post Spike (PS) recoveries within project acceptance limits?			•	Post Spike was not required as MS/MSD recoveries were within acceptance limits.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Was a Dilution Test/Serial Dilution performed and within project acceptance critiera?		•		A serial dilution was prepared with project sample IINY-DUMP-SW-18-041922. The serial dilution %D for calcium was above QC limits. The calcium sample result has been flagged with a J qualifier.
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			One field duplicate was included with 20 project samples. Parent sample IINY-DUMP-SW-18-041922 is associated with field duplicate sample IINY-DUMP-SW-FD1-041922. Parent/field duplicate RPDs were in control.
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?	•			
Were Interference Check Solutions (ICS) or Spectral Interference Checks (SIC) performed at the requried frequency and within project acceptance limits?	•			
Were internal standard recoveries within project acceptance limits?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?			•	No DoD QSM deviations were noted.
Were any data recommended for exclusion in the data validation process?		•		

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?			•	Only water samples were included with this SDG.
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		Analysis batches 573788 and 573934 both included a LCS, but did not include an LCSD. Both batches did have a MS/MSD pair. LCSDs are not required per the QAPP.
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Analysis batches 573788 and 573934 both included a LCS, but did not have an LCSD. Both batches did have a MS/MSD pair.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
Were Post Spike (PS) recoveries within project acceptance limits?	•			
Was a Dilution Test/Serial Dilution performed and within project acceptance critiera?	•			
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			One field duplicate was included with 20 project samples. Parent sample IINY-DUMP-SW-18-041922 is associated with field duplicate sample IINY-DUMP-SW-FD1-041922. Copper, nickel, and zinc had RPDs>30%, but one or both results were below the LOQ; therefore, no data were qualified.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			Silver results less than the LOD for three samples were U qualified at the LOD based on detections in CCBs greater than the detection limit but less than 1/2 LOQ.
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?	•			
Were Interference Check Solutions (ICS) or Spectral Interference Checks (SIC) performed at the requried frequency and within project acceptance limits?		•		Barium was detected in ICSA at concentrations greater than 1/2 LOQ. The vendor acknowledges that barium is a trace impurity in the standard. No data were qualified.
Were internal standard recoveries within project acceptance limits?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			In addition to the items on this checklist, the Case Narrative notes that a low-level CCV (CCVL, separate from the LLCCV) had %R above QC limits for barium. The associated results were non-detect or greater than 10 times the CCVL concentrations. No data were qualified based on CCVLs.
Were DoD QSM corrective actions followed if deviations were noted?			•	
Were any data recommended for exclusion in the data validation process?		•		

Review Questions

Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique))				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?			•	Only water samples were included with this SDG.
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?		•		A MS/MSD pair was not prepared with prep batch 573178/analytical batch 573302. One MS/MSD was analyzed for the 20 field samples, in accordance with the QAPP.
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			One field duplicate was included with 20 project samples. Parent sample IINY-DUMP-SW-18-041922 is associated with field duplicate sample IINY-DUMP-SW-FD1-041922. Mercury was not detected in the parent or duplicate.
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			

Review Questions

Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique))				
Review Questions	Yes	No	NA	Comment
Were CCVs run at the required frequency and within project acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?			•	Separate LLCCVs were not required.
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?			•	No DoD QSM deviations were noted.
Were any data recommended for exclusion in the data validation process?		•		

Data Validation Report for 280-161371-2_52_2a_FUDSChem

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling Phase II
SDG:	280-161371-2_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Mike McGuire
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	EA Engineering, Science, and Technology
Data Review Level:	S2BVEM
Primary Data Reviewer:	Christopher Ma, Chemist
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	August 24, 2022

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2340B
IINY-DUMP-SW-01-041922	280-161371-1	Water	Field Sample/N	X
IINY-DUMP-SW-02-041922	280-161371-2	Water	Field Sample/N	X
IINY-DUMP-SW-03-041922	280-161371-3	Water	Field Sample/N	X
IINY-DUMP-SW-04-041922	280-161371-4	Water	Field Sample/N	X
IINY-DUMP-SW-05-041922	280-161371-5	Water	Field Sample/N	X
IINY-DUMP-SW-06-041922	280-161371-6	Water	Field Sample/N	X
IINY-DUMP-SW-07-041922	280-161371-7	Water	Field Sample/N	X
IINY-DUMP-SW-08-041922	280-161371-8	Water	Field Sample/N	X
IINY-DUMP-SW-09-041922	280-161371-9	Water	Field Sample/N	X
IINY-DUMP-SW-10-041922	280-161371-10	Water	Field Sample/N	X
IINY-DUMP-SW-11-041922	280-161371-11	Water	Field Sample/N	X
IINY-DUMP-SW-12-041922	280-161371-12	Water	Field Sample/N	X
IINY-DUMP-SW-13-041922	280-161371-13	Water	Field Sample/N	X
IINY-DUMP-SW-14-041922	280-161371-14	Water	Field Sample/N	X
IINY-DUMP-SW-15-041922	280-161371-15	Water	Field Sample/N	X
IINY-DUMP-SW-16-041922	280-161371-16	Water	Field Sample/N	X
IINY-DUMP-SW-17-041922	280-161371-17	Water	Field Sample/N	X
IINY-DUMP-SW-18-041922	280-161371-18	Water	Field Sample/N	X
IINY-DUMP-SW-19-041922	280-161371-19	Water	Field Sample/N	X

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2340B
IINY-DUMP-SW-20-041922	280-161371-20	Water	Field Sample/N	X
IINY-DUMP-SW-FD1-041922	280-161371-21	Water	Field Duplicate/FD	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 280-161371-2_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

Field Duplicate RPD

Prep Hold Time

Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 1 results (4.76%) out of the 21 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency (X qualifier). Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

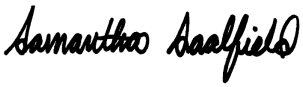
Narrative Comments

Analytical Method	Data Reviewer Comment
A2340B	No additional comments; see Checklist for detail.

July 26, 2022

Reviewed by Christopher Ma, Chemist, EA Engineering, Science, and Technology

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of the reported sample results and method quality control data between the two deliverables.



Reviewed by Samantha Saalfield, Project Chemist, EA Engineering, Science, and Technology

August 24, 2022

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

No Outliers were associated with this sample delivery group.

Table of All Qualified Results

Test Method: A2340B		**Extraction Method: NONE**						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-DUMP-SW-18-041922 280-161371-18	N	Hardness (as CaCO3)	3.00	75.0	75.0 J		mg/l	A

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of Results with Modified Qualifiers

Modified Qualifiers for test method A2340B

FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-DUMP-SW-18-041922 280-161371-18	N	Hardness (as CaCO3)	3.00	75.0	75.0	75.0 J	A

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
A	Serial dilution

Flag Code and Definitions

Flag	Definition
J	Estimated Value
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a tentative identification.
NJ	The analyte has been tentatively identified or presumptively as present and the associated numerical value was the estimated concentration in the sample.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
X	Result may require rejection; PDT attention required

Bias

-	The result may be biased low
+	The result may be biased high

Note - The bias field is a separate field; however, it is an integral part of the final flag (qualifier) on the sample result

Review Questions

Method: A2340B (Hardness by Calculation)

Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?			•	Only water samples were included with this SDG.
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)			•	A PQL was not established for hardness by SM2340B in the QAPP.
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?			•	SM2340B is a calculation; therefore, a method blank was not prepared.
Were target analytes in the method blank less than DL?			•	SM2340B is a calculation; therefore, a method blank was not prepared.
Was an LCS/LCSD pair prepared and analyzed with each batch?			•	SM2340B is a calculation; therefore, a LCS/LCSD pair was not prepared.
Were LCS/LCSD recoveries within project acceptance limits?			•	SM2340B is a calculation; therefore, a LCS/LCSD pair was not prepared.
Was the LCS/LCSD RPD within project acceptance limits?			•	SM2340B is a calculation; therefore, a LCS/LCSD pair was not prepared.
Was a MS/MSD pair prepared with each batch?			•	SM2340B is a calculation; therefore, a MS/MSD pair was not prepared.
Were MS/MSD recoveries within project acceptance limits?			•	SM2340B is a calculation; therefore, a MS/MSD pair was not prepared.
Was the MS/MSD RPD within project acceptance limits?			•	SM2340B is a calculation; therefore, a MS/MSD pair was not prepared.
Were Post Spike (PS) recoveries within project acceptance limits?			•	SM2340B is a calculation; therefore, a Post Spike sample was not prepared.
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	Only water samples were included with this SDG.
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			One field duplicate was included with 20 project samples. Parent sample IINY-DUMP-SW-18-041922 is associated with field duplicate sample IINY-DUMP-SW-FD1-041922. Parent/field duplicate RPDs were in control.
Were reported sample concentrations within calibration range?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared
Was the Calibration within project acceptance criteria?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.

Review Questions

Method: A2340B (Hardness by Calculation)

Review Questions	Yes	No	NA	Comment
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.
Were CCVs run at the required frequency and within project acceptance criteria?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.
Were ICB/CCBs run at the required frequency and within acceptance criteria?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.
Were internal standard recoveries within project acceptance limits?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.
Were instrument run logs present and filled out appropriately?			•	SM2340B is a calculation; therefore, instrument run logs were not prepared.
Were sample preparation sheets present and filled out appropriately?			•	SM2340B is a calculation; therefore, sample preparation sheets were not prepared.
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			Note that the hardness result for one sample was J qualified during validation because the calcium result used in the calculation was J qualified, due to high %D for a serial dilution.
Were DoD QSM corrective actions followed if deviations were noted?			•	The hardness calculation is not included in the QSM.
Were any data recommended for exclusion in the data validation process?		•		

Data Validation Report for SP2145

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling Phase II
SDG:	SP2145
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Mike McGuire
Contract Laboratory(ies):	Katahdin Analytical Services, Scarborough, ME
Data Review Contractor:	EA Engineering, Science, and Technology
Data Review Level:	S2BVEM
Primary Data Reviewer:	Christopher Ma, Chemist
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	August 24, 2022

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	WBLACK
IINY-CHHRS-SU-01-SEDIS-042122	SP2145-1	Solid	Field Sample/N	X
IINY-CHHRS-SU-02-SEDIS-042122	SP2145-2	Solid	Field Sample/N	X
IINY-CHHRS-SU-03-SEDIS-042122	SP2145-3	Solid	Field Sample/N	X
IINY-CHHRS-SU-04-SEDIS-042122	SP2145-4	Solid	Field Sample/N	X
IINY-CHHRS-SU-05-SEDIS-042122	SP2145-5	Solid	Field Sample/N	X
IINY-CHHRS-SU-06-SEDIS-042122	SP2145-6	Solid	Field Sample/N	X
IINY-CHHRS-SU-07-SEDIS-042122	SP2145-7	Solid	Field Sample/N	X
IINY-CHHRS-SU-08-SEDIS-042122	SP2145-9	Solid	Field Sample/N	X
IINY-CHMS-SU-01-SEDIS-042122	SP2145-10	Solid	Field Sample/N	X
IINY-CHMS-SU-02-SEDIS-042122	SP2145-11	Solid	Field Sample/N	X
IINY-CHMS-SU-03-SEDIS-042122	SP2145-12	Solid	Field Sample/N	X
IINY-CHMS-SU-04-SEDIS-042122	SP2145-13	Solid	Field Sample/N	X

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	WBLACK
IINY-CHMS-SU-05-SEDIS-042122	SP2145-14	Solid	Field Sample/N	X
IINY-CHMS-SU-06-SEDIS-042122	SP2145-15	Solid	Field Sample/N	X
IINY-CHMS-SU-07-SEDIS-042122	SP2145-16	Solid	Field Sample/N	X
IINY-CHMS-SU-08-SEDIS-042122	SP2145-17	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Katahdin Analytical Services, Scarborough, ME and were reported under sample delivery group (SDG) SP2145. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

Lab Blank

LCS Recovery

MS Recovery

MS RPD

Prep Hold Time

Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 16 results (100.00%) out of the 16 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency (X qualifier). Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

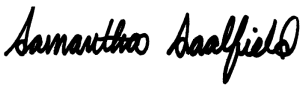
This DVR for SDG "SP2145" addresses the Total Organic Carbon results for the samples included in SDG 280-161477-1.

Analytical Method	Data Reviewer Comment
WBLACK	No additional comments; see Checklist for detail.

July 15, 2022

Reviewed by Christopher Ma, Chemist, EA Engineering, Science, and Technology

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of the reported sample results and method quality control data between the two deliverables.



Reviewed by Samantha Saalfield, Project Chemist, EA Engineering, Science, and Technology

August 24, 2022

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

No Outliers were associated with this sample delivery group.

Table of All Qualified Results

Test Method: WBLACK		**Extraction Method: NONE**						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-CHHRS-SU-01-SEDIS-042122 SP2145-1	N	Total Organic Carbon	1000	46000	46000 J		mg/kg	P2
IINY-CHHRS-SU-02-SEDIS-042122 SP2145-2	N	Total Organic Carbon	1000	42000	42000 J		mg/kg	P2
IINY-CHHRS-SU-03-SEDIS-042122 SP2145-3	N	Total Organic Carbon	1000	36000	36000 J		mg/kg	P2
IINY-CHHRS-SU-04-SEDIS-042122 SP2145-4	N	Total Organic Carbon	1000	32000	32000 J		mg/kg	P2
IINY-CHHRS-SU-05-SEDIS-042122 SP2145-5	N	Total Organic Carbon	1000	34000	34000 J		mg/kg	P2
IINY-CHHRS-SU-06-SEDIS-042122 SP2145-6	N	Total Organic Carbon	1000	7200	7200 J		mg/kg	P2
IINY-CHHRS-SU-07-SEDIS-042122 SP2145-7	N	Total Organic Carbon	1000	25000	25000 J		mg/kg	P2
IINY-CHHRS-SU-08-SEDIS-042122 SP2145-9	N	Total Organic Carbon	1000	12000	12000 J		mg/kg	P2
IINY-CHMS-SU-01-SEDIS-042122 SP2145-10	N	Total Organic Carbon	1000	220000	220000 J		mg/kg	P2
IINY-CHMS-SU-02-SEDIS-042122 SP2145-11	N	Total Organic Carbon	1000	250000	250000 J		mg/kg	P2
IINY-CHMS-SU-03-SEDIS-042122 SP2145-12	N	Total Organic Carbon	1000	220000	220000 J		mg/kg	P2

Table of All Qualified Results

Test Method: WBLACK		Extraction Method: NONE						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-CHMS-SU-04-SEDIS-042122 SP2145-13	N	Total Organic Carbon	1000	200000	200000 J		mg/kg	P2
IINY-CHMS-SU-05-SEDIS-042122 SP2145-14	N	Total Organic Carbon	1000	110000	110000 J		mg/kg	P2
IINY-CHMS-SU-06-SEDIS-042122 SP2145-15	N	Total Organic Carbon	1000	140000	140000 J		mg/kg	P2
IINY-CHMS-SU-07-SEDIS-042122 SP2145-16	N	Total Organic Carbon	1000	130000	130000 J		mg/kg	P2
IINY-CHMS-SU-08-SEDIS-042122 SP2145-17	N	Total Organic Carbon	1000	150000	150000 J		mg/kg	P2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of Results with Modified Qualifiers

Modified Qualifiers for test method WBLACK							
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-CHHRS-SU-01-SEDIS-042122 SP2145-1	N	Total Organic Carbon	1000	46000	46000	46000 J	P2
IINY-CHHRS-SU-02-SEDIS-042122 SP2145-2	N	Total Organic Carbon	1000	42000	42000	42000 J	P2
IINY-CHHRS-SU-03-SEDIS-042122 SP2145-3	N	Total Organic Carbon	1000	36000	36000	36000 J	P2
IINY-CHHRS-SU-04-SEDIS-042122 SP2145-4	N	Total Organic Carbon	1000	32000	32000	32000 J	P2
IINY-CHHRS-SU-05-SEDIS-042122 SP2145-5	N	Total Organic Carbon	1000	34000	34000	34000 J	P2
IINY-CHHRS-SU-06-SEDIS-042122 SP2145-6	N	Total Organic Carbon	1000	7200	7200	7200 J	P2
IINY-CHHRS-SU-07-SEDIS-042122 SP2145-7	N	Total Organic Carbon	1000	25000	25000	25000 J	P2
IINY-CHHRS-SU-08-SEDIS-042122 SP2145-9	N	Total Organic Carbon	1000	12000	12000	12000 J	P2
IINY-CHMS-SU-01-SEDIS-042122 SP2145-10	N	Total Organic Carbon	1000	220000	220000	220000 J	P2
IINY-CHMS-SU-02-SEDIS-042122 SP2145-11	N	Total Organic Carbon	1000	250000	250000	250000 J	P2
IINY-CHMS-SU-03-SEDIS-042122 SP2145-12	N	Total Organic Carbon	1000	220000	220000	220000 J	P2
IINY-CHMS-SU-04-SEDIS-042122 SP2145-13	N	Total Organic Carbon	1000	200000	200000	200000 J	P2
IINY-CHMS-SU-05-SEDIS-042122 SP2145-14	N	Total Organic Carbon	1000	110000	110000	110000 J	P2
IINY-CHMS-SU-06-SEDIS-042122 SP2145-15	N	Total Organic Carbon	1000	140000	140000	140000 J	P2
IINY-CHMS-SU-07-SEDIS-042122 SP2145-16	N	Total Organic Carbon	1000	130000	130000	130000 J	P2
IINY-CHMS-SU-08-SEDIS-042122 SP2145-17	N	Total Organic Carbon	1000	150000	150000	150000 J	P2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
P2	Improper preparation/extraction
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
J	Estimated Value
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a tentative identification.
NJ	The analyte has been tentatively identified or presumptively as present and the associated numerical value was the estimated concentration in the sample.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
X	Result may require rejection; PDT attention required

Bias

-	The result may be biased low
+	The result may be biased high

Note - The bias field is a separate field; however, it is an integral part of the final flag (qualifier) on the sample result

Review Questions

Method: WBLACK (Walkley-Black Method, Organic Carbon (TOC))				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?	•			
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			No quantitation limit goals were specified for TOC in the QAPP. However, MDL/LOD/LOQ were consistent with those presented in the QAPP.
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		An LCS was prepared and analyzed. Since an MS/MSD pair was included with the analysis batch, a LCSD was not required.
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Since an MS/MSD pair was included with the analysis batch, a LCSD was not required.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
Were Post Spike (PS) recoveries within project acceptance limits?			•	PS not applicable for method Walkley Black.
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?			•	No field replicates were collected. Samples are from ISM survey units in a background sediment area.
Were reported sample concentrations within calibration range?			•	
Was the Calibration within project acceptance criteria?			•	
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?			•	
Were CCVs run at the required frequency and within project acceptance criteria?			•	

Review Questions

Method: WBLACK (Walkley-Black Method, Organic Carbon (TOC))				
Review Questions	Yes	No	NA	Comment
Were ICB/CCBs run at the required frequency and within acceptance criteria?			•	
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?			•	
Were internal standard recoveries within project acceptance limits?			•	
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			The Case Narrative notes that results were calculated using 100% total solids, and that the 9 -11 gram sample aliquots provided had to be subsampled prior to analysis due to high carbon content. Sample results were flagged with a J qualifier, due to the additional subsampling combined with a lack of field triplicates to assess representativeness/precision.
Were DoD QSM corrective actions followed if deviations were noted?			•	TOC by Walkley Black is not included in the DoD QSM.
Were any data recommended for exclusion in the data validation process?		•		

Data Validation Report for 280-161477-1_52_2a_FUDSChem

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling Phase II
SDG:	280-161477-1_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Mike McGuire
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	EA Engineering Science, and Technology
Data Review Level:	S2BVEM
Primary Data Reviewer:	Christopher Ma, Chemist
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	July 20, 2022

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW6010C	SW6020A	SW7471B
IINY-CHHRS-SU-01-SEDIS-042122	280-161477-1	Solid	Field Sample/N	X	X	X
IINY-CHHRS-SU-02-SEDIS-042122	280-161477-2	Solid	Field Sample/N	X	X	X
IINY-CHHRS-SU-03-SEDIS-042122	280-161477-3	Solid	Field Sample/N	X	X	X
IINY-CHHRS-SU-04-SEDIS-042122	280-161477-4	Solid	Field Sample/N	X	X	X
IINY-CHHRS-SU-05-SEDIS-042122	280-161477-5	Solid	Field Sample/N	X	X	X
IINY-CHHRS-SU-06-SEDIS-042122	280-161477-6	Solid	Field Sample/N	X	X	X
IINY-CHHRS-SU-07-SEDIS-042122	280-161477-7	Solid	Field Sample/N	X	X	X
IINY-CHHRS-SU-08-SEDIS-042122	280-161477-8	Solid	Field Sample/N	X	X	X
IINY-CHMS-SU-01-SEDIS-042122	280-161477-9	Solid	Field Sample/N	X	X	X
IINY-CHMS-SU-02-SEDIS-042122	280-161477-10	Solid	Field Sample/N	X	X	X
IINY-CHMS-SU-03-SEDIS-042122	280-161477-11	Solid	Field Sample/N	X	X	X
IINY-CHMS-SU-04-SEDIS-042122	280-161477-12	Solid	Field Sample/N	X	X	X

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW6010C	SW6020A	SW7471B
IINY-CHMS-SU-05-SEDIS-042122	280-161477-13	Solid	Field Sample/N	X	X	X
IINY-CHMS-SU-06-SEDIS-042122	280-161477-14	Solid	Field Sample/N	X	X	X
IINY-CHMS-SU-07-SEDIS-042122	280-161477-15	Solid	Field Sample/N	X	X	X
IINY-CHMS-SU-08-SEDIS-042122	280-161477-16	Solid	Field Sample/N	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 280-161477-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Lab Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 22 results (7.24%) out of the 304 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency (X qualifier). Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

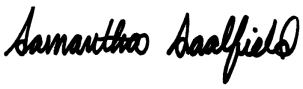
Narrative Comments

Analytical Method	Data Reviewer Comment
SW6010C	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW7471B	No additional comments; see Checklist for detail.

July 16, 2022

Reviewed by Christopher Ma, Chemist, EA Engineering Science, and Technology

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of the reported sample results and method quality control data between the two deliverables.



Reviewed by Samantha Saalfield, Project Chemist, EA Engineering Science, and Technology

July 28, 2022

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW6010C, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-574426/1-A (LB)	Iron	13.40	< 8.3	< 80	mg/kg	U/None*	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

*Blank flags displayed in the above table identify qualification of the sample result when it is less than or equal to the LOQ/RL. Sample results above the LOQ will be qualified based on the validation type such as J+ at the sample result.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6010C, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-CHHRS-SU-07-SEDIS-042122 (MS)	Aluminum	371.0	74 - 119	10 - 125	percent	J/None	M	Spike amount Insignificant
IINY-CHHRS-SU-07-SEDIS-042122 (SD)	Aluminum	243.0	74 - 119	10 - 125	percent	J/None	M	Spike amount Insignificant
IINY-CHHRS-SU-07-SEDIS-042122 (MS)	Iron	14.00	81 - 118	10 - 125	percent	J/UJ	M	Spike amount Insignificant
IINY-CHHRS-SU-07-SEDIS-042122 (SD)	Iron	-114.0	81 - 118	10 - 125	percent	J/X	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6020A, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-574723/1-A (LB)	Manganese	0.5610	< 0.19	< 2	mg/kg	U/None*	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

*Blank flags displayed in the above table identify qualification of the sample result when it is less than or equal to the LOQ/RL. Sample results above the LOQ will be qualified based on the validation type such as J+ at the sample result.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6020A, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-CHHRS-SU-07-SEDIS-042122 (MS)	Barium	140.0	86 - 116	10 - 125	percent	J/None	M	
IINY-CHHRS-SU-07-SEDIS-042122 (SD)	Barium	168.0	86 - 116	10 - 125	percent	J/None	M	Spike amount Insignificant
IINY-CHHRS-SU-07-SEDIS-042122 (MS)	Copper	83.00	84 - 119	10 - 125	percent	J/UJ	M	
IINY-CHHRS-SU-07-SEDIS-042122 (SD)	Lead	196.0	84 - 118	10 - 125	percent	J/None	M	Spike amount Insignificant
IINY-CHHRS-SU-07-SEDIS-042122 (MS)	Manganese	-74.00	85 - 116	10 - 125	percent	J/X	M	Spike amount Insignificant
IINY-CHHRS-SU-07-SEDIS-042122 (SD)	Vanadium	119.0	82 - 116	10 - 125	percent	J/None	M	
IINY-CHHRS-SU-07-SEDIS-042122 (MS)	Zinc	75.00	82 - 119	10 - 125	percent	J/UJ	M	
IINY-CHMS-SU-02-SEDIS-042122 (MS)	Arsenic	71.00	82 - 118	10 - 125	percent	J/UJ	M	
IINY-CHMS-SU-02-SEDIS-042122 (SD)	Arsenic	66.00	82 - 118	10 - 125	percent	J/UJ	M	
IINY-CHMS-SU-02-SEDIS-042122 (MS)	Barium	152.0	86 - 116	10 - 125	percent	J/None	M	
IINY-CHMS-SU-02-SEDIS-042122 (SD)	Barium	133.0	86 - 116	10 - 125	percent	J/None	M	
IINY-CHMS-SU-02-SEDIS-042122 (MS)	Beryllium	73.00	80 - 120	10 - 125	percent	J/UJ	M	
IINY-CHMS-SU-02-SEDIS-042122 (SD)	Beryllium	69.00	80 - 120	10 - 125	percent	J/UJ	M	
IINY-CHMS-SU-02-SEDIS-042122 (MS)	Cadmium	71.00	84 - 116	10 - 125	percent	J/UJ	M	
IINY-CHMS-SU-02-SEDIS-042122 (SD)	Cadmium	67.00	84 - 116	10 - 125	percent	J/UJ	M	
IINY-CHMS-SU-02-SEDIS-042122 (SD)	Chromium	81.00	83 - 119	10 - 125	percent	J/UJ	M	
IINY-CHMS-SU-02-SEDIS-042122 (MS)	Cobalt	75.00	84 - 115	10 - 125	percent	J/UJ	M	
IINY-CHMS-SU-02-SEDIS-042122 (SD)	Cobalt	69.00	84 - 115	10 - 125	percent	J/UJ	M	
IINY-CHMS-SU-02-SEDIS-042122 (SD)	Copper	80.00	84 - 119	10 - 125	percent	J/UJ	M	
IINY-CHMS-SU-02-SEDIS-042122 (MS)	Lead	137.0	84 - 118	10 - 125	percent	J/None	M	
IINY-CHMS-SU-02-SEDIS-042122 (MS)	Manganese	417.0	85 - 116	10 - 125	percent	J/None	M	Spike amount Insignificant
IINY-CHMS-SU-02-SEDIS-042122 (SD)	Manganese	295.0	85 - 116	10 - 125	percent	J/None	M	Spike amount Insignificant
IINY-CHMS-SU-02-SEDIS-042122 (SD)	Nickel	76.00	84 - 119	10 - 125	percent	J/UJ	M	
IINY-CHMS-SU-02-SEDIS-042122 (MS)	Selenium	69.00	80 - 119	10 - 125	percent	J/UJ	M	

Quality Control Outliers for test method SW6020A, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-CHMS-SU-02-SEDIS-042122 (SD)	Selenium	63.00	80 - 119	10 - 125	percent	J/UJ	M	
IINY-CHMS-SU-02-SEDIS-042122 (MS)	Thallium	63.00	83 - 118	10 - 125	percent	J/UJ	M	
IINY-CHMS-SU-02-SEDIS-042122 (SD)	Thallium	60.00	83 - 118	10 - 125	percent	J/UJ	M	
IINY-CHMS-SU-02-SEDIS-042122 (MS)	Zinc	158.0	82 - 119	10 - 125	percent	J/None	M	Spike amount Insignificant
IINY-CHMS-SU-02-SEDIS-042122 (SD)	Zinc	128.0	82 - 119	10 - 125	percent	J/None	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW6020A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Barium	0.680	56.0 Q J1	56.0 J	+	mg/kg	M
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Copper	4.20	33.0	33.0 J	-	mg/kg	M
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Vanadium	0.850	19.0 J1	19.0 J	+	mg/kg	M
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Zinc	4.20	67.0 J1	67.0 J	-	mg/kg	M
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Arsenic	0.960	4.00 J1	4.00 J	-	mg/kg	M
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Barium	0.640	40.0 J1 Q	40.0 J	+	mg/kg	M
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Beryllium	0.160	0.970 J1	0.970 J	-	mg/kg	M
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Cadmium	0.160	0.570 J1	0.570 J	-	mg/kg	M
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Chromium	0.960	15.0 J1	15.0 J	-	mg/kg	M
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Cobalt	0.160	5.30 J1	5.30 J	-	mg/kg	M

Qualified Results associated with the MS Recovery for SW6020A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Copper	4.00	19.0 J1	19.0 J	-	mg/kg	M
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Lead	0.640	53.0 J1	53.0 J	+	mg/kg	M
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Nickel	0.560	15.0 J1	15.0 J	-	mg/kg	M
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Selenium	0.800	0.670 J J1	0.670 J	-	mg/kg	M/TR
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Thallium	0.160	0.140 J J1	0.140 J	-	mg/kg	M/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6020A, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-CHHRS-SU-07-SEDIS-042122 (SD)	Arsenic	22.80	< 20	< 20	rpd	J/UJ	D	
IINY-CHHRS-SU-07-SEDIS-042122 (SD)	Beryllium	23.66	< 20	< 20	rpd	J/UJ	D	
IINY-CHHRS-SU-07-SEDIS-042122 (SD)	Cadmium	29.97	< 20	< 20	rpd	J/UJ	D	
IINY-CHHRS-SU-07-SEDIS-042122 (SD)	Selenium	30.62	< 20	< 20	rpd	J/UJ	D	
IINY-CHHRS-SU-07-SEDIS-042122 (SD)	Thallium	31.92	< 20	< 20	rpd	J/UJ	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS RPD for SW6020A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Arsenic	1.00	4.10 J1	4.10 J		mg/kg	D
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Beryllium	0.170	1.60 J1	1.60 J		mg/kg	D
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Cadmium	0.170	0.330 J1	0.330 J		mg/kg	D
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Selenium	0.850	0.350 J J1	0.350 J		mg/kg	D/TR
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Thallium	0.170	0.130 J J1	0.130 J		mg/kg	D/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: SW6010C		Extraction Method: SW3050B						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Aluminum	46.0	13000 J1	13000 J		mg/kg	A
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Iron	74.0	19000 J1	19000 J		mg/kg	A

Test Method: SW6020A		Extraction Method: SW3050B						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Arsenic	1.00	4.10 J1	4.10 J		mg/kg	D
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Barium	0.680	56.0 Q J1	56.0 J	+	mg/kg	M
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Beryllium	0.170	1.60 J1	1.60 J		mg/kg	D
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Cadmium	0.170	0.330 J1	0.330 J		mg/kg	D
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Copper	4.20	33.0	33.0 J	-	mg/kg	M
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Selenium	0.850	0.350 J J1	0.350 J		mg/kg	D/TR
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Thallium	0.170	0.130 J J1	0.130 J		mg/kg	D/TR
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Vanadium	0.850	19.0 J1	19.0 J	+	mg/kg	M
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Zinc	4.20	67.0 J1	67.0 J	-	mg/kg	M
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Arsenic	0.960	4.00 J1	4.00 J	-	mg/kg	M
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Barium	0.640	40.0 J1 Q	40.0 J	+	mg/kg	M
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Beryllium	0.160	0.970 J1	0.970 J	-	mg/kg	M
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Cadmium	0.160	0.570 J1	0.570 J	-	mg/kg	M
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Chromium	0.960	15.0 J1	15.0 J	-	mg/kg	M
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Cobalt	0.160	5.30 J1	5.30 J	-	mg/kg	M

Table of All Qualified Results

Test Method: SW6020A		Extraction Method: SW3050B						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Copper	4.00	19.0 J1	19.0 J	-	mg/kg	M
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Lead	0.640	53.0 J1	53.0 J	+	mg/kg	M
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Nickel	0.560	15.0 J1	15.0 J	-	mg/kg	M
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Selenium	0.800	0.670 J J1	0.670 J	-	mg/kg	M/TR
IINY-CHMS-SU-02-SEDIS-042122 280-161477-10	N	Thallium	0.160	0.140 J J1	0.140 J	-	mg/kg	M/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW6010C

FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Aluminum	46.0	13000 J1	13000	13000 J	A
IINY-CHHRS-SU-07-SEDIS-042122 280-161477-7	N	Iron	74.0	19000 J1	19000	19000 J	A

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
A	Serial dilution
D	MS RPD
L	Lab Blank
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

Bias

-	The result may be biased low
+	The result may be biased high

Note - The bias field is a separate field; however, it is an integral part of the final flag (qualifier) on the sample result

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?	•			
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?		•		Iron was detected in a method blank sample at a concentration exceeding the DL. However, all associated sample results for iron were greater than 5x the method blank detection; therefore, no qualification was necessary.
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		The preparation batch included a LCS and a MS/MSD pair, but did not include a LCSD. An LCSD is not required per the QAPP.
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Preparation batch 574426 included a LCS and a MS/MSD pair, but did not include a LCSD.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		A MS/MSD was performed on sample IINY-CHHRS-SU-07-SEDIS-042122. Recoveries were outside acceptance limits, but the parent sample results were greater than 4x the spike concentration.
Was the MS/MSD RPD within project acceptance limits?	•			
Were Post Spike (PS) recoveries within project acceptance limits?		•		A PS was performed on sample IINY-CHHRS-SU-07-SEDIS-042122. Recoveries were outside acceptance limits. Results were qualified based on serial dilution also outside QC limits (see next item).

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)

Review Questions	Yes	No	NA	Comment
Was a Dilution Test/Serial Dilution performed and within project acceptance critiera?		•		A serial dilution was performed on sample IINY-CHHRS-SU-07-SEDIS-042122, and the % difference for aluminum and iron (both results above 50x the LOQ) were above QC limits, at 13% and 16%. Associated results were flagged with a J qualifier.
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?		•		
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?			•	No field replicates were collected. Samples are from ISM survey units in a background sediment area.
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?	•			
Were Interference Check Solutions (ICS) or Spectral Interference Checks (SIC) performed at the requried frequency and within project acceptance limits?	•			
Were internal standard recoveries within project acceptance limits?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?			•	No DoD QSM deviations were noted.
Were any data recommended for exclusion in the data validation process?		•		

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?	•			
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?		•		Manganese was detected in method blank sample 280-574723/1-A. The associated sample results for manganese were greater than 5x the method blank detection; therefore, no qualification was necessary.
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		Prep batches 574430, 574733, and 574723 each included a LCS and a MS/MSD pair, but did not include a LCSD.
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Prep batches 574430, 574733, and 574723 each included a LCS and a MS/MSD pair, but did not include a LCSD.
Was a MS/MSD pair prepared with each batch?	•			

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)

Review Questions	Yes	No	NA	Comment
Were MS/MSD recoveries within project acceptance limits?		•		The MS/MSD %Rs prepared with project sample IINY-CHHRS-SU-07-SEDIS-042122 for the analysis of barium and vanadium were above QC limits. The associated sample results have been flagged with the J qualifier with positive bias. The %R for copper and zinc in the same MS/MSD were below QC limits. The associated sample results have been flagged with the J qualifier with negative bias. The MS/MSD %Rs prepared with project sample IINY-CHMS-SU-02-SEDIS-042122 for the analysis of lead and barium were above QC limits. The associated sample results have been flagged with the J qualifier with positive bias. The %Rs for arsenic, beryllium, cadmium, chromium, cobalt, copper, nickel, selenium, and thallium, in the same MS/MSD were below QC limits. The associated sample result has been flagged with the J qualifier with negative bias. Lead, manganese, and/or zinc also had high recoveries in these MS/MSDs, but the parent sample concentrations were more than 4x the spikes.
Was the MS/MSD RPD within project acceptance limits?		•		The RPDs for the MS/MSD prepared with project sample IINY-CHHRS-SU-07-SEDIS-042122 for the analysis of arsenic, beryllium, cadmium, selenium, and thallium were above QC limits. The associated sample results have been flagged with the J qualifier.
Were Post Spike (PS) recoveries within project acceptance limits?		•		A PS was performed on samples IINY-CHMS-SU-02-SEDIS-042122 and IINY-CHHRS-SU-07-SEDIS-042122. The %Rs for manganese were below acceptance limits; however, serial dilution results were within acceptance limits and the data were not qualified.
Was a Dilution Test/Serial Dilution performed and within project acceptance critiera?	•			Serial dilutions were performed on samples IINY-CHMS-SU-02-SEDIS-042122 and IINY-CHHRS-SU-07-SEDIS-042122. Recoveries were within acceptance limits.
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?		•		
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?			•	No field replicates were collected. Samples are from ISM survey units in a background sediment area.
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?	•			
Were Interference Check Solutions (ICS) or Spectral Interference Checks (SIC) performed at the requried frequency and within project acceptance limits?		•		Barium was detected in ICSA at concentrations greater than 1/2 LOQ. The vendor acknowledges that barium is a trace impurity in the standard. No data were qualified.
Were internal standard recoveries within project acceptance limits?	•			

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			In addition to the items on this checklist, the Case Narrative notes that low-level CCVs (CCVLs, separate from the LLCCVs) had %Rs above QC limits for manganese and barium. The associated results were greater than 10 times the CCVL concentrations. No data were qualified based on CCVLs.
Were DoD QSM corrective actions followed if deviations were noted?			•	No DoD QSM deviations were noted.
Were any data recommended for exclusion in the data validation process?		•		

Review Questions

Method: SW7471B (Mercury in Soil (Manual Cold-Vapor Technique))				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?	•			
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?		•		Prep batch 574308 did not include a MS/MSD pair.
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?		•		
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?			•	No field replicates were collected. Samples are from ISM survey units in a background sediment area.
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			

Review Questions

Method: SW7471B (Mercury in Soil (Manual Cold-Vapor Technique))

Review Questions	Yes	No	NA	Comment
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?			•	Separate LLCCVs were not required.
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?			•	
Were any data recommended for exclusion in the data validation process?		•		No DoD QSM deviations were noted.

Data Validation Report for 280-161508-1_52_2a_FUDSChem

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling Phase II
SDG:	280-161508-1_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Mike McGuire
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	EA Engineering, Science, and Technology
Data Review Level:	S2BVEM
Primary Data Reviewer:	Christopher Ma, Chemist
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	August 24, 2022

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW6010C - Dissolved	SW6020A - Dissolved	SW7470A - Dissolved
IINY-RRDS-SW-01-042022	280-161508-1	Water	Field Sample/N	X	X	X
IINY-RRDS-SW-02-042022	280-161508-2	Water	Field Sample/N	X	X	X
IINY-RRDS-SW-03-042022	280-161508-3	Water	Field Sample/N	X	X	X
IINY-RRDS-SW-04-042022	280-161508-4	Water	Field Sample/N	X	X	X
IINY-RRDS-SW-05-042022	280-161508-5	Water	Field Sample/N	X	X	X
IINY-RRDS-SW-06-042022	280-161508-6	Water	Field Sample/N	X	X	X
IINY-RRDS-SW-07-042022	280-161508-7	Water	Field Sample/N	X	X	X
IINY-RRDS-SW-08-042022	280-161508-8	Water	Field Sample/N	X	X	X
IINY-RRDS-SW-09-042022	280-161508-9	Water	Field Sample/N	X	X	X
IINY-RRDS-SW-10-042022	280-161508-10	Water	Field Sample/N	X	X	X
IINY-RRDS-SW-FD1-042022	280-161508-11	Water	Field Duplicate/FD	X	X	X
IINY-TWS-SW-01-042022	280-161508-12	Water	Field Sample/N	X	X	X
IINY-TWS-SW-02-042022	280-161508-13	Water	Field Sample/N	X	X	X
IINY-TWS-SW-03-042022	280-161508-14	Water	Field Sample/N	X	X	X
IINY-TWS-SW-04-042022	280-161508-15	Water	Field Sample/N	X	X	X
IINY-TWS-SW-05-042022	280-161508-16	Water	Field Sample/N	X	X	X
IINY-TWS-SW-06-042022	280-161508-17	Water	Field Sample/N	X	X	X
IINY-TWS-SW-07-042022	280-161508-18	Water	Field Sample/N	X	X	X
IINY-TWS-SW-08-042022	280-161508-19	Water	Field Sample/N	X	X	X

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW6010C - Dissolved	SW6020A - Dissolved	SW7470A - Dissolved
IINY-TWS-SW-09-042022	280-161508-20	Water	Field Sample/N	X	X	X
IINY-TWS-SW-10-042022	280-161508-21	Water	Field Sample/N	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 280-161508-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Field Duplicate RPD
- Lab Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 25 results (5.18%) out of the 483 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency (X qualifier). Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

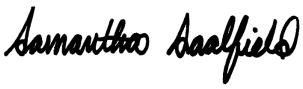
Narrative Comments

Analytical Method	Data Reviewer Comment
SW6010C	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW7470A	No additional comments; see Checklist for detail.

July 26, 2022

Reviewed by Christopher Ma, Chemist, EA Engineering, Science, and Technology

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of the reported sample results and method quality control data between the two deliverables.



Reviewed by Samantha Saalfield, Project Chemist, EA Engineering, Science, and Technology

August 24, 2022

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW6010C, Dissolved, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-573688/1-A (LB)	Calcium	24.30	< 24	< 200	ug/l	U/None*	L	
MB 280-573688/1-A (LB)	Iron	26.50	< 9.1	< 100	ug/l	U/None*	L	
MB 280-573688/1-A (LB)	Magnesium	4.590	< 4.2	< 200	ug/l	U/None*	L	
MB 280-573817/1-A (LB)	Iron	13.40	< 9.1	< 100	ug/l	U/None*	L	
MB 280-573817/1-A (LB)	Sodium	145.0	< 97	< 1000	ug/l	U/None*	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

*Blank flags displayed in the above table identify qualification of the sample result when it is less than or equal to the LOQ/RL. Sample results above the LOQ will be qualified based on the validation type such as J+ at the sample result.

Qualified Results associated with the Lab Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-RRDS-SW-01-042022 280-161508-1	N	Iron	100	35.0 J	100 U		ug/l	L
IINY-RRDS-SW-02-042022 280-161508-2	N	Iron	100	39.0 J	100 U		ug/l	L
IINY-RRDS-SW-03-042022 280-161508-3	N	Iron	100	41.0 J	100 U		ug/l	L
IINY-RRDS-SW-04-042022 280-161508-4	N	Iron	100	47.0 J	100 U		ug/l	L
IINY-RRDS-SW-05-042022 280-161508-5	N	Iron	100	41.0 J	100 U		ug/l	L
IINY-RRDS-SW-06-042022 280-161508-6	N	Iron	100	41.0 J	100 U		ug/l	L
IINY-RRDS-SW-07-042022 280-161508-7	N	Iron	100	46.0 J	100 U		ug/l	L
IINY-RRDS-SW-08-042022 280-161508-8	N	Iron	100	46.0 J	100 U		ug/l	L
IINY-RRDS-SW-09-042022 280-161508-9	N	Iron	100	41.0 J	100 U		ug/l	L
IINY-RRDS-SW-10-042022 280-161508-10	N	Iron	100	42.0 J	100 U		ug/l	L
IINY-RRDS-SW-FD1-042022 280-161508-11	FD	Iron	100	28.0 J	34.0 U		ug/l	L
IINY-TWS-SW-01-042022 280-161508-12	N	Iron	100	100	100 U		ug/l	L

Qualified Results associated with the Lab Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-TWS-SW-02-042022 280-161508-13	N	Iron	100	71.0 J	100 U		ug/l	L
IINY-TWS-SW-03-042022 280-161508-14	N	Iron	100	43.0 J	100 U		ug/l	L
IINY-TWS-SW-04-042022 280-161508-15	N	Iron	100	75.0 J	100 U		ug/l	L
IINY-TWS-SW-05-042022 280-161508-16	N	Iron	100	65.0 J	100 U		ug/l	L
IINY-TWS-SW-06-042022 280-161508-17	N	Iron	100	70.0 J	100 U		ug/l	L
IINY-TWS-SW-07-042022 280-161508-18	N	Iron	100	57.0 J	100 U		ug/l	L
IINY-TWS-SW-08-042022 280-161508-19	N	Iron	100	60.0 J	100 U		ug/l	L
IINY-TWS-SW-09-042022 280-161508-20	N	Iron	100	35.0 J	100 U		ug/l	L
IINY-TWS-SW-10-042022 280-161508-21	N	Iron	100	47.0 J	100 U		ug/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6020A, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-RRDS-SW-10-MSD-042022 (SD)	Zinc	131.0	83 - 119	10 - 125	percent	J/None	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6020A, Total, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-573998/1-A (LB)	Manganese	0.9980	< 0.31	< 3.5	ug/l	U/None*	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

*Blank flags displayed in the above table identify qualification of the sample result when it is less than or equal to the LOQ/RL. Sample results above the LOQ will be qualified based on the validation type such as J+ at the sample result.

No results associated with this QC element required qualification.

Table of All Qualified Results

Test Method: SW6010C		Extraction Method: FLDFLT						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-RRDS-SW-01-042022 280-161508-1	N	Iron	100	35.0 J	100 U		ug/l	L
IINY-RRDS-SW-02-042022 280-161508-2	N	Iron	100	39.0 J	100 U		ug/l	L
IINY-RRDS-SW-03-042022 280-161508-3	N	Iron	100	41.0 J	100 U		ug/l	L
IINY-RRDS-SW-04-042022 280-161508-4	N	Iron	100	47.0 J	100 U		ug/l	L
IINY-RRDS-SW-05-042022 280-161508-5	N	Iron	100	41.0 J	100 U		ug/l	L
IINY-RRDS-SW-06-042022 280-161508-6	N	Iron	100	41.0 J	100 U		ug/l	L
IINY-RRDS-SW-07-042022 280-161508-7	N	Iron	100	46.0 J	100 U		ug/l	L
IINY-RRDS-SW-08-042022 280-161508-8	N	Iron	100	46.0 J	100 U		ug/l	L
IINY-RRDS-SW-09-042022 280-161508-9	N	Iron	100	41.0 J	100 U		ug/l	L
IINY-RRDS-SW-10-042022 280-161508-10	N	Iron	100	42.0 J	100 U		ug/l	L
IINY-RRDS-SW-FD1-042022 280-161508-11	FD	Iron	100	28.0 J	34.0 U		ug/l	L
IINY-TWS-SW-01-042022 280-161508-12	N	Iron	100	100	100 U		ug/l	L
IINY-TWS-SW-02-042022 280-161508-13	N	Iron	100	71.0 J	100 U		ug/l	L
IINY-TWS-SW-03-042022 280-161508-14	N	Iron	100	43.0 J	100 U		ug/l	L
IINY-TWS-SW-04-042022 280-161508-15	N	Iron	100	75.0 J	100 U		ug/l	L
IINY-TWS-SW-05-042022 280-161508-16	N	Iron	100	65.0 J	100 U		ug/l	L
IINY-TWS-SW-06-042022 280-161508-17	N	Iron	100	70.0 J	100 U		ug/l	L
IINY-TWS-SW-07-042022 280-161508-18	N	Iron	100	57.0 J	100 U		ug/l	L
IINY-TWS-SW-08-042022 280-161508-19	N	Iron	100	60.0 J	100 U		ug/l	L
IINY-TWS-SW-09-042022 280-161508-20	N	Iron	100	35.0 J	100 U		ug/l	L
IINY-TWS-SW-10-042022 280-161508-21	N	Iron	100	47.0 J	100 U		ug/l	L

Test Method: SW6020A		Extraction Method: FLDFLT						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-RRDS-SW-01-042022 280-161508-1	N	Beryllium	1.00	0.130 J	0.300 U		ug/l	L
IINY-RRDS-SW-01-042022 280-161508-1	N	Silver	5.00	0.0490 J	0.100 U		ug/l	L

Table of All Qualified Results

Test Method: SW6020A		Extraction Method: FLDFLT						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-TWS-SW-06-042022 280-161508-17	N	Silver	5.00	0.0340 J	0.100 U		ug/l	L
IINY-TWS-SW-07-042022 280-161508-18	N	Silver	5.00	0.0560 J	0.100 U		ug/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW6020A, Dissolved

FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-RRDS-SW-01-042022 280-161508-1	N	Beryllium	1.00	0.130 J	0.130 J	0.300 U	L
IINY-RRDS-SW-01-042022 280-161508-1	N	Silver	5.00	0.0490 J	0.0490 J	0.100 U	L
IINY-TWS-SW-06-042022 280-161508-17	N	Silver	5.00	0.0340 J	0.0340 J	0.100 U	L
IINY-TWS-SW-07-042022 280-161508-18	N	Silver	5.00	0.0560 J	0.0560 J	0.100 U	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
L	Lab Blank
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
J	Estimated Value
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a tentative identification.
NJ	The analyte has been tentatively identified or presumptively as present and the associated numerical value was the estimated concentration in the sample.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
X	Result may require rejection; PDT attention required

Bias

-	The result may be biased low
+	The result may be biased high

Note - The bias field is a separate field; however, it is an integral part of the final flag (qualifier) on the sample result

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			Typo in some sample IDs (04022 versus 042022) was corrected after delivery to the laboratory.
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?			•	Only water samples were included with this SDG.
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?		•		Calcium, iron, magnesium, and sodium were detected in method blanks. Associated sample results for iron less than the LOQ were qualified U. Associated sample results for calcium, magnesium, and sodium were greater than the LOQ and more than 5x the blank detections and were not qualified.
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		Prep batches 573688 and 573817 were analyzed with a LCS, but not with a LCSD. An LCSD is not required per the QAPP.
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Prep batches 573688 and 573817 were analyzed with a LCS, but not with a LCSD.
Was a MS/MSD pair prepared with each batch?		•		Prep batch 573688 did not include MS/MSD. One MS/MSD pair was collected for the 20 field samples per the QAPP.
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
Were Post Spike (PS) recoveries within project acceptance limits?			•	Post Spike was not required as MS/MSD recoveries were within acceptance limits.
Was a Dilution Test/Serial Dilution performed and within project acceptance critiera?	•			
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			One field duplicate was included with 20 project samples. Parent sample IINY-RRDS-SW-10-042022 is associated with field duplicate sample IINY-RRDS-SW-FD1-042022. Parent/field duplicate RPDs were in control. Iron had an RPD>30%, but concentrations were less than the LOQ.
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?	•			
Were Interference Check Solutions (ICS) or Spectral Interference Checks (SIC) performed at the requried frequency and within project acceptance limits?	•			
Were internal standard recoveries within project acceptance limits?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?			•	No DoD QSM deviations were noted.
Were any data recommended for exclusion in the data validation process?		•		

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			Typo in some sample IDs (04022 versus 042022) was corrected after delivery to the laboratory.
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?			•	Only water samples were included with this SDG.
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?		•		Manganese was detected in a method blank. Associated sample results were greater than the LOQ and more than 5x the blank detection. No data were qualified.
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		Prep batches 573997 and 573998 included LCSs, and MS/MSD pairs, but did not include LCSD. LCSDs are not required per the QAPP.
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Prep batches 573997 and 573998 did not include LCSD.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		A high recovery of zinc (131%) was reported in the MSD performed on sample IINY-RRDS-SW-10-042022. Zinc was not detected in the parent sample; therefore, data quality is not affected.
Was the MS/MSD RPD within project acceptance limits?		•		The RPD for zinc (23%) in the MS/MSD performed on sample IINY-RRDS-SW-10-MSD-042022 exceeded the acceptance limit. Zinc was not detected in the parent sample; therefore, data quality is not affected.
Were Post Spike (PS) recoveries within project acceptance limits?	•			
Was a Dilution Test/Serial Dilution performed and within project acceptance critiera?	•			
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			One field duplicate was included with 20 project samples. Parent sample IINY-RRDS-SW-10-042022 is associated with field duplicate sample IINY-RRDS-SW-FD1-042022. Parent/field duplicate RPDs were in control.
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?		•		The CCV associated with batch 574452 recovered at 113% for manganese. Only a method blank was associated with this CCV; therefore, no data were qualified.
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			Three silver results and one beryllium result less than the LODs were U qualified at the LODs based on detections in the ICB and/or CCBs greater than the detection limits but less than 1/2 LOQ.
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?	•			
Were Interference Check Solutions (ICS) or Spectral Interference Checks (SIC) performed at the requried frequency and within project acceptance limits?		•		Barium was detected in ICSA at concentrations greater than 1/2 LOQ. The vendor acknowledges that barium is a trace impurity in the standard. No data were qualified.
Were internal standard recoveries within project acceptance limits?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			In addition to the items on this checklist, the Case Narrative notes that a low-level CCV (CCVL, separate from the LLCCV) had %R above QC limits for barium. The associated project sample results were greater than 10 times the CCVL concentration. No data were qualified based on CCVL.
Were DoD QSM corrective actions followed if deviations were noted?			•	No DoD QSM corrective actions were noted.
Were any data recommended for exclusion in the data validation process?		•		

Review Questions

Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique))				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			Typo in some sample IDs (04022 versus 042022) was corrected after delivery to the laboratory.
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?			•	Only water samples were included with this SDG.
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		Prep batch 573594 included a LCS but not a LCSD, but did include a MS/MSD pair.
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?		•		Prep batch 573316 did not include a MS/MSD pair.
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			One field duplicate was included with 20 project samples. Parent sample IINY-RRDS-SW-10-042022 is associated with field duplicate sample IINY-RRDS-SW-FD1-042022. Mercury was not detected in the parent or duplicate.
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?	•			

Review Questions

Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique))

Review Questions	Yes	No	NA	Comment
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?			•	Separate LLCCVs were not required.
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?			•	No DoD QSM deviations were noted.
Were any data recommended for exclusion in the data validation process?		•		

Data Validation Report for 280-161508-2_52_2a_FUDSChem

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling Phase II
SDG:	280-161508-2_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Mike McGuire
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	EA Engineering, Science, and Technology
Data Review Level:	S2BVEM
Primary Data Reviewer:	Christopher Ma, Chemist
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	August 09, 2022

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2340B
IINY-RRDS-SW-01-042022	280-161508-1	Water	Field Sample/N	X
IINY-RRDS-SW-02-042022	280-161508-2	Water	Field Sample/N	X
IINY-RRDS-SW-03-042022	280-161508-3	Water	Field Sample/N	X
IINY-RRDS-SW-04-042022	280-161508-4	Water	Field Sample/N	X
IINY-RRDS-SW-05-042022	280-161508-5	Water	Field Sample/N	X
IINY-RRDS-SW-06-042022	280-161508-6	Water	Field Sample/N	X
IINY-RRDS-SW-07-042022	280-161508-7	Water	Field Sample/N	X
IINY-RRDS-SW-08-042022	280-161508-8	Water	Field Sample/N	X
IINY-RRDS-SW-09-042022	280-161508-9	Water	Field Sample/N	X
IINY-RRDS-SW-10-042022	280-161508-10	Water	Field Sample/N	X
IINY-RRDS-SW-FD1-042022	280-161508-11	Water	Field Duplicate/FD	X
IINY-TWS-SW-01-042022	280-161508-12	Water	Field Sample/N	X
IINY-TWS-SW-02-042022	280-161508-13	Water	Field Sample/N	X
IINY-TWS-SW-03-042022	280-161508-14	Water	Field Sample/N	X
IINY-TWS-SW-04-042022	280-161508-15	Water	Field Sample/N	X
IINY-TWS-SW-05-042022	280-161508-16	Water	Field Sample/N	X
IINY-TWS-SW-06-042022	280-161508-17	Water	Field Sample/N	X
IINY-TWS-SW-07-042022	280-161508-18	Water	Field Sample/N	X
IINY-TWS-SW-08-042022	280-161508-19	Water	Field Sample/N	X

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2340B
IINY-TWS-SW-09-042022	280-161508-20	Water	Field Sample/N	X
IINY-TWS-SW-10-042022	280-161508-21	Water	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 280-161508-2_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

Field Duplicate RPD

Prep Hold Time

Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 0 results (0.00%) out of the 21 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency (X qualifier). Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

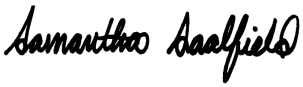
Narrative Comments

Analytical Method	Data Reviewer Comment
A2340B	No additional comments; see Checklist for detail.

July 26, 2022

Reviewed by Christopher Ma, Chemist, EA Engineering, Science, and Technology

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of the reported sample results and method quality control data between the two deliverables.



Reviewed by Samantha Saalfield, Project Chemist, EA Engineering, Science, and Technology

August 09, 2022

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

No Outliers were associated with this sample delivery group.

Qualified Results

No results associated with this sample delivery group required qualification.

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition

Flag Code and Definitions

Flag	Definition
J	Estimated Value
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a tentative identification.
NJ	The analyte has been tentatively identified or presumptively as present and the associated numerical value was the estimated concentration in the sample.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
U	Undetected: The analyte was analyzed for, but not detected.

UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
X	Result may require rejection; PDT attention required

Bias	
-	The result may be biased low
+	The result may be biased high
Note - The bias field is a separate field; however, it is an integral part of the final flag (qualifier) on the sample result	

Review Questions

Method: A2340B (Hardness by Calculation)

Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			Typo in some sample IDs (04022 versus 042022) was corrected after delivery to the laboratory.
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?			•	Only water samples were included with this SDG.
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)			•	A PQL was not established for hardness by SM2340B in the QAPP.
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?			•	SM2340B is a calculation; therefore, a method blank was not prepared.
Were target analytes in the method blank less than DL?			•	SM2340B is a calculation; therefore, a method blank was not prepared.
Was an LCS/LCSD pair prepared and analyzed with each batch?			•	SM2340B is a calculation; therefore, a LCS/LCSD pair was not prepared.
Were LCS/LCSD recoveries within project acceptance limits?			•	SM2340B is a calculation; therefore, a LCS/LCSD pair was not prepared.
Was the LCS/LCSD RPD within project acceptance limits?			•	SM2340B is a calculation; therefore, a LCS/LCSD pair was not prepared.
Was a MS/MSD pair prepared with each batch?			•	SM2340B is a calculation; therefore, a MS/MSD pair was not prepared.
Were MS/MSD recoveries within project acceptance limits?			•	SM2340B is a calculation; therefore, a MS/MSD pair was not prepared.
Was the MS/MSD RPD within project acceptance limits?			•	SM2340B is a calculation; therefore, a MS/MSD pair was not prepared.
Were Post Spike (PS) recoveries within project acceptance limits?			•	SM2340B is a calculation; therefore, a PS sample was not prepared.
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	Only water samples were included with this SDG.
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			One field duplicate was included with 20 project samples. Parent sample IINY-RRDS-SW-10-042022 is associated with field duplicate sample IINY-RRDS-SW-FD1-042022. Parent/field duplicate RPDs were in control.
Were reported sample concentrations within calibration range?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.
Was the Calibration within project acceptance criteria?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.

Review Questions

Method: A2340B (Hardness by Calculation)

Review Questions	Yes	No	NA	Comment
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.
Were CCVs run at the required frequency and within project acceptance criteria?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.
Were ICB/CCBs run at the required frequency and within acceptance criteria?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.
Were internal standard recoveries within project acceptance limits?			•	SM2340B is a calculation; therefore, internal standards were not prepared.
Were instrument run logs present and filled out appropriately?			•	SM2340B is a calculation; therefore, instrument run logs were not prepared.
Were sample preparation sheets present and filled out appropriately?			•	SM2340B is a calculation; therefore, sample preparation sheets were not prepared.
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?			•	The hardness calculation is not included in the QSM.
Were any data recommended for exclusion in the data validation process?		•		

Data Validation Report for 280-161508-3_52_2a_FUDSChem

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling Phase II
SDG:	280-161508-3_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Mike McGuire
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	EA Engineering, Science, and Technology
Data Review Level:	S2BVEM
Primary Data Reviewer:	Christopher Ma, Chemist
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	August 24, 2022

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW6010C - Dissolved	SW6020A - Dissolved	SW7470A - Dissolved
IINY-CHMS-SW-01-042122	280-161508-22	Water	Field Sample/N	X	X	X
IINY-CHMS-SW-02-042122	280-161508-23	Water	Field Sample/N	X	X	X
IINY-CHMS-SW-03-042122	280-161508-24	Water	Field Sample/N	X	X	X
IINY-CHMS-SW-04-042122	280-161508-25	Water	Field Sample/N	X	X	X
IINY-CHMS-SW-05-042122	280-161508-26	Water	Field Sample/N	X	X	X
IINY-CHMS-SW-06-042122	280-161508-27	Water	Field Sample/N	X	X	X
IINY-CHMS-SW-07-042122	280-161508-28	Water	Field Sample/N	X	X	X
IINY-CHMS-SW-08-042122	280-161508-29	Water	Field Sample/N	X	X	X
IINY-CHMS-SW-09-042122	280-161508-30	Water	Field Sample/N	X	X	X
IINY-CHMS-SW-10-042122	280-161508-31	Water	Field Sample/N	X	X	X
IINY-CHMS-SW-11-042122	280-161508-32	Water	Field Sample/N	X	X	X
IINY-CHMS-SW-12-042122	280-161508-33	Water	Field Sample/N	X	X	X
IINY-CHMS-SW-13-042122	280-161508-34	Water	Field Sample/N	X	X	X
IINY-CHMS-SW-14-042122	280-161508-35	Water	Field Sample/N	X	X	X
IINY-CHMS-SW-15-042122	280-161508-36	Water	Field Sample/N	X	X	X
IINY-CHMS-SW-16-042122	280-161508-37	Water	Field Sample/N	X	X	X
IINY-CHMS-SW-17-042122	280-161508-38	Water	Field Sample/N	X	X	X
IINY-CHMS-SW-18-042122	280-161508-39	Water	Field Sample/N	X	X	X
IINY-CHMS-SW-19-042122	280-161508-40	Water	Field Sample/N	X	X	X

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW6010C - Dissolved	SW6020A - Dissolved	SW7470A - Dissolved
IINY-CHMS-SW-20-042122	280-161508-41	Water	Field Sample/N	X	X	X
IINY-CHMS-SW-FD1-042122	280-161508-42	Water	Field Duplicate/FD	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 280-161508-3_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Field Duplicate RPD
- Lab Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 19 results (3.93%) out of the 483 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency (X qualifier). Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

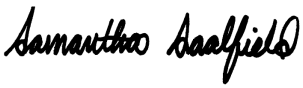
Narrative Comments

Analytical Method	Data Reviewer Comment
SW6010C	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW7470A	No additional comments; see Checklist for detail.

July 26, 2022

Reviewed by Christopher Ma, Chemist, EA Engineering, Science, and Technology

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of the reported sample results and method quality control data between the two deliverables.



Reviewed by Samantha Saalfield, Project Chemist, EA Engineering, Science, and Technology

August 24, 2022

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW6010C, Dissolved, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-573817/1-A (LB)	Iron	13.40	< 9.1	< 100	ug/l	U/None*	L	
MB 280-573817/1-A (LB)	Sodium	145.0	< 97	< 1000	ug/l	U/None*	L	
MB 280-573818/1-A (LB)	Iron	40.50	< 9.1	< 100	ug/l	U/None*	L	
MB 280-573818/1-A (LB)	Sodium	300.0	< 97	< 1000	ug/l	U/None*	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

*Blank flags displayed in the above table identify qualification of the sample result when it is less than or equal to the LOQ/RL. Sample results above the LOQ will be qualified based on the validation type such as J+ at the sample result.

Qualified Results associated with the Lab Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-CHMS-SW-01-042122 280-161508-22	N	Iron	100	36.0 J	100 U		ug/l	L
IINY-CHMS-SW-02-042122 280-161508-23	N	Iron	100	54.0 J	100 U		ug/l	L
IINY-CHMS-SW-03-042122 280-161508-24	N	Iron	100	52.0 J	100 U		ug/l	L
IINY-CHMS-SW-04-042122 280-161508-25	N	Iron	100	59.0 J	100 U		ug/l	L
IINY-CHMS-SW-05-042122 280-161508-26	N	Iron	100	110	110 J	+	ug/l	L
IINY-CHMS-SW-06-042122 280-161508-27	N	Iron	100	140	140 J	+	ug/l	L
IINY-CHMS-SW-09-042122 280-161508-30	N	Iron	100	160	160 J	+	ug/l	L
IINY-CHMS-SW-10-042122 280-161508-31	N	Iron	100	160	160 J	+	ug/l	L
IINY-CHMS-SW-11-042122 280-161508-32	N	Iron	100	200	200 J	+	ug/l	L
IINY-CHMS-SW-12-042122 280-161508-33	N	Iron	100	150	150 J	+	ug/l	L
IINY-CHMS-SW-13-042122 280-161508-34	N	Iron	100	160	160 J	+	ug/l	L
IINY-CHMS-SW-17-042122 280-161508-38	N	Iron	100	45.0 J	100 U		ug/l	L

Qualified Results associated with the Lab Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-CHMS-SW-18-042122 280-161508-39	N	Iron	100	48.0 J	100 U		ug/l	L
IINY-CHMS-SW-19-042122 280-161508-40	N	Iron	100	48.0 J	100 U		ug/l	L
IINY-CHMS-SW-20-042122 280-161508-41	N	Iron	100	55.0 J	100 U		ug/l	L
IINY-CHMS-SW-FD1-042122 280-161508-42	FD	Iron	100	35.0 J	100 U		ug/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6020A, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-CHMS-SW-17-MS-042122 (MS)	Manganese	83.00	87 - 115	10 - 125	percent	J/UJ	M	
IINY-CHMS-SW-17-MSD-042122 (SD)	Manganese	84.00	87 - 115	10 - 125	percent	J/UJ	M	
IINY-CHMS-SW-17-MSD-042122 (SD)	Zinc	82.00	83 - 119	10 - 125	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW6020A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-CHMS-SW-17-042122 280-161508-38	N	Manganese	3.50	17.0 J1	17.0 J	-	ug/l	M
IINY-CHMS-SW-17-042122 280-161508-38	N	Zinc	20.0	3.70 J J1	3.70 J	-	ug/l	M/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6020A, Total, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-573998/1-A (LB)	Manganese	0.9980	< 0.31	< 3.5	ug/l	U/None*	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

*Blank flags displayed in the above table identify qualification of the sample result when it is less than or equal to the LOQ/RL. Sample results above the LOQ will be qualified based on the validation type such as J+ at the sample result.

No results associated with this QC element required qualification.

Table of All Qualified Results

Test Method: SW6010C		Extraction Method: FLDFLT						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-CHMS-SW-01-042122 280-161508-22	N	Iron	100	36.0 J	100 U		ug/l	L
IINY-CHMS-SW-02-042122 280-161508-23	N	Iron	100	54.0 J	100 U		ug/l	L
IINY-CHMS-SW-03-042122 280-161508-24	N	Iron	100	52.0 J	100 U		ug/l	L
IINY-CHMS-SW-04-042122 280-161508-25	N	Iron	100	59.0 J	100 U		ug/l	L
IINY-CHMS-SW-05-042122 280-161508-26	N	Iron	100	110	110 J	+	ug/l	L
IINY-CHMS-SW-06-042122 280-161508-27	N	Iron	100	140	140 J	+	ug/l	L
IINY-CHMS-SW-09-042122 280-161508-30	N	Iron	100	160	160 J	+	ug/l	L
IINY-CHMS-SW-10-042122 280-161508-31	N	Iron	100	160	160 J	+	ug/l	L
IINY-CHMS-SW-11-042122 280-161508-32	N	Iron	100	200	200 J	+	ug/l	L
IINY-CHMS-SW-12-042122 280-161508-33	N	Iron	100	150	150 J	+	ug/l	L
IINY-CHMS-SW-13-042122 280-161508-34	N	Iron	100	160	160 J	+	ug/l	L
IINY-CHMS-SW-17-042122 280-161508-38	N	Iron	100	45.0 J	100 U		ug/l	L
IINY-CHMS-SW-18-042122 280-161508-39	N	Iron	100	48.0 J	100 U		ug/l	L
IINY-CHMS-SW-19-042122 280-161508-40	N	Iron	100	48.0 J	100 U		ug/l	L
IINY-CHMS-SW-20-042122 280-161508-41	N	Iron	100	55.0 J	100 U		ug/l	L
IINY-CHMS-SW-FD1-042122 280-161508-42	FD	Iron	100	35.0 J	100 U		ug/l	L

Test Method: SW6020A		Extraction Method: FLDFLT						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-CHMS-SW-17-042122 280-161508-38	N	Manganese	3.50	17.0 J1	17.0 J	-	ug/l	M
IINY-CHMS-SW-17-042122 280-161508-38	N	Zinc	20.0	3.70 J J1	3.70 J	-	ug/l	M/TR
IINY-CHMS-SW-18-042122 280-161508-39	N	Silver	5.00	0.0350 J	0.100 U		ug/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW6020A, Dissolved							
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-CHMS-SW-18-042122 280-161508-39	N	Silver	5.00	0.0350 J	0.0350 J	0.100 U	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
L	Lab Blank
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
J	Estimated Value
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a tentative identification.
NJ	The analyte has been tentatively identified or presumptively as present and the associated numerical value was the estimated concentration in the sample.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
X	Result may require rejection; PDT attention required

Bias

-	The result may be biased low
+	The result may be biased high

Note - The bias field is a separate field; however, it is an integral part of the final flag (qualifier) on the sample result

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?			•	Only water samples were included with this SDG.
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?		•		Iron and sodium were detected in method blanks. Associated sample results for iron less than the LOQ were U qualified, and associated results for iron greater than the LOQ but less than 5x the blank detection were J qualified with a positive bias. Sodium concentrations in associated samples were more than 5x the blank detection and were not qualified.
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		Prep batches 573817 and 573818 included a LCS but did not include a LCSD. An LCSD is not required per the QAPP.
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Prep batches 573817 and 573818 included a LCS but did not include a LCSD.
Was a MS/MSD pair prepared with each batch?		•		Prep batch 573817 did not include a MS/MSD pair. One MS/MSD pair was collected for the 20 field samples per the QAPP.
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
Were Post Spike (PS) recoveries within project acceptance limits?			•	Post Spike was not required as MS/MSD recoveries were within acceptance limits.
Was a Dilution Test/Serial Dilution performed and within project acceptance critiera?	•			
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			One field duplicate was included with 20 project samples. Parent sample IINY-CHMS-SW-17-042122 is associated with field duplicate sample IINY-CHMS-SW-FD1-042122. Parent/field duplicate RPDs were in control.
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?	•			
Were Interference Check Solutions (ICS) or Spectral Interference Checks (SIC) performed at the requried frequency and within project acceptance limits?	•			
Were internal standard recoveries within project acceptance limits?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?			•	No DoD QSM deviations were noted.
Were any data recommended for exclusion in the data validation process?		•		

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?			•	Only water samples were included with this SDG.
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?		•		Manganese was detected in a method blank sample. The associated sample results were greater than 5x the method blank detection, and no data were qualified.
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		Prep batches 574097 and 573998 included a LCS but did not include a LCSD. An LCSD is not required per the QAPP.
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Prep batches 574097 and 573998 included a LCS but did not include a LCSD.
Was a MS/MSD pair prepared with each batch?		•		Prep batch 573998 did not include a MS/MSD pair. One MS/MSD pair was collected for the 20 field samples per the QAPP.
Were MS/MSD recoveries within project acceptance limits?		•		The %Rs for manganese and zinc in the MS and/or MSD prepared with project sample IINY-CHMS-SW-17-042122 were below QC limits. The manganese and zinc results for the parent sample have been flagged with the J qualifier.
Was the MS/MSD RPD within project acceptance limits?	•			
Were Post Spike (PS) recoveries within project acceptance limits?	•			
Was a Dilution Test/Serial Dilution performed and within project acceptance critiera?	•			
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)

Review Questions	Yes	No	NA	Comment
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			One field duplicate was included with 20 project samples. Parent sample IINY-CHMS-SW-17-042122 is associated with field duplicate sample IINY-CHMS-SW-FD1-042122. Parent/field duplicate RPDs were in control.
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?		•		The %R for manganese was above QC limits for CCV sample 280-574452/76. The CCV is not associated with any project samples, and no data were qualified.
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			One silver result less than the LOD was U qualified at the LOD based on detections in the ICB and CCBs greater than the detection limit but less than 1/2 LOQ.
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?	•			
Were Interference Check Solutions (ICS) or Spectral Interference Checks (SIC) performed at the requried frequency and within project acceptance limits?		•		Barium was detected in ICSA at concentrations greater than 1/2 LOQ. The vendor acknowledges that barium is a trace impurity in the standard. No data were qualified.
Were internal standard recoveries within project acceptance limits?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?			•	No DoD QSM deviations were noted.
Were any data recommended for exclusion in the data validation process?		•		

Review Questions

Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique))				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?			•	Only water samples were included with this SDG.
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?			•	Prep batch 573862 included an LCS/LCSD pair. Prep batches 573594 and 574022 included LCSs but did not include LCSDs.
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?		•		Prep batches 573594 and 574022 did not include MS/MSD pairs.
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			One field duplicate was included with 20 project samples. Parent sample IINY-CHMS-SW-17-042122 is associated with field duplicate sample IINY-CHMS-SW-FD1-042122. Mercury was not detected in the parent or duplicate.
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?	•			

Review Questions

Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique))

Review Questions	Yes	No	NA	Comment
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?			•	Separate LLCCVs were not required.
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?			•	No DoD QSM deviations were noted.
Were any data recommended for exclusion in the data validation process?		•		

Data Validation Report for 280-161508-4_52_2a_FUDSChem

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling Phase II
SDG:	280-161508-4_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Mike McGuire
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	EA Engineering, Science, and Technology
Data Review Level:	S2BVEM
Primary Data Reviewer:	Christopher Ma, Chemist
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	August 09, 2022

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2340B
IINY-CHMS-SW-01-042122	280-161508-22	Water	Field Sample/N	X
IINY-CHMS-SW-02-042122	280-161508-23	Water	Field Sample/N	X
IINY-CHMS-SW-03-042122	280-161508-24	Water	Field Sample/N	X
IINY-CHMS-SW-04-042122	280-161508-25	Water	Field Sample/N	X
IINY-CHMS-SW-05-042122	280-161508-26	Water	Field Sample/N	X
IINY-CHMS-SW-06-042122	280-161508-27	Water	Field Sample/N	X
IINY-CHMS-SW-07-042122	280-161508-28	Water	Field Sample/N	X
IINY-CHMS-SW-08-042122	280-161508-29	Water	Field Sample/N	X
IINY-CHMS-SW-09-042122	280-161508-30	Water	Field Sample/N	X
IINY-CHMS-SW-10-042122	280-161508-31	Water	Field Sample/N	X
IINY-CHMS-SW-11-042122	280-161508-32	Water	Field Sample/N	X
IINY-CHMS-SW-12-042122	280-161508-33	Water	Field Sample/N	X
IINY-CHMS-SW-13-042122	280-161508-34	Water	Field Sample/N	X
IINY-CHMS-SW-14-042122	280-161508-35	Water	Field Sample/N	X
IINY-CHMS-SW-15-042122	280-161508-36	Water	Field Sample/N	X
IINY-CHMS-SW-16-042122	280-161508-37	Water	Field Sample/N	X
IINY-CHMS-SW-17-042122	280-161508-38	Water	Field Sample/N	X
IINY-CHMS-SW-18-042122	280-161508-39	Water	Field Sample/N	X
IINY-CHMS-SW-19-042122	280-161508-40	Water	Field Sample/N	X

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2340B
IINY-CHMS-SW-20-042122	280-161508-41	Water	Field Sample/N	X
IINY-CHMS-SW-FD1-042122	280-161508-42	Water	Field Duplicate/FD	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 280-161508-4_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

Field Duplicate RPD

Prep Hold Time

Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 0 results (0.00%) out of the 21 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency (X qualifier). Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

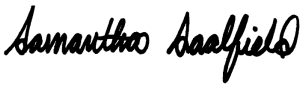
Narrative Comments

Analytical Method	Data Reviewer Comment
A2340B	No additional comments; see Checklist for detail.

July 26, 2022

Reviewed by Christopher Ma, Chemist, EA Engineering, Science, and Technology

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of the reported sample results and method quality control data between the two deliverables.



Reviewed by Samantha Saalfield, Project Chemist, EA Engineering, Science, and Technology

August 09, 2022

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

No Outliers were associated with this sample delivery group.

Qualified Results

No results associated with this sample delivery group required qualification.

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition

Flag Code and Definitions

Flag	Definition
J	Estimated Value
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a tentative identification.
NJ	The analyte has been tentatively identified or presumptively as present and the associated numerical value was the estimated concentration in the sample.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
U	Undetected: The analyte was analyzed for, but not detected.

UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
X	Result may require rejection; PDT attention required

Bias	
-	The result may be biased low
+	The result may be biased high
Note - The bias field is a separate field; however, it is an integral part of the final flag (qualifier) on the sample result	

Review Questions

Method: A2340B (Hardness by Calculation)				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?	•			
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?			•	Only water samples were included with this SDG.
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)			•	A PQL was not established for hardness by SM2340B in the QAPP.
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?			•	SM2340B is a calculation; therefore, a method blank was not prepared.
Were target analytes in the method blank less than DL?			•	SM2340B is a calculation; therefore, a method blank was not prepared.
Was an LCS/LCSD pair prepared and analyzed with each batch?			•	SM2340B is a calculation; therefore, a LCS/LCSD pair was not prepared.
Were LCS/LCSD recoveries within project acceptance limits?			•	SM2340B is a calculation; therefore, a LCS/LCSD pair was not prepared.
Was the LCS/LCSD RPD within project acceptance limits?			•	SM2340B is a calculation; therefore, a LCS/LCSD pair was not prepared.
Was a MS/MSD pair prepared with each batch?			•	SM2340B is a calculation; therefore, a MS/MSD pair was not prepared.
Were MS/MSD recoveries within project acceptance limits?			•	SM2340B is a calculation; therefore, a MS/MSD pair was not prepared.
Was the MS/MSD RPD within project acceptance limits?			•	SM2340B is a calculation; therefore, a MS/MSD pair was not prepared.
Were Post Spike (PS) recoveries within project acceptance limits?			•	SM2340B is a calculation; therefore, a PS sample was not prepared.
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	Only water samples were included with this SDG.
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			One field duplicate was included with 20 project samples. Parent sample IINY-CHMS-SW-17-042122 is associated with field duplicate sample IINY-CHMS-SW-FD1-042122. Parent/field duplicate RPDs were in control.
Were reported sample concentrations within calibration range?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.
Was the Calibration within project acceptance criteria?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.

Review Questions

Method: A2340B (Hardness by Calculation)

Review Questions	Yes	No	NA	Comment
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.
Were CCVs run at the required frequency and within project acceptance criteria?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.
Were ICB/CCBs run at the required frequency and within acceptance criteria?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?			•	Since SM2340B is a calculation, instrument calibration was not required.
Were internal standard recoveries within project acceptance limits?			•	SM2340B is a calculation; therefore, internal standards were not prepared.
Were instrument run logs present and filled out appropriately?			•	SM2340B is a calculation; therefore, instrument run logs were not prepared.
Were sample preparation sheets present and filled out appropriately?			•	SM2340B is a calculation; therefore, sample preparation sheets were not prepared.
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?			•	The hardness calculation is not included in the QSM.
Were any data recommended for exclusion in the data validation process?		•		

Data Validation Report for 280-161508-5_52_2a_FUDSChem

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling Phase II
SDG:	280-161508-5_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Mike McGuire
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	EA Engineering, Science, and Technology
Data Review Level:	S2BVEM
Primary Data Reviewer:	Christopher Ma, Chemist
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	August 24, 2022

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW6010C - Dissolved	SW6020A - Dissolved	SW7470A - Dissolved
IINY-CHHRS-SW-01-042122	280-161508-43	Water	Field Sample/N	X	X	X
IINY-CHHRS-SW-02-042122	280-161508-44	Water	Field Sample/N	X	X	X
IINY-CHHRS-SW-03-042122	280-161508-46	Water	Field Sample/N	X	X	X
IINY-CHHRS-SW-04-042122	280-161508-47	Water	Field Sample/N	X	X	X
IINY-CHHRS-SW-05-042122	280-161508-48	Water	Field Sample/N	X	X	X
IINY-CHHRS-SW-06-042122	280-161508-49	Water	Field Sample/N	X	X	X
IINY-CHHRS-SW-07-042122	280-161508-50	Water	Field Sample/N	X	X	X
IINY-CHHRS-SW-08-042122	280-161508-51	Water	Field Sample/N	X	X	X
IINY-CHHRS-SW-09-042122	280-161508-52	Water	Field Sample/N	X	X	X
IINY-CHHRS-SW-10-042122	280-161508-53	Water	Field Sample/N	X	X	X
IINY-CHHRS-SW-11-042122	280-161508-54	Water	Field Sample/N	X	X	X
IINY-CHHRS-SW-12-042122	280-161508-55	Water	Field Sample/N	X	X	X
IINY-CHHRS-SW-13-042122	280-161508-56	Water	Field Sample/N	X	X	X
IINY-CHHRS-SW-14-042122	280-161508-57	Water	Field Sample/N	X	X	X
IINY-CHHRS-SW-15-042122	280-161508-58	Water	Field Sample/N	X	X	X
IINY-CHHRS-SW-16-042122	280-161508-59	Water	Field Sample/N	X	X	X
IINY-CHHRS-SW-17-042122	280-161508-60	Water	Field Sample/N	X	X	X
IINY-CHHRS-SW-18-042122	280-161508-61	Water	Field Sample/N	X	X	X
IINY-CHHRS-SW-19-042122	280-161508-62	Water	Field Sample/N	X	X	X

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW6010C - Dissolved	SW6020A - Dissolved	SW7470A - Dissolved
IINY-CHHRS-SW-20-042122	280-161508-63	Water	Field Sample/N	X	X	X
IINY-CHHRS-SW-FD1-042122	280-161508-45	Water	Field Duplicate/FD	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 280-161508-5_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Field Duplicate RPD
- Lab Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 11 results (2.28%) out of the 483 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency (X qualifier). Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW6010C	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW7470A	No additional comments; see Checklist for detail.

July 26, 2022

Reviewed by Christopher Ma, Chemist, EA Engineering, Science, and Technology

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of the reported sample results and method quality control data between the two deliverables.

Reviewed by Samantha Saalfield, Project Chemist, EA Engineering, Science, and Technology

August 24, 2022

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW6010C, Dissolved, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-573818/1-A (LB)	Iron	40.50	< 9.1	< 100	ug/l	U/None*	L	
MB 280-573818/1-A (LB)	Sodium	300.0	< 97	< 1000	ug/l	U/None*	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

*Blank flags displayed in the above table identify qualification of the sample result when it is less than or equal to the LOQ/RL. Sample results above the LOQ will be qualified based on the validation type such as J+ at the sample result.

Qualified Results associated with the Lab Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-CHHRS-SW-01-042122 280-161508-43	N	Iron	100	48.0 J	100 U		ug/l	L
IINY-CHHRS-SW-FD1-042122 280-161508-45	FD	Iron	100	82.0 J	100 U		ug/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6020A, Dissolved, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-574107/1-A (LB)	Chromium	0.6620	< 0.5	< 10	ug/l	U/None*	L	
MB 280-574107/1-A (LB)	Zinc	4.920	< 2	< 20	ug/l	U/None*	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

*Blank flags displayed in the above table identify qualification of the sample result when it is less than or equal to the LOQ/RL. Sample results above the LOQ will be qualified based on the validation type such as J+ at the sample result.

Qualified Results associated with the Lab Blank for SW6020A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-CHHRS-SW-12-042122 280-161508-55	N	Zinc	20.0	5.10 J	8.00 U		ug/l	L
IINY-CHHRS-SW-13-042122 280-161508-56	N	Chromium	10.0	0.540 J	1.80 U		ug/l	L
IINY-CHHRS-SW-13-042122 280-161508-56	N	Zinc	20.0	4.30 J	8.00 U		ug/l	L
IINY-CHHRS-SW-16-042122 280-161508-59	N	Zinc	20.0	2.90 J	8.00 U		ug/l	L
IINY-CHHRS-SW-17-042122 280-161508-60	N	Chromium	10.0	0.700 J	1.80 U		ug/l	L
IINY-CHHRS-SW-18-042122 280-161508-61	N	Zinc	20.0	3.20 J	8.00 U		ug/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6020A, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-CHHRS-SW-02-MSD-042122 (SD)	Zinc	193.0	83 - 119	10 - 125	percent	J/None	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6020A, Dissolved, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
IINY-CHHRS-SW-02-MSD-042122 (SD)	Zinc	38.90	< 20	< 20	ug/l	J/UJ	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS RPD for SW6020A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-CHHRS-SW-02-042122 280-161508-44	N	Zinc	20.0	8.00 U J1	8.00 UJ		ug/l	D

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: SW6010C		**Extraction Method: FLDFLT**						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-CHHRS-SW-01-042122 280-161508-43	N	Iron	100	48.0 J	100 U		ug/l	L
IINY-CHHRS-SW-FD1-042122 280-161508-45	FD	Iron	100	82.0 J	100 U		ug/l	L

Test Method: SW6020A		**Extraction Method: FLDFLT**						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
IINY-CHHRS-SW-02-042122 280-161508-44	N	Zinc	20.0	8.00 U J1	8.00 UJ		ug/l	D
IINY-CHHRS-SW-12-042122 280-161508-55	N	Silver	5.00	0.0340 J	0.100 U		ug/l	L
IINY-CHHRS-SW-12-042122 280-161508-55	N	Zinc	20.0	5.10 J	8.00 U		ug/l	L
IINY-CHHRS-SW-13-042122 280-161508-56	N	Chromium	10.0	0.540 J	1.80 U		ug/l	L
IINY-CHHRS-SW-13-042122 280-161508-56	N	Zinc	20.0	4.30 J	8.00 U		ug/l	L
IINY-CHHRS-SW-16-042122 280-161508-59	N	Zinc	20.0	2.90 J	8.00 U		ug/l	L
IINY-CHHRS-SW-17-042122 280-161508-60	N	Chromium	10.0	0.700 J	1.80 U		ug/l	L
IINY-CHHRS-SW-18-042122 280-161508-61	N	Zinc	20.0	3.20 J	8.00 U		ug/l	L
IINY-CHHRS-SW-FD1-042122 280-161508-45	FD	Silver	5.00	0.0520 J	0.100 U		ug/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW6020A, Dissolved							
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
IINY-CHHRS-SW-12-042122 280-161508-55	N	Silver	5.00	0.0340 J	0.0340 J	0.100 U	L
IINY-CHHRS-SW-FD1-042122 280-161508-45	FD	Silver	5.00	0.0520 J	0.0520 J	0.100 U	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
D	MS RPD
L	Lab Blank
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
J	Estimated Value
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a tentative identification.
NJ	The analyte has been tentatively identified or presumptively as present and the associated numerical value was the estimated concentration in the sample.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
X	Result may require rejection; PDT attention required

Bias

-	The result may be biased low
+	The result may be biased high

Note - The bias field is a separate field; however, it is an integral part of the final flag (qualifier) on the sample result

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)

Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?		•		The sample container label "IINY-CHHRS-FD1-042122" did not match the COC ID "IINY-CHHRS-SW-FD1-042122". The COC ID was used for sample login.
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?			•	Only water samples were included with this SDG.
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?		•		Iron and sodium were detected in a method blank. Associates samples IINY-CHHRS-SW-02-042122 and IINY-CHHRS-SW-FD1-042122 had iron detections less than the LOQ and were U qualified.
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		Prep batches 573818 and 573819 included a LCS but did not include a LCSD. An LCSD is not required per the QAPP.
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Prep batches 573818 and 573819 included aLCS but did not include a LCSD.
Was a MS/MSD pair prepared with each batch?		•		Prep batch 573818 did not include a MS/MSD pair.
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
Were Post Spike (PS) recoveries within project acceptance limits?			•	Post Spike was not required as MS/MSD recoveries were within acceptance limits.
Was a Dilution Test/Serial Dilution performed and within project acceptance critiera?	•			
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			One field duplicate was included with 20 project samples. Parent sample IINY-CHHRS-SW-02-042122 is associated with field duplicate sample IINY-CHHRS-SW-FD1-042122. Parent/field duplicate RPDs were in control. The RPD for iron was >30%, but concentrations were less than the LOQ so no data were qualified.
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?	•			
Were Interference Check Solutions (ICS) or Spectral Interference Checks (SIC) performed at the requried frequency and within project acceptance limits?	•			
Were internal standard recoveries within project acceptance limits?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?			•	No DoD QSM deviations were noted.
Were any data recommended for exclusion in the data validation process?		•		

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)

Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?		•		The sample container label "IINY-CHHRS-FD1-042122" did not match the COC ID "IINY-CHHRS-SW-FD1-042122". The COC ID was used for sample login.
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?			•	Only water samples were included with this SDG.
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?		•		Chromium and zinc were detected in a methodblank. The associated sample results whichwere less than the LOQs have been U qualified.
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		Prep batches 574097 and 574107 had a LCS and a MS/MSD pair but did not include a LCSD. An LCSD is not required per the QAPP.
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Prep batches 574097 and 574107 had a LCS and a MS/MSD pair but did not include a LCSD.
Was a MS/MSD pair prepared with each batch?		•		Prep batch 574107 did not include a MS/MSD pair. One MS/MSD pair was collected for the 20 field samples per the QAPP.
Were MS/MSD recoveries within project acceptance limits?		•		Zinc had a recovery above QC limits in the MSD performed on sample IINY-CHHRS-SW-02-042122. The associated sample result was non-detect, so no data were qualified.
Was the MS/MSD RPD within project acceptance limits?		•		The RPD for zinc was above QC limits in the MS/MSD performed on sample IINY-CHHRS-SW-02-042122. The associated sample result was J qualified.
Were Post Spike (PS) recoveries within project acceptance limits?	•			A PS was performed in analytical batch 548387 and results are included in the report for SDG 280-161508-3.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Was a Dilution Test/Serial Dilution performed and within project acceptance critiera?	•			A serial dilution was performed in analytical batch 548387 and results are included in the report for SDG 280-161508-3.
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			One field duplicate was included with 20 project samples. Parent sample IINY-CHHRS-SW-02-042122 is associated with field duplicate sample IINY-CHHRS-SW-FD1-042122. Parent/field duplicate RPDs were in control.
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			Silver results less than the LOD for two samples were U qualified at the LOD based on detections in the ICB and CCBs greater than the detection limit but less than 1/2 LOQ.
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?	•			
Were Interference Check Solutions (ICS) or Spectral Interference Checks (SIC) performed at the requried frequency and within project acceptance limits?		•		Barium was detected in ICSA at concentrationsgreater than 1/2 LOQ. The vendor acknowledgesthat barium is a trace impurity in the standard.No data were qualified.
Were internal standard recoveries within project acceptance limits?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			In addition to the items on this checklist, the Case Narrative notes that low-level CCVs (CCVLs, separate from the LLCCVs) had %Rs above QC limits for beryllium, zinc, manganese, copper, lead, and barium. The associated results were greater than 10 times the CCVL concentrations. No data were qualified based on CCVLs.
Were DoD QSM corrective actions followed if deviations were noted?			•	No DoD QSM deviations were noted.
Were any data recommended for exclusion in the data validation process?		•		

Review Questions

Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique))				
Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?		•		The sample container label "IINY-CHHRS-FD1-042122" did not match the COC ID "IINY-CHHRS-SW-FD1-042122". The COC ID was used for sample login.
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?			•	Only water samples were included with this SDG.
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)	•			
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than DL?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		Prep batch 574024 contained an LCS/LCSD pair. Prep batch 574022 included a LCS but did not include a LCSD.
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?		•		Prep batch 574024 did not include a MS/MSD pair.
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?	•			One field duplicate was included with 20 project samples. Parent sample IINY-CHHRS-SW-02-042122 is associated with field duplicate sample IINY-CHHRS-SW-FD1-042122. Mercury was not detected in the parent or duplicate.
Were reported sample concentrations within calibration range?	•			
Was the Calibration within project acceptance criteria?	•			

Review Questions

Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique))

Review Questions	Yes	No	NA	Comment
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?	•			
Were CCVs run at the required frequency and within project acceptance criteria?	•			
Were ICB/CCBs run at the required frequency and within acceptance criteria?	•			
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?			•	Separate LLCCVs were not required.
Were instrument run logs present and filled out appropriately?	•			
Were sample preparation sheets present and filled out appropriately?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?			•	No DoD QSM deviations were noted.
Were any data recommended for exclusion in the data validation process?		•		

Data Validation Report for 280-161508-6_52_2a_FUDSChem

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling Phase II
SDG:	280-161508-6_52_2a_FUDSChem
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc., Hunt Valley, MD
Project Manager:	Mike McGuire
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	EA Engineering, Science, and Technology
Data Review Level:	S2BVEM
Primary Data Reviewer:	Christopher Ma, Chemist
Second Reviewer:	Samantha Saalfield, Project Chemist
Date Submitted:	August 09, 2022

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2340B
IINY-CHHRS-SW-01-042122	280-161508-43	Water	Field Sample/N	X
IINY-CHHRS-SW-02-042122	280-161508-44	Water	Field Sample/N	X
IINY-CHHRS-SW-03-042122	280-161508-46	Water	Field Sample/N	X
IINY-CHHRS-SW-04-042122	280-161508-47	Water	Field Sample/N	X
IINY-CHHRS-SW-05-042122	280-161508-48	Water	Field Sample/N	X
IINY-CHHRS-SW-06-042122	280-161508-49	Water	Field Sample/N	X
IINY-CHHRS-SW-07-042122	280-161508-50	Water	Field Sample/N	X
IINY-CHHRS-SW-08-042122	280-161508-51	Water	Field Sample/N	X
IINY-CHHRS-SW-09-042122	280-161508-52	Water	Field Sample/N	X
IINY-CHHRS-SW-10-042122	280-161508-53	Water	Field Sample/N	X
IINY-CHHRS-SW-11-042122	280-161508-54	Water	Field Sample/N	X
IINY-CHHRS-SW-12-042122	280-161508-55	Water	Field Sample/N	X
IINY-CHHRS-SW-13-042122	280-161508-56	Water	Field Sample/N	X
IINY-CHHRS-SW-14-042122	280-161508-57	Water	Field Sample/N	X
IINY-CHHRS-SW-15-042122	280-161508-58	Water	Field Sample/N	X
IINY-CHHRS-SW-16-042122	280-161508-59	Water	Field Sample/N	X
IINY-CHHRS-SW-17-042122	280-161508-60	Water	Field Sample/N	X
IINY-CHHRS-SW-18-042122	280-161508-61	Water	Field Sample/N	X
IINY-CHHRS-SW-19-042122	280-161508-62	Water	Field Sample/N	X

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2340B
IINY-CHHRS-SW-20-042122	280-161508-63	Water	Field Sample/N	X
IINY-CHHRS-SW-FD1-042122	280-161508-45	Water	Field Duplicate/FD	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S2BVEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by EA Engineering Science & Technology, Inc., Hunt Valley, MD; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 280-161508-6_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

Field Duplicate RPD

Prep Hold Time

Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 0 results (0.00%) out of the 21 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency (X qualifier). Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

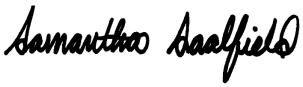
Narrative Comments

Analytical Method	Data Reviewer Comment
A2340B	No additional comments; see Checklist for detail.

July 26, 2022

Reviewed by Christopher Ma, Chemist, EA Engineering, Science, and Technology

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of the reported sample results and method quality control data between the two deliverables.



Reviewed by Samantha Saalfield, Project Chemist, EA Engineering, Science, and Technology

August 09, 2022

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

No Outliers were associated with this sample delivery group.

Qualified Results

No results associated with this sample delivery group required qualification.

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition

Flag Code and Definitions

Flag	Definition
J	Estimated Value
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a tentative identification.
NJ	The analyte has been tentatively identified or presumptively as present and the associated numerical value was the estimated concentration in the sample.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
U	Undetected: The analyte was analyzed for, but not detected.

UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
X	Result may require rejection; PDT attention required

Bias	
-	The result may be biased low
+	The result may be biased high
Note - The bias field is a separate field; however, it is an integral part of the final flag (qualifier) on the sample result	

Review Questions

Method: A2340B (Hardness by Calculation)

Review Questions	Yes	No	NA	Comment
Were all samples documented correctly on the chain-of-custody (COC)?	•			
Did samples listed on COCs match the sample labels?		•		The sample container label "IINY-CHHRS-FD1-042122" did not match the COC ID "IINY-CHHRS-SW-FD1-042122". The COC ID was used for sample login.
Were samples relinquished properly on the COC?	•			
Were all samples properly preserved?	•			
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) are documented?	•			
Were sample results reported with percent moisture correction if required?			•	Only water samples were included with this SDG.
Were analytical methods performed and analysis dates present?	•			
Were all requested target analytes reported?	•			
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)			•	A PQL was not established for hardness by SM2340B in the QAPP.
Were holding times met?	•			
Were trip blanks analyzed at the proper frequency and in control?			•	Trip blanks were not required.
Were field blanks analyzed at the proper frequency and in control?			•	Field blanks were not required.
Were equipment blanks analyzed at the proper frequency and in control?			•	Equipment blanks were not required.
Was a method blank prepared and analyzed with each batch?			•	SM2340B is a calculation; therefore, a method blank was not prepared.
Were target analytes in the method blank less than DL?			•	SM2340B is a calculation; therefore, a method blank was not prepared.
Was an LCS/LCSD pair prepared and analyzed with each batch?			•	SM2340B is a calculation; therefore, a LCS/LCSD pair was not prepared.
Were LCS/LCSD recoveries within project acceptance limits?			•	SM2340B is a calculation; therefore, a LCS/LCSD pair was not prepared.
Was the LCS/LCSD RPD within project acceptance limits?			•	SM2340B is a calculation; therefore, a LCS/LCSD pair was not prepared.
Was a MS/MSD pair prepared with each batch?			•	SM2340B is a calculation; therefore, a MS/MSD pair was not prepared.
Were MS/MSD recoveries within project acceptance limits?			•	SM2340B is a calculation; therefore, a MS/MSD pair was not prepared.
Was the MS/MSD RPD within project acceptance limits?			•	SM2340B is a calculation; therefore, a MS/MSD pair was not prepared.
Were Post Spike (PS) recoveries within project acceptance limits?			•	SM2340B is a calculation; therefore, a PS sample was not prepared.
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?			•	Only water samples were included with this SDG.
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?			•	One field duplicate was included with 20 project samples. Parent sample IINY-CHHRS-SW-02-042122 is associated with field duplicate sample IINY-CHHRS-SW-FD1-042122. Parent/field duplicate RPDs were in control.
Were reported sample concentrations within calibration range?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.

Review Questions

Method: A2340B (Hardness by Calculation)

Review Questions	Yes	No	NA	Comment
Was the Calibration within project acceptance criteria?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.
Were CCVs run at the required frequency and within project acceptance criteria?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.
Were ICB/CCBs run at the required frequency and within acceptance criteria?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.
Was a Low Level Calibration Check Verification (LLCCV) analyzed prior to sample and within acceptance criteria?			•	SM2340B is a calculation; therefore, instrument calibration was not prepared.
Were internal standard recoveries within project acceptance limits?			•	SM2340B is a calculation; therefore, internal standards were not prepared.
Were instrument run logs present and filled out appropriately?			•	SM2340B is a calculation; therefore, instrument run logs were not prepared.
Were sample preparation sheets present and filled out appropriately?			•	SM2340B is a calculation; therefore, sample preparation sheets were not prepared.
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were DoD QSM corrective actions followed if deviations were noted?			•	The hardness calculation is not included in the QSM.
Were any data recommended for exclusion in the data validation process?		•		

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Appendix D

Data Usability Assessment Reports

D1: Phase I Data Usability Assessment Report
D2: Phase II Data Usability Assessment Report
D3: Phase II FUDSChem Data Usability Assessment Output

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D1
Phase I Data Usability Assessment Report

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Data Usability Assessment Report
Phase I

Hazardous Toxic and Radioactive Waste Project

Remedial Investigation

Iona Island Naval Ammunition Depot
Formerly Used Defense Site
Stony Point, Rockland County, New York

Contract No. 912DR-15-D-0014
Delivery Order No. W912DR18F0587

Prepared for

U.S. Army Corps of Engineers

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3	Phase I Shoreline Reconnaissance Survey Areas and Sediment Sampling Locations
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Number	Title
1	Sample and Analysis
2	Summary of Sample Results and Qualifiers

LIST OF ACRONYMS AND ABBREVIATIONS

%D	Percent difference
%R	Percent recovery
AOC	Area of concern
bgs	Below ground surface
BTEX	Benzene, ethylbenzene, toluene, and xylenes
DL	Detection limit
DoD	Department of Defense
DUAR	Data Usability Assessment Report
DU	Decision Unit
EA	EA Engineering, P.C. and its affiliate EA Science and Technology
EPA	U.S. Environmental Protection Agency
FUDS	Formerly Used Defense Site
HTRW	Hazardous Toxic and Radioactive Waste
in.	inch(es)
ISM	Incremental sampling methodology
LCS	Laboratory control sample
LOD	Limit of detection
LOQ	Limit of quantitation
MS	Matrix spike
MSD	Matrix spike duplicate
NA	Not applicable
PAH	Polycyclic aromatic hydrocarbon
PARCCS	Precision, accuracy, representativeness, completeness, comparability, and sensitivity
PCB	Polychlorinated biphenyl
QAPP	Quality Assurance Project Plan
QC	Quality control
RI	Remedial Investigation

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

RPD	Relative percent difference
RSD	Relative standard deviation
SEDD	Staged Electronic data deliverable
SOP	Standard operating procedure
TAL	Target analyte list
TOC	Total organic carbon
UFP	Uniform Federal Policy
USACE	U.S. Army Corps of Engineers

1. SITE DESCRIPTION AND PROJECT SCOPE

1.1 INTRODUCTION

EA Engineering, P.C. and its affiliate EA Science and Technology (EA) has prepared this Data Usability Assessment Report (DUAR) Phase I in support of the Hazardous Toxic and Radioactive Waste (HTRW) Remedial Investigation (RI) at the Iona Island Naval Ammunition Depot Formerly Used Defense Site (FUDS), located in Stony Point, Rockland County, New York (FUDS Project Number [No.] C02NY074403) (Figure 1). The work is being performed under Contract No.W912DR-15-D-0014 Delivery Order No. W912DR18F0587, under the oversight of the U.S. Army Corps of Engineers (USACE) Baltimore and New England Districts.

The HTRW RI is being conducted to characterize the nature and extent of hazardous substances in environmental media attributable to past Department of Defense (DoD) activities and evaluate potential risk to human health and ecological receptors. From 9 to 20 March 2020 and from 30 March to 7 April 2020, EA conducted the Phase I HTRW project RI field activities at the Iona Island Naval Ammunition Depot FUDS located in Stony Point, Rockland County, New York, along the west bank of the Hudson River. Phase I field activities were conducted in accordance with the HTRW RI Uniform Federal Policy (UFP) – Quality Assurance Project Plan (QAPP) (EA 2020).

1.2 PROJECT SCOPE

A two-phased approach was employed during this RI to facilitate data collection, evaluation, and discussion. Phase I was conducted in March–April 2020 and included soil sampling within the FUDS boundary (surface soil from 0 to 6 inches [in.] below ground surface [bgs] and shallow subsurface soil from 6 to a maximum of 36 in. bgs or to refusal. In addition, Phase I included a shoreline reconnaissance survey and sediment sampling for total organic carbon (TOC) and grain size. The results of the Phase I investigation are the focus of this DUAR.

The Phase I investigation addressed the following:

- 19 AOCs encompassing the locations/footprints of former buildings/structures where contaminants related to the facilities or from historical processes during the site's commission as an ammunition depot may be present (Figure 2);

- Previous surface and subsurface soil sampling locations where COPCs were detected at concentrations above applicable screening levels (Figure 2); and

- 7 former buildings identified as having potential for exposure risk from remaining explosives residues in environmental media to human and ecological receptors (Figure 2).

Decision units (DUs) were established for onsite sampling locations following the procedures in the UFP-QAPP (EA 2020) (Figure 2). Phase I soil samples were collected within 30 of 32 DUs using incremental sampling methodology (ISM), with samples in each DU collected in triplicate (initial ISM sample plus two additional samples). The analytes to be sampled at each DU were based on previous investigation results and COPCs identified for each AOC. Samples were analyzed for Target Analyte List (TAL) metals, polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (benzene, toluene, ethylbenzene, and xylenes [BTEX]), polychlorinated biphenyls (PCBs), and/or explosives residues.

A shoreline reconnaissance survey was also conducted as part of Phase I (April 6-7, 2020) to identify potential pathways that lead to the shoreline environment, evaluate whether there are barriers to overland transport from Iona Island to the shoreline, and conduct a receptor and resource inventory evaluation. Seven discrete sediment samples were collected as part of the shoreline reconnaissance for analysis of grain size and TOC to identify physical characteristics of sediment and evaluate whether sediments could be a potential "sink" for site-related contaminants (Figure 3).

Background sampling was included in the Phase I investigation to establish regional background metal and PAH concentration ranges in surface and subsurface soil. Eight non-contiguous background DUs were established in Bear Mountain State Park outside the influence of the Iona Island Naval Ammunition Depot FUDS. Single surface soil samples (0-6 in. bgs) were collected from each DU using ISM (Figure 4). Samples were analyzed for TAL metals and PAHs.

1.3 PURPOSE AND ORGANIZATION OF THE DATA USABILITY ASSESSMENT REPORT

This DUAR provides a summary of the quality control (QC) practices employed in the production of definitive level data collected as part of Phase I RI sampling conducted in March–April 2020. The report summarizes the results of data validation and provides an assessment of the usability of the data for the intended purposes. Soil and sediment sampling and analysis and data validation were conducted according to the approved UFP-QAPP (EA 2020). Deviations from the UFP-QAPP are noted in this report.

The organization of the DUAR is as follows:

- ***Section 1 Site Description and Project Scope:*** Provides information regarding the history of the site and scope of the project, and the purpose of the DUAR.

- ***Section 2 Data Management and Reporting:*** Summarizes the sample management and data reporting procedures, and any deviations from the UFP-QAPP.

- ***Section 3 Chemical Data Quality Assessment:*** Summarizes the findings of the data validation and assesses the quality of the data.

- ***Section 4 Chemical Data Usability Assessment:*** Summarizes the usability of the data for each analysis.

- ***Section 5 References.***

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2. DATA MANAGEMENT AND REPORTING

Phase I ISM soil samples and discrete sediment samples were collected in accordance with the standard operating procedures (SOPs) provided in the UFP-QAPP (EA 2020). Each ISM soil sample was analyzed for TAL metals, PAHs, BTEX, PCBs, and/or explosives residues. The discrete sediment samples were analyzed for TOC and grain size. Measurement of sample pH was also conducted.

2.1 SAMPLE MANAGEMENT

Laboratory analytical services for Phase I soil and sediment samples were provided by DoD-certified laboratories:

- Eurofins TestAmerica in St. Louis, Missouri: processing of ISM soil metals (including mercury), Aroclor PCBs, and explosives residue samples via air drying and grinding.
- Eurofins Test America in Denver, CO: analysis of ISM soil metals (including mercury), Aroclor PCBs, and explosives residue samples
- Eurofins TestAmerica, Denver, CO: processing and analysis of ISM soil BTEX samples.

The laboratories logged the samples into their laboratory information management systems and sent the work orders to EA for review and correction of any issues, if there were any (e.g., typos in sample names). Laboratory data were then generated in accordance with the laboratory SOPs listed in Worksheet #23 of the UFP-QAPP and included in Appendix G of the UPF-QAPP (EA 2020).

2.2 DATA REPORTING

The samples covered by this data quality assessment include 119 soil samples and 7 sediment samples, not including QC samples (field and trip blanks). These samples were sent to the laboratory as part of 10 sample delivery groups. Separate laboratory analytical reports were provided for each sample delivery group. Laboratory reports are included in Appendix B of the RI Report.

Data reporting requirements included quality assurance/QC reviews of the data by the laboratory prior to data upload into the FUDSChem database. When the laboratory loaded the staged electronic data deliverables (SEDD) files into FUDSChem, they were automatically checked against the sample chains-of-custody to ensure that the correct sample designations and analyses were included. If any non-conformances were found, the SEDD was corrected and re-checked before accepted into the FUDSChem database.

2.3 DEVIATIONS FROM THE UFP-QAPP

This section details deviations from the UFP-QAPP (EA 2020) that relate to the collection of validated data:

- Decision unit (DU)-08 not sampled – Following mark-out for DU-08 in the field and site reconnaissance conducted on 18 March 2020, numerous rusted and deteriorating 55-gallon drums, deteriorating pallets, piles of roofing shingles, chain-link fencing, and other debris were observed in DU-08. Several empty 55-gallon drums were lying on their sides, while other drums were upright and filled with fluid. The material contained within the drums is not known. Residue indicative of roofing tar was observed on the outside of several drums, and staining was noted on the ground surface. Per discussion with USACE on 24 March 2020, DU-08 was not sampled because it would not be possible to separate metals and PAH contaminants originating from former Building 207, from contaminants originating from drums and other debris observed in DU-08.

- DU-24 not sampled – A downed former electric pole was noted during a reconnaissance on 20 March 2020. The majority of DU-24 is exposed bedrock with little to thin soil cover. Sediment and soil were noted along the northeastern edge of DU-24 off the bedrock outcrop of Round Island; however, this sediment/soil is along the shoreline of the tidally influenced Hudson River. Per a call with USACE on 24 March 2020, DU-24 was not sampled. There is little/no soil available for sampling in the area of the former transformer. Any PCBs that may have been released from former transformers would have been transported via runoff and overland flow across the bedrock outcrop of Round Island to the Hudson River. However, as the Hudson River itself is a PCB source, collecting PCBs from soil/sediment along the Hudson River would not provide information that could be used to evaluate a potential release related to former transformers.

- Subsurface soil was not collected as stated in the UFP-QAPP (EA 2020) at the following DUs, due to refusal: DU-01, DU-02, DU-03, DU-04, DU-05, DU-06, DU-0 7, DU-09, DU-10, DU-11, DU-12, DU-13, DU-14, DU-515, DU-16, DU-22, DU-23, and DU-25. Additionally, at DU-20, the subsurface soil was up to 18 in. deep and at DU-24 the subsurface soil was up to 24 in. deep. The UFP-QAPP stated that subsurface soil would be collected from 6 to 36 in. (EA 2020).

- The ISM soil preparation was sent to Eurofins TestAmerica in St. Louis, Missouri, instead of Eurofins TestAmerica in Denver, Colorado. The change occurred because Eurofins TestAmerica's ISM preparation laboratory in Denver, Colorado, was over capacity at the time of sample collection.

3. CHEMICAL DATA QUALITY ASSESSMENT

This section summarizes the findings of the data validation, assesses whether data quality objectives were achieved, and describes the field and laboratory oversight activities and other measures used to ensure data reliability.

3.1 DATA QUALITY ASSESSMENT AND VALIDATION RESULTS

Table 1 provides a tabular summary that lists all the samples that were submitted to the laboratory, the sample delivery group number, sample depth, matrix, sampling method, validation level, and analysis.

Field triplicates of ISM samples were collected, and one trip blank and one methanol field blank were also collected with the BTEX samples. Laboratory QC samples analyzed included matrix spikes (MSs) and matrix spike duplicates (MSDs), method/preparation and calibration blanks, continuing calibration verification samples, interference check samples, serial dilutions, and laboratory control samples (LCSs).

Laboratory data were validated in accordance with the data validation methods and SOPs provided in the UFP-QAPP (EA 2020). Stage 2B Validation Electronic and Manual (S2BVEM) was completed using the FUDSChem software. Automated Data Review in FUDSChem was used to perform a Stage 2A data validation. The EA Project Chemist and Data Manager then performed a Stage 2B data validation, which included reviewing the Stage 2A validation report against the PDF laboratory report, verifying/modifying qualifiers applied during the Stage 2A review, and manually reviewing QC elements that were not included in the Stage 2A review. Validation was performed in accordance with the DoD Quality System Manual Version 5.3 (2019) and U.S. Environmental Protection Agency (EPA) National Functional Guidelines for Organic and Inorganic Superfund Methods Data Review (EPA 2017a, 2017b). The specific validation procedures are detailed in the validation reports included in Appendix C of the RI Report.

The field and laboratory QC samples listed above were reviewed as part of data validation, and the chain-of-custody records, holding times, instrument performance records, initial calibrations, compound quantitations, and data qualifiers were also reviewed. Sample results, with validation qualifiers and qualifier reason codes, are included in Table 2. The data assessed for precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS) are discussed in the following sections.

3.1.1 Data Validation Qualifiers

The analytical data were qualified and appropriately flagged during data validation. The qualifications were made by assessing the results submitted by the laboratory in terms of the technical requirements of the analytical methods (including QA/QC criteria) and data validation requirements. Qualifiers that were applied during data validation are discussed in detail in each

data validation report. The data usability assessment focused on results that were qualified due to QC issues. The following qualifiers were applied to the reported data (Table 2):

- No qualifier: The analyte was positively identified at the specified numerical value exceeding the LOQ, and no data quality issues necessitating validation were identified
- U: The analyte was not detected at a level greater than or equal to the associated numerical value (LOD or LOQ)
- J: The analyte was positively identified, and the associated numerical value is the approximate concentration of the analyte in the sample
- UJ: The analyte was not detected; however, the associated numerical value (LOD or LOQ) is approximate and may be inaccurate or imprecise
- -: Result may be biased low. May be applied to J or UJ qualified data
- +: Result may be biased high. May be applied to J or UJ qualified data
- R: The data are unusable. The sample results are rejected due to serious deficiencies in meeting the QC criteria. The analyte may or may not be present in the sample.

U qualified data were reported to either the LOQ or the LOD. The laboratory LOD is defined as the lowest concentration for reliable reporting of a non-detect of a specific analyte in a specific matrix with a specific method at 99 percent confidence (DoD 2017). The smallest concentration that produces a quantitative result with known and recorded precision and bias is known as the LOQ (DoD 2017). Instrument-specific detection limits (DLs) (e.g., the smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration with 99 percent confidence [DoD 2017]), as provided for each analyte by the laboratory, are reported along with the LODs and LOQs in the laboratory analytical reports. Non-detect (U qualified) data are typically reported to the LOD. Results that are reported to the LOQ are due to blank contamination, or due to the LOD and LOQ having the same value (e.g., for a few explosives analytes). Note that under the DoD QSM, it is acceptable that the LOD and LOQ are equal in some cases, because the definitions of these two limits yield potential overlap. Results were reported to the LOQ instead of the LOD due to blank contamination and are in accordance with the National Functional Guidelines as indicated on worksheet #36 of the UFP-QAPP (EA 2020). National Functional Guidelines guidance indicates to qualify results less than the LOQ to the LOQ and qualify them as "U."

Analytical results reported at estimated concentrations between the DL and LOQ were qualified as estimated (J) with a qualifier reason code of TR. Various data were also qualified as estimated (J or UJ) during data validation due to minor QC issues as follows:

- MS/MSD RPDs outside control limits (qualifier reason code = D)
- Serial dilutions outside QC limits (qualifier reason code = A)
- Dual column RPDs outside QC limits (qualifier reason code = P1)
- Percent recovery (%R) outside QC limits in LCSs (qualifier reason code = C)
- %R outside QC limits in MS/MSDs (qualifier reason code = M)
- %R outside QC limits in the post digestion spike (qualifier reason code = M)
- Surrogate %R outside QC limits (qualifier reason code = I)
- Percent difference (%D) outside QC limits (qualifier reason code = V2)
- Detections in the laboratory blank (blank contamination) (qualifier reason code = L)
- PAH Extraction outside of the maximum hold time (qualifier reason code = H2).

3.1.2 Measurement Performance Criteria

The following sections present the results of the data quality indicators used to validate and assess the data produced during the project (precision, accuracy/bias, representativeness, completeness, comparability, and sensitivity).

3.1.2.1 Precision

The precision of the analytical data was assessed through calculation of relative percent difference (RPD) for laboratory duplicates and dual columns and through evaluation of serial dilutions. Assessment was performed during data validation, as recorded in the validation reports included in Appendix C of the RI Report. QC deficiencies in laboratory duplicate, dual column, and serial duplicate runs that resulted in qualification of data are summarized below:

- The MS/MSD run on a sample from IINY-DU-19 had RPDs outside QC limits for several PAHs and metals. Results were J qualified due to RPDs outside control limits (qualifier reason code = D; Table 2).

- One iron result from each of 4 DUs (IINY-DU-09, DU-11, DU-14, and DU-19), one magnesium result from each of 4 DUs (IINY-BADU-05, DU-09, DU-10, and DU-19), one calcium result from each of 3 DUs (IINY-DU-09, DU-14, and DU-19), and one vanadium result from IINY-DU-18 were J qualified due to serial dilutions outside QC limits (qualifier reason code = A; Table 2).

- PCB Aroclor 1260 in samples from 4 DUs (IINY-DU-17, DU-19, DU-23, and DU-25) and explosive compounds 2,4-DNT and 1,3,5-trinitrobenzene in samples from IINY-EXDU-01 had dual column RPDs outside QC limits. Results had already been J qualified due to detection below the LOQ (qualifier reason code = TR), and a P1 reason code was added based on the dual column RPDs outside QC limits (Table 2).

Note that the relative standard deviation (RSD) was calculated for detected results for each analyte in each DU where triplicate samples were collected (all DUs except background DUs). RSDs are

presented in Tables 4-1a/b through 4-6a/b. As described in the ITRC guidance for ISM sampling (ITRC 2012a), RSD provides information about measurement precision but does not provide an indication of the accuracy of the estimate of the mean or the 95UCL. Therefore, a comment from the USACE Center of Expertise, provided on 1 August 2019 during preparation of the UFP-QAPP, indicated that an acceptance criterion for the RSD was unnecessary for this project because inferences about contamination are being made using a statistical approach that inherently takes the total measurement variability into account. Because no acceptance criterion was included in the UFP-QAPP, no data were qualified based on RSD.

3.1.2.2 Accuracy and Bias

The accuracy of the analytical data was assessed by comparing the results for spiked samples (MS, MSD, LCS, and post-digestion spikes), field, trip, and laboratory blanks, surrogates, and continuing calibration verifications to the project control limits. Percent recoveries and percent differences, and were within control limits, with the following exceptions.

Data for LCSs and laboratory control spike duplicates are generated to provide information on the accuracy of the analytical method and on the laboratory performance independent of the sample matrix effects. Recoveries of target analytes from the LCS associated with the analysis of all the samples collected during the reporting period were found to be within QC limits with the following exceptions:

- Explosive compounds had %R below QC limits in LCSs associated with samples from 10 DUs (IINY-DU-17, DU-18, DU-19, EXDU-01, EXDU-02, EXDU-03, EXDU-04, EXDU-05, EXDU-06, and EXDU-07). Positive results were J qualified and non-detects were UJ qualified due to %R outside QC limits (qualifier reason code = C; Table 2). These results may have a low bias (indicated by "-" added to qualifier).

Data for the MS/MSD and post digestion spikes are generated to assess the effects of the sample matrix on analytical efficiency and to evaluate the analytical accuracy. QC deficiencies in MS/MSD and post-digestion spike recoveries that resulted in qualification of data are summarized below:

- PAHs had %R outside QC limits in MS/MSDs associated with sample from 4 DUs (IINY-BADU-05, DU-09, DU-19, and DU-20). Results positive were J qualified (qualifier reason code = M). Recoveries for some PAHs were high, and others were low; bias is indicated in Table 2, where available.

- Metals including mercury had %R outside QC limits in MS/MSDs associated with sample from 5 DUs (IINY-BADU-05, DU-09, DU-11, DU-14, and DU-19). Positive results were J qualified (qualifier reason code = M). Recoveries for some metals were high and others were low; bias is indicated in Table 2, where available.

- PCB Aroclor 1260 had %R outside QC limits in the MS/MSD associated with samples from IINY-DU-19. Results had already been J qualified due to detection below the LOQ (qualifier reason code = TR), and a M reason code was added based on the MS/MSD recoveries (Table 2). These results may have a low bias.

- The explosive compound 3,5-Dinitroaniline had %R outside QC limits in the MS/MSD associated with samples from IINY-EXDU-04 and IINY-DU-19. The non-detect results were UJ qualified (qualifier reason code = M; Table 2).

- A few metals had %R outside QC limits in the post digestion spike associated with samples from 4 DUs (IINY-BADU-05, DU-05, DU-10, and DU-19). Positive results were J qualified and non-detects were UJ qualified due to %R outside QC limits (qualifier reason code = M2; Table 2).

Samples, blanks, and laboratory QC samples analyzed for organic compounds are spiked with surrogate compounds prior to extraction. Surrogate recoveries provide a means to evaluate the effects of individual sample matrices on analytical efficiencies. Surrogate recoveries outside QC limits can indicate that the sample matrix impacted analytical efficiency. The specific %Rs reported for each sample are evaluated to assess data quality and usability. QC deficiencies in surrogate compound recoveries that resulted in qualification of data are summarized below:

- PAHs in samples from 11 DUs (IINY-BADU-02, BADU-03, BADU-04, BADU-05, BADU-06, BADU-07, BADU-08, DU-09, DU-16, DU-17, and DU-18) had surrogate %R outside QC limits. Positive results were J qualified and non-detects were UJ qualified due to %R below QC limits but greater than 10 percent (qualifier reason code = I; Table 2). Surrogate recoveries outside QC limits indicated a potential low bias (indicated by "-" added to qualifier). Bias is indicated in Table 2, where available. Sample IINY-BADU-04 had a 0 percent recovery for the surrogate associated with dibenz(a,h)anthracene. The dibenz(a,h)anthracene result was non-detect and was qualified R during validation, indicating that it is not usable, due to the extremely low recovery.

- PCB Aroclors in 3 DUs (IINY-DU-17, DU-18, and DU-19) had surrogate %R outside QC limits. Positive results were J qualified and non-detects were UJ qualified due to %R below QC limits but greater than 10 percent (qualifier reason code = I; Table 2). Possible low bias is indicated for PCB-1260 in one sample each from IINY-DU-17, DU-18 and DU-19 and for total PCBs and PCB-1248 in one sample from IINY-DU-18.

- Explosives in samples from IINY-DU-17 and IINY-DU-18 had surrogate %R outside QC limits. Non-detect results were UJ qualified due to %R outside QC limits but greater than 10 percent (qualifier reason code = I; Table 2).

The stability of the analytical system is monitored by analysis of continuing calibration standards at concentrations near the mid-point of the instrument calibration range. The %D values between the relative response factor in the initial calibration and the relative response factor in the continuing calibration are reviewed to ensure instrument calibration criteria are within method control limits. QC deficiencies in initial and continuing calibration verifications that resulted in qualification of data are summarized below:

- PCB Aroclor %Ds were outside QC limits in continuing calibration verification analyses associated with samples from 3 DUs (IINY-DU-17, DU-18, and DU-19). Positive results were J qualified and non-detects were UJ qualified due to %D outside QC limits (qualifier reason code = V2). No specific bias is associated with this issue. Bias is indicated in Table 2 where available.
-

QA blanks, such as method, field, trip, calibration, and preparation blanks, are prepared to identify any contamination that may have been introduced into the samples either in the field or at the laboratory. No BTEX was detected in the field or trip blank. The purpose of method blank analysis is to determine the presence and magnitude of contamination resulting from laboratory activities. Method blanks that indicate potential contamination during sample preparation or analysis and resulted in qualification of data are listed below:

- Silver was detected in the laboratory blank associated with samples from 6 DUs (IINY-DU-01, DU-02, DU-03, DU-05, DU-09, and DU-10). Results less than the LOQ were U qualified due to the blank contamination (qualifier reason code = L).

3.1.2.3 Representativeness

Representativeness is the measure of the degree to which data accurately and precisely represent a characteristic of a population, a parameter variation at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter that is dependent upon the proper design and implementation of the sampling program and proper laboratory protocol. In order to meet the needs of the data users, project data must meet the measurement performance criteria for sample representativeness specified in the UFP-QAPP Worksheets #12 and #28 (EA 2020). Representativeness of the samples submitted for analysis is ensured by adherence to standard sampling techniques and standard analytical method protocols. Exceedances of maximum holding times that may have affected representativeness and resulted in qualification of data are summarized below:

- Several samples were extracted outside of the maximum hold time for PAH analysis (14 days) due to the time required for ISM preparation prior to extraction. ISM sample drying occurs at room temperature, and the drying time may have been prolonged due to characteristics of the samples, such as texture and moisture content. The samples were extracted within 28 days after collection; and thus, exceeded the maximum hold time by less than a factor of two. Positive results were therefore J qualified and non-detects were

UJ qualified for samples from 14 DUs (IINY-BADU-01, BADU-02, BADU-03, BADU-04, BADU-05, BADU-06, BADU-07, BADU-08, DU-01, DU-03, DU-04, DU-11, DU-12, and DU-13) (qualifier reason code = H2; Table 2). The hold time exceedances are associated with potential low bias (indicated by "-" added to qualifier). However, these exceedances are expected to have only minor potential impacts on PAH data quality, particularly for high molecular weight (HMW) PAHs, which are persistent and not prone to degradation, and therefore not expected to experience a measurable decrease in concentration over a few weeks.

3.1.2.4 Completeness

The completeness goal for this project is 100 percent for each DU. Completeness for each analyte is calculated as the percentage of usable data points, which meet the measurement performance criteria. Rejected sample data, as described above, included 1 dibenz(a,h)anthracene result. Given a total of 71 dibenz(a,h)anthracene results generated and 1 rejected result, the completeness for this analyte is 99 percent. All other analysis achieved 100 percent completeness, achieving the project goal.

3.1.2.5 Comparability

Comparability is the degree to which different methods, data sets, and decisions agree or can be represented as similar. Comparability describes the confidence (expressed qualitatively or quantitatively) that two data sets can contribute to a common analysis and interpolation. In order to meet the needs of the data users, project data must meet the measurement performance criteria for comparability specified in the UFP-QAPP (EA 2020) Worksheets #12 and #28.

The extent to which the analytical data will be comparable depends on the similarity of sampling and analytical methods. This objective is met by using standard methods for sampling and analysis and by following techniques and methods set forth in the UFP-QAPP (EA 2020).

3.1.2.6 Sensitivity

Sensitivity is the capability of a test method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest. Examples of QC measures for determining sensitivity include laboratory fortified blanks, an MDL study, and calibration standards at the quantitation limit.

To meet the needs of the data users, the LODs for non-detects and LOQs for detections need to be less than the project action levels included in Worksheet #15 of the UFP-QAPP (EA 2020). Several results were reported from diluted analysis, and LODs and LOQs were adjusted accordingly for the diluted results. The dilutions were necessary to bring the target analytes within the calibration range. Additionally, the results for internal standards must meet the measurement performance criteria specified in Worksheet #12 of the UFP-QAPP, Tables 12-4 (PAH) and 12-5 (BTEX) (EA

2020). Internal standard recoveries for PAH and BTEX analyses met the method criteria. No sensitivity problems were noted for this Phase I dataset; therefore, the sensitivity objectives set forth in the project UFP-QAPP were met.

3.2 SUMMARY OF VALIDATION RESULTS BY ANALYTE GROUP

The objective of the HTRW RI is to collect environmental analytical data at the Iona Island Naval Ammunition Depot FUDS that are scientifically defensible and representative of site conditions. The Phase I data will be used to evaluate the nature and extent of environmental impact and determine if concentrations of contaminants pose an unacceptable risk to human health and/or ecological receptors. Each DU was sampled for suspected contaminants based on historical sampling results and historical activities as presented in the RI Report.

3.2.1 Explosives

Explosives by Method SW8330B were analyzed at 10 DUs: IINY-DU-17, DU-18, DU-19, EXDU-01, EXDU-02, EXDU-03, EXDU-04, EXDU-05, EXDU-06, and EXDU-07 (Table 1). Explosive results had estimated (J and/or UJ) qualifiers added during data validation for the following reasons: low LCS recoveries (all samples), surrogate recoveries outside QC limits (IINY-DU-17 and DU-18), MS recoveries outside QC limits (IINY-DU-19 and IINY-EXDU-04), and dual column RPDs outside QC limits (IINY-EXDU-01). The remaining J qualifiers for the explosive data are due to trace detects between the LOQ and the DL (qualifier reason code = TR). The only detected results that were qualified during validation were three 2,4,6-trinitrotoluene results that were J qualified due to low LCS recoveries and two results qualified due to high column RPDs that had already been J qualified by the laboratory as trace detects. For surrogate and MS recoveries outside QC limits, only non-detect results were qualified. The total number of explosives results is 663; of these, 232 results were qualified during data validation due to minor QC issues. Of the 232 results qualified during validation, 227 were non-detect results that were UJ qualified to indicate that the LOD or LOQ is estimated. All results with the validation qualifiers and validation reason codes are included in Table 2.

3.2.2 Metals

Metals were analyzed using Methods SW6010C, SW6020A, and SW7471B in samples from 26 DUs: IINY-BADU-01, BADU-02, BADU-03, BADU-04, BADU-05, BADU-06, BADU-07, BADU-08, DU-01, DU-02, DU-03, DU-04, DU-05, DU-06, DU-07, DU-09, DU-10, DU-11, DU-12, DU-13, DU-14, DU-15, DU-16, DU-17, DU-18, and DU-19 (Table 1). Results for calcium, iron, magnesium, and/or vanadium in samples from 6 DUs (IINY-DU-9, DU-10, DU-11, DU-14, DU-18, and DU-19) were J qualified due to serial dilutions outside QC limits. Several metals results for samples from IINY-DU-19 were J qualified due to MS/MSD RPD exceedances. Silver results less than the LOQ were qualified U (non-detect) for samples from IINY-DU-01, DU-02, DU-03, DU-05, DU-09, and DU-10 due to method blank contamination. MS recoveries were outside QC limits for metals in samples associated with IINY-BADU-05, DU-09, DU-11, DU-14,

and DU-19. Some MS recoveries were high, and others were low, leading to a mix of high and low bias for associated results (Table 2). A few metals at BADU-05, DU-05, DU-10, and DU-19 had post digestion spike recoveries outside QC limits. MS and post digestion spike QC issues resulted in J and UJ qualifiers. These MS and post digestion spike recovery issues likely resulted from the complexity of the matrices sampled. The remaining J qualifiers for the metals data are due to trace detects between the LOQ and the DL. The total number of results for metals Method SW6010C is 426 and the total number of qualified results due to minor QC issues is 34 (including 33 detected results for calcium, iron, magnesium, potassium, and sodium that were J qualified and 1 non-detect sodium result that was UJ qualified). The total number of results for metals Method SW6020A is 1,136 and the total number of qualified results due to minor QC issues is 60 (including 16 U qualified silver results and 44 J qualified results). The total number of results for mercury Method SW7471B is 62 and the total number of qualified results due to minor QC issues is 6 (J qualified detects). All results with the validation qualifiers and validation reason codes are included in Table 2.

3.2.3 Polycyclic Aromatic Hydrocarbons

PAHs by Method SW8270D SIM were analyzed at 23 DUs: IINY-BADU-01, BADU-02, BADU-03, BADU-04, BADU-05, BADU-06, BADU-07, BADU-08, DU-02, DU-03, DU-04, DU-05, DU-09, DU-11, DU-12, DU-13, DU-16, DU-17, DU-18, DU-19, DU-20, DU-21, and DU-22 (Table 1). Naphthalene, acenaphthylene, and 2-methylnaphthalene results for samples from IINY-DU-19 were J qualified due to MS/MSD RPDs outside QC limits. Results from IINY-BADU-05, DU-09, DU-19, and DU-20 were J qualified due to MS/MSD recoveries outside QC limits. Results from IINY-BADU-02, BADU-03, BADU-04, BADU-05, BADU-06, BADU-07, BADU-08, DU0-9, DU-16, DU-17, and DU-18 had surrogate recoveries outside QC limits. Results for samples with at least 10 percent surrogate recovery were qualified as estimated (J or UJ). Sample IINY-BADU-04 had a 0 percent recovery in the surrogate for dibenz(a,h)anthracene and the result was rejected during validation. The frequency of MS and surrogate recoveries outside control limits suggests that the project sample matrix interfered with the analysis of the target compounds. Samples from IINY-BADU-01, BADU-02, BADU-03, BADU-04, BADU-05, BADU-06, BADU-07, BADU-08, DU-01, DU-03, and DU-04, DU-11, DU-12, and DU-13 were extracted outside of hold time due to the time required for ISM preparation, and results were J or UJ qualified. These holding time exceedances are expected to have only minor impact on data quality, particularly for the HMW PAHs, which are not prone to degradation. The remaining J qualifiers for the PAH data are due to trace detects between the LOQ and the DL. The total number of PAH results is 1,278 and the total number of results qualified during data validation due to minor QC issues is 660. Of these, 237 were J or UJ qualified solely because of the holding time exceedance, and 143 were J qualified during validation but were also below the LOQ; and therefore, had already been J qualified by the laboratory. Additionally, 1 result was R qualified (rejected) due to a major QC issue. All results with the validation qualifiers and validation reason codes are included in Table 2.

3.2.4 Polychlorinated Biphenyls

PCB Aroclors by Method SW8082A were analyzed at 5 DUs: IINY-DU-17, DU-18, DU-19, DU-23, and DU-25. In samples from IINY-DU-17, DU-19, DU-23, and DU-25, results for PCB-1260 were J qualified due to dual column RPDs outside QC limits. The MS/MSD associated with samples from DU-19 also had recoveries below QC limits for PCB-1260. Samples from IINY-DU-17, DU-18, and DU-19 had surrogate recoveries outside QC limits. Continuing calibration verification %D outside QC limits was associated with samples from IINY-DU-17, DU-18, and DU-19. The remaining J qualifiers for the PCB data are due to trace detects between the LOQ and the DL. The total number of PCB results is 240 and the total number of results qualified during data validation due to minor QC issues is 67 (including 50 UJ qualified non-detects and 17 J qualified results, of which 12 were already J qualified as trace detects). Seven of the 17 PCB results that were J qualified had a potential low bias. All results with the validation qualifiers and validation reason codes are included in Table 2.

3.2.5 Total Organic Carbon

Seven sediment samples were analyzed for TOC by the Walkley Black method. No data were qualified due to QC issues. One J flag was applied due to the result falling between the LOQ and the DL. All results with the validation qualifiers and validation reason codes are included in Table 2.

3.2.6 Benzene, Ethylbenzene, Toluene, and Xylenes

BTEX by Method SW8260B was analyzed at IINY-DU-20 and DU-21. No data were qualified due to QC issues. All sample results were non-detect. All results with the validation qualifiers and validation reason codes are included in Table 2.

4. CHEMICAL DATA USABILITY ASSESSMENT

This section summarizes the usability of the Phase I data based on the data validation findings, the PARCCS data quality assessment, and achievement of data quality objectives.

As stated in Worksheet #11 Project Quality Objective of the UFP-QAPP (EA 2020), the HTRW RI is to collect environmental analytical data at the Iona Island Naval Ammunition Depot FUDS that are scientifically defensible and representative of site conditions to:

- Evaluate the nature and extent of potential impacts associated with former structures and/or operations
- Evaluate potential risks to human health and ecological receptors
- Collect sufficient data to complete a feasibility study, if necessary.

Various data were qualified as estimated (J or UJ) during data validation due to minor QC issues, as summarized in Section 3 and in the table below. Of the 3,848 results that were reported, 1,058 were qualified during validation. Overall, 27.5 percent of the dataset was qualified as estimated due to data quality issues and is considered usable. One result (dibenz[a,h]anthracene at BADU-4) was qualified as R (rejected) due to a major QC issue (0 percent recovery in the surrogate) and is not considered usable. The number of J qualified data in this dataset is relatively high due to the nature of the ISM soil samples (including chemical composition, texture, and moisture content) and the established laboratory procedures and methods that were required for this project, which resulted in analytical interferences as well as extended ISM processing times for some samples. However, based on evaluation against the project DQOs specified in the UFP-QAPP (EA 2020), the Phase I data, with the exception of the one rejected result, are usable for the intended purposes. The potential impacts of data qualified as estimated values will be addressed in uncertainty discussions in the human health and ecological risk assessments.

Summary of Results Qualified During Validation

Analyte Group	Total Results	Rejected Results	Qualified Results	J Qualified Detected Results	Qualified Results Greater than LOQ	Bias of Qualified Results		
						Low Bias	High Bias	Unknown Bias
Metals	1,624	0	100	83	73	28	32	40
PAHs	1,278	1	660	652	544	632	14	14
Explosives	663	0	232	5	3	186	0	46
PCBs	240	0	67	17	5	7	0	60
BTEX	36	0	0	0	0	NA	NA	NA
TOC	7	0	0	0	0	NA	NA	NA

Notes:
NA = Not applicable

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Phase II Data Usability Assessment Report

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Data Usability Assessment Report
Phase II

Hazardous Toxic and Radioactive Waste Project

Remedial Investigation

Iona Island Naval Ammunition Depot
Formerly Used Defense Site
Stony Point, Rockland County, New York

Contract No. 912DR-15-D-0014
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LIST OF ACRONYMS AND ABBREVIATIONS

%D	Percent difference
%R	Percent recovery
AOC	Area of concern
bgs	Below ground surface
CEC	Cation exchange capacity
DL	Detection limit
DoD	Department of Defense
DUAR	Data Usability Assessment Report
DU	Decision Unit
EA	EA Engineering, P.C. and its affiliate EA Science and Technology
EPA	U.S. Environmental Protection Agency
FUDS	Formerly Used Defense Site
HTRW	Hazardous Toxic and Radioactive Waste
in.	inch(es)
ISM	Incremental sampling methodology
LCS	Laboratory control sample
LOD	Limit of detection
LOQ	Limit of quantitation
MS	Matrix spike
MSD	Matrix spike duplicate
mV	Millivolt
NA	Not applicable
PARCCS	Precision, accuracy, representativeness, completeness, comparability, and sensitivity
QAPP	Quality Assurance Project Plan
QC	Quality control
RI	Remedial Investigation

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

RPD	Relative percent difference
RSD	Relative standard deviation
SEDD	Staged Electronic data deliverable
SOP	Standard operating procedure
TAL	Target analyte list
TOC	Total organic carbon
UFP	Uniform Federal Policy
USACE	U.S. Army Corps of Engineers

1. SITE DESCRIPTION AND PROJECT SCOPE

1.1 INTRODUCTION

EA Engineering, P.C. and its affiliate EA Science and Technology (EA) has prepared this Data Usability Assessment Report (DUAR) Phase II in support of the Hazardous Toxic and Radioactive Waste (HTRW) Remedial Investigation (RI) at the Iona Island Naval Ammunition Depot Formerly Used Defense Site (FUDS) (FUDS Project Number [No.] C02NY074403) (Figure 1). The work is being performed under Contract No.W912DR-15-D-0014 Delivery Order No. W912DR18F0587, under the oversight of the U.S. Army Corps of Engineers (USACE) Baltimore and New England Districts.

The Iona Island Naval Ammunition Depot FUDS is located in Stony Point, Rockland County, New York, along the west bank of the Hudson River, The HTRW RI is being conducted at the site to characterize the nature and extent of hazardous substances in environmental media attributable to past Department of Defense (DoD) activities and evaluate potential risk to human health and ecological receptors. A two-phased approach was employed during this RI to facilitate data collection, evaluation, and discussion. Phase I was conducted in March-April 2021 to evaluate the presence/absence and/or nature and extent of hazardous in onsite soil within the FUDS boundary, evaluate the source-pathway-receptor interaction, and evaluate the subsequent risk to terrestrial receptors. Phase II was conducted in April 2022 to close data gaps identified after completion of Phase I, further evaluate contaminant migration pathways to the shoreline environment, evaluate impacts to shoreline media (surface water and sediment), and evaluate the subsequent risk to aquatic receptors.

The results of the Phase II investigation are the focus of this DUAR. Phase II field activities were conducted in accordance with the HTRW RI Uniform Federal Policy (UFP) – Quality Assurance Project Plan (QAPP) Addendum (EA 2022), in conjunction with the HTRW RI UFP-QAPP (EA 2020).

1.2 PROJECT SCOPE

Phase II field activities consisted of onsite soil sampling and onsite and background sediment and surface water sampling.

Phase II includes the following field activities:

- Collection of Incremental sampling methodology (ISM) soil samples from 8 previously established Phase I decision units (DUs) for analysis of physical parameter data (grain size, total organic carbon [TOC], oxidation-reduction potential [ORP], and cation-exchange capacity [CEC]). Samples from each DU were collected in triplicate (initial ISM sample plus two additional samples) (Figure 2);

- Collection of discrete surface water samples from 60 onsite locations for analysis of metals (Figure 3);

- Collection of ISM sediment samples from 3 onsite DUs for analysis of metals and physical parameter data (grain size, TOC, pH, and ORP). Samples from each DU were collected in triplicate (initial ISM sample plus two additional samples) (Figure 4);

- Collection of discrete surface water samples from 40 background locations for analysis of metals (Figure 5);

- Collection of ISM sediment samples from 2 background DUs, each consisting of 8 sampling units (SUs), for analysis of metals and physical parameter data (grain size, TOC, pH, and ORP). Single ISM samples were collected from each SU (Figure 5);

- Collection of discrete onsite shoreline sediment samples for analysis of acid volatile sulfide (AVS)/simultaneously extracted metals (SEM) (Figure 4).

1.3 PURPOSE AND ORGANIZATION OF THE DATA USABILITY ASSESSMENT REPORT

This DUAR provides a summary of the quality control (QC) practices employed in the production of definitive level data collected as part of Phase I RI sampling conducted in March–April 2020. The report summarizes the results of data validation and provides an assessment of the usability of the data for the intended purposes. Soil and sediment sampling and analysis and data validation were conducted according to the approved UFP-QAPP (EA 2020). Deviations from the UFP-QAPP are noted in this report.

The organization of the DUAR is as follows:

- ***Section 1 Site Description and Project Scope:*** Provides information regarding the history of the site and scope of the project, and the purpose of the DUAR.

- ***Section 2 Data Management and Reporting:*** Summarizes the sample management and data reporting procedures, and any deviations from the UFP-QAPP.

- ***Section 3 Chemical Data Quality Assessment:*** Summarizes the findings of the data validation and assesses the quality of the data.

- ***Section 4 Chemical Data Usability Assessment:*** Summarizes the usability of the data for each analysis.

- ***Section 5 References.***

2. DATA MANAGEMENT AND REPORTING

Phase II ISM soil samples and discrete sediment samples were collected in accordance with the standard operating procedures (SOPs) provided in the UFP-QAPP (EA 2020) and UFP-QAPP Addendum (EA 2022). Phase II ISM soil samples were screened in the field for ORP and submitted for offsite laboratory analysis of TAL metals, grain size, TOC, and CEC. Phase II discrete surface water samples were screened in the field for water quality parameters (i.e., pH, temperature, specific conductivity, dissolved oxygen [DO], ORP, turbidity, and salinity) and submitted for offsite laboratory analysis of TAL metals and hardness. Phase II ISM sediment samples were screened in the field for pH and ORP and submitted for offsite laboratory analysis of TAL metals, grain size, and TOC. Phase II discrete sediment samples were submitted for offsite laboratory analysis of AVS/SEM.

Laboratory analytical methods for samples collected during Phase II include the following:

- TAL Metals by U.S. Environmental Protection Agency (EPA) Methods 6010C/6020A
- Mercury by EPA Methods 7470A (water samples) and 7471B (soil samples)
- Hardness by Standard Method (SM) 2340B
- AVS/SEM by SM 4500-S2D and EPA Method 6010D[1]
- Grain size by ASTM International (ASTM) D422[2]
- TOC by Walkley-Black
- CEC by EPA SW-846 Method 9081.

2.1 SAMPLE MANAGEMENT

Laboratory analytical services Phase II were provided by the following laboratories:

- Eurofins TestAmerica Canton, OH: ISM sediment preparation
- Eurofins TestAmerica, Denver, CO: metals analyses (including mercury and hardness)
- Eurofins-Lancaster, PA: AVS/SEM analysis
- Eurofins TestAmerica, Corpus Christi, TX: CEC analysis
- Katahdin Analytical Services, LLC, Scarborough, ME: TOC and grain size analyses.

ISM sample preparation and laboratory analysis of CEC were conducted by laboratories that were not DoD-accredited but had been deemed acceptable by the USACE project chemist. The project team was unable to identify a DoD ELAP accredited laboratory with capacity to perform the ISM processing with ball milling. DoD has not accredited any laboratories for CEC by EPA SW-846

[1] AVS/SEM involves acidification of the sediment to release the AVS. Sulfide from the AVS was analyzed using SM 4500-S2D. SEM liberated during the acidification process were analyzed via EPA Method 6010D.
[2] The most recent version of ASTM-D422 was withdrawn in 2016 because it was not updated within the required period of time. At the time of the Phase II laboratory analysis, ASTM D422 has not yet been replaced, and DoD still accredited labs for ASTM D422. ASTM D422 was used to analyze grain size during Phase I and was used during Phase II for consistency.

Method 9081. Laboratories that are not DoD-accredited were required to follow QA/QC requirements per the DoD Quality Systems Manual (QSM), Version 5.3 (DoD 2019 and DOE 2019) to the extent possible.

The laboratories logged the samples into their laboratory information management systems and sent the work orders to EA for review and correction of any issues, if there were any (e.g., typos in sample names). Laboratory data were then generated in accordance with the laboratory SOPs listed in Worksheet #23 and included in Appendix E of the UPF-QAPP Addendum (EA 2022).

2.2 DATA REPORTING

The samples covered by this data quality assessment include 23 ISM soil samples, 105 discrete surface water samples (including 5 field duplicates), 25 ISM sediment samples, and 10 discrete sediment AVS/SEM samples (including 1 field duplicate). These samples were sent to the laboratories as part of 15 sample delivery groups. Separate laboratory analytical reports were provided for each sample delivery group. Laboratory reports are included in Appendix B of the RI Report.

Data reporting requirements included quality assurance/QC reviews of the data by the laboratory prior to data upload into the FUDSChem database. When the laboratory loaded the staged electronic data deliverables (SEDD) files into FUDSChem, they were automatically checked against the sample chains-of-custody to ensure that the correct sample designations and analyses were included. If any non-conformances were found, the SEDD was corrected and re-checked before being accepted into the FUDSChem database.

Level 4 PDF data packages from the laboratory were also uploaded to the FUDSChem library. Grain size data were not uploaded via SEDD, but instead were included in the PDF laboratory reports uploaded to FUDSChem.

Environmental measurement data (e.g., water quality parameters for surface water, soil and sediment pH) were transcribed from field notes into table format and uploaded to FUDSChem via the data submission tool.

2.3 DEVIATIONS FROM THE UFP-QAPP

This section details deviations from the UFP-QAPP Addendum (EA 2022) that relate to the collection of validated data:

- One Phase II triplicate sample collected from DU-11 (IINY-DU-11C)was screened in the field for pH and ORP. However, the sample was misplaced and was not shipped to the analytical laboratory for analysis of TOC, CEC, and grain size. Laboratory analytical results are not available for this triplicate sample. Results from the two other samples

collected from DU-11 (IINY-DU-11A and IINY-DU-11B) were used to evaluate bioavailability of metals in soil at DU-11.

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3. CHEMICAL DATA QUALITY ASSESSMENT

This section summarizes the findings of the data review and validation, assesses whether data quality objectives were achieved, and describes the field and laboratory oversight activities and other measures used to ensure data reliability.

3.1 FIELD DATA QUALITY ASSESSMENT RESULTS

Field screening data were reviewed and verified to ensure correct reporting of information and completeness. No errors were noted and data are usable for the intended purposes. Detailed findings of the review are provided below.

3.1.1 ISM Soil and Sediment Sample Field Screening Data Quality Review

Soil and sediment pH and ORP field screening results for each DU were compared to evaluate accuracy and precision. No issues were noted with pH data. Inconsistencies were noted for soil ORP in one of three samples collected from DU-07 and for sediment ORP for one of three samples collected from the Iona Island Hudson River shoreline. ORP results for these samples were elevated compared to the replicate readings as follows:

- DU-07: field ORP measurements of 402, 310, and 307 millivolts (mV) (calculated standard hydrogen electrode corrected ORP results were 607, 515, and 512 mV). The 402 mV field screening value (607 mV calculated standard hydrogen electrode corrected ORP value) was elevated compared to the replicate readings. This elevated reading was also outside the range of ORP values for the remaining 14 upland ORP field screening values (field readings of 225 to 322 mV and calculated standard hydrogen electrode corrected ORP values of 430 to 527 mV).

- Iona Island Hudson River shoreline sediment: field ORP measurements of 493, 512, and 754 mV (calculated standard hydrogen electrode corrected ORP results were 698, 717, and 959 mV). The 754 mV field screening value (959 mV calculated standard hydrogen electrode corrected ORP value) was elevated compared to the replicate readings.

Elevated ORP results were considered anomalous. ORP and pH data were not used in any quantitative calculations. Data was used incorporated into a qualitative assessments to evaluate background representativeness and bioavailability of metals in onsite media. The single anomalous ORP readings in soil and sediment did not impact the assessments or change the conclusions for the background representativeness and bioavailability evaluations.

3.1.2 Discrete Surface Water Field Screening Data Quality Review

Surface water pH, temperature, specific conductance, DO, ORP, turbidity, and salinity field screening parameters collected during Phase I and Phase II were reviewed and verified to ensure correct reporting of information and completeness. In addition, water quality parameters for each

of the 20 samples collected within each onsite and background area (AOC #16 – Area D [former Dumping Area], Iona Island Hudson River shoreline, Iona Marsh shoreline, Con Hook Hudson River shoreline, and Con Hook Marsh shoreline) were compared to evaluate accuracy and precision. No errors or issues were noted with the surface water quality parameter dataset.

3.2 LABORATORY DATA QUALITY ASSESSMENT AND VALIDATION RESULTS

Table 1 provides a tabular summary that lists all the samples that were submitted to the laboratory, the sample delivery group number, sample depth, matrix, sampling method, validation level, and analysis.

Field QC samples by media and analyte are summarized in the table below. The quantities collected are consistent with the UFP-QAPP Addendum (EA 2022), with one exception. Although MS/MSDs for CEC were included in the QAPP, the laboratory subsequently indicated that MS/MSDs are not part of the CEC method.

Analytical Method	Matrix	# Discrete Samples	# ISM Decision Units (triplicates)	# ISM Survey Units (1 sample each)	# MS/MSD Pairs	# Field Duplicates
Metals (SW6010C, SW6020A, SW7470A)	Surface Water	100	NA	NA	5	5
Water Hardness (SM2340B)	Surface Water	100	NA	NA	5	5
AVS/SEM	Sediment	9	NA	NA	1	1
Metals (SW6010C, 6020A, SW7471B)	Sediment	NA	3	16	2	NA
TOC (WBLACK)	Sediment	NA	3	16	2	NA
Grain Size (ASTM D422)	Sediment	NA	3	16	NA	NA
Grain Size (ASTM D422)	Soil	NA	8	NA	NA	NA
TOC (WBLACK)	Soil	NA	8	NA	2	NA
CEC (SW9081)	Soil	NA	8	NA	NA	NA

Laboratory QC samples analyzed included matrix spikes (MSs) and matrix spike duplicates (MSDs), laboratory replicates (LR), method/preparation and calibration blanks, continuing calibration verification samples, interference check samples, serial dilutions, and laboratory control samples (LCSs).

Laboratory data were validated in accordance with DoD General Data Validation Guidelines (DoD 2019) and Module 2: Data Validation Procedure for Metals by ICP-OES, using the method

requirements specified in the UFP-QAPP Addendum (EA 2022) and the DoD QSM Version 5.3 (DoD and DOE 2019). Stage 2B Validation Electronic and Manual (S2BVEM) was completed using the FUDSChem software. Automated Data Review in FUDSChem was used to perform a Stage 2A data validation. The EA project chemists then performed a Stage 2B data validation, which included reviewing the Stage 2A validation report against the PDF laboratory report, verifying/modifying qualifiers applied during the Stage 2A review, and manually reviewing QC elements that were not included in the Stage 2A review. Stage 2A validation evaluates sample specific information and Stage 2B evaluates instrument performance as described in the DoD General Data Validation Guidelines (DoD 2019). Validation was performed in accordance with the DoD Quality System Manual Version 5.3 (2021). The specific validation procedures are detailed in the validation reports included in Appendix C of the HTRW RI Report.

The field and laboratory QC samples listed above were reviewed as part of data validation, and the chain-of-custody records, holding times, instrument performance records, initial calibrations, and data qualifiers were also reviewed. Sample results, with validation qualifiers and qualifier reason codes, are included in Table 2. The data assessed for precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS) are discussed in the following sections.

3.2.1 Data Validation Qualifiers

The analytical data were qualified and appropriately flagged during data validation. The qualifications were made by assessing the results submitted by the laboratory in terms of the technical requirements of the analytical methods (including QA/QC criteria) and data validation requirements. Qualifiers that were applied during data validation are discussed in detail in each data validation report. The data usability assessment focused on results that were qualified due to QC issues. The following qualifiers were applied to the reported data (Table 2):

- No qualifier: The analyte was positively identified at the specified numerical value exceeding the LOQ, and no data quality issues necessitating validation were identified

- U: The analyte was not detected at a level greater than or equal to the associated numerical value (LOD)

- J: The analyte was positively identified, and the associated numerical value is the approximate concentration of the analyte in the sample
- UJ: The analyte was not detected; however, the associated numerical value (LOD) is approximate and may be inaccurate or imprecise

- -: Result may be biased low. May be applied to J or UJ qualified data

- +: Result may be biased high. May be applied to J or UJ qualified data

The laboratory LOD is defined as the lowest concentration for reliable reporting of a non-detect of a specific analyte in a specific matrix with a specific method at 99 percent confidence (DoD 2017). The smallest concentration that produces a quantitative result with known and recorded precision and bias is known as the LOQ (DoD 2017). Instrument-specific detection limits (DLs) (e.g., the smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration with 99 percent confidence [DoD 2017]), as provided for each analyte by the laboratory, are reported along with the LODs and LOQs in the laboratory analytical reports. Non-detect (U qualified) data are reported to the LOD.

Analytical results reported at estimated concentrations between the DL and LOQ were qualified as estimated (J) with a qualifier reason code of TR. Various data were also qualified as estimated (J or UJ) during data validation due to minor QC issues as follows:

- MS/MSD RPDs outside control limits (qualifier reason code = D)
- LR RPDs outside control limits (qualifier reason code = D1)
- FD RPDs outside control limits (qualifier reason code = D3)
- Serial dilutions outside QC limits (qualifier reason code = A)
- Sample preservation/collection requirement not met (qualifier reason code = P)
- Improper preparation/extraction (qualifier reason code = P2)
- %R outside QC limits in MS/MSDs (qualifier reason code = M)
- %R outside QC limits in the post digestion spike (qualifier reason code = M2)
- Detections in the laboratory blank (blank contamination) (qualifier reason code = L)
- Exceedance of test hold time (qualifier reason code = H1).

3.2.2 Measurement Performance Criteria

The following sections present the results of the data quality indicators used to validate and assess the data produced during the project (precision, accuracy/bias, representativeness, completeness, comparability, and sensitivity).

3.2.2.1 Precision

The precision of the analytical data was assessed through calculation of relative percent difference (RPD) for laboratory duplicates, field duplicates and serial dilutions. Assessment was performed during data validation, as recorded in the validation reports included in Appendix C of the RI Report. QC deficiencies in laboratory duplicate and serial duplicate runs that resulted in qualification of data are summarized below:

- The MS/MSDs ran on samples from IINY-CHHRS-SU-07-SEDIS, IINY-CHHRS-SW-02, and IINY-IHRS-DU-01A-SEDIS had RPDs outside QC limits for a subset of metals. Results for the parent samples were J qualified due to RPDs outside control limits (qualifier reason code = D; Table 2).

- The LR ran on samples from IINY-DU-04A-SSIS, IINY-DU-04B-SSIS, and IINY-DU-04C-SSIS had RPDs outside QC limits for cation-exchange capacity. Results were J qualified due to RPDs outside control limits (qualifier reason code = D1; Table 2).

- Field duplicate pair IINY-IHRS-SW-04 / IINY-IHRS-SW-FD1 had a RPD outside QC limits for copper, and field duplicate pair IINY-RRDS-FD1/ IINY-RRDS-SED-03 had a RPD outside QC criteria for SEM nickel. Results were J qualified due to RPDs outside control limits (qualifier reason code = D3; Table 2).

- Results for samples IINY-DUMP-SW-18, IINY-IHRS-DU-01A, and IINY-RRDS-SED-01, and IINY-CHHRS-SU-07were J qualified due to serial dilutions outside QC limits for metals and SEM (qualifier reason code = A; Table 2).

Note that the relative standard deviation (RSD) was calculated for detected results for each analyte in each DU where triplicate samples were collected and for background DUs where multiple SUs were sampled. RSDs for Phase II data are presented in Tables 5-2a, 5-5a, 6-12, 6-13, and 6-16 of the RI Report. As described in the current ITRC guidance for ISM sampling (ITRC 2020), RSD provides information about measurement precision but does not provide an indication of the accuracy of the estimate of the mean or the 95UCL. Therefore, a comment from the USACE Center of Expertise, provided on 1 August 2019 during preparation of the Phase 1 UFP-QAPP, indicated that an acceptance criterion for the RSD was unnecessary for this project because inferences about contamination are being made using a statistical approach that inherently takes the total measurement variability into account. Because no acceptance criterion was included in the UFP-QAPP, no data were qualified based on RSD.

3.2.2.2 Accuracy and Bias

The accuracy of the analytical data was assessed by comparing the results for spiked samples (MS, MSD, LCS, and post-digestion spikes), field, trip, and laboratory blanks, surrogates, and continuing calibration verifications to the project control limits. Percent recoveries and percent differences, and were within control limits, with the following exceptions.

Data for LCSs and laboratory control spike duplicates are generated to provide information on the accuracy of the analytical method and on the laboratory performance independent of the sample matrix effects. Recoveries of target analytes from the LCS associated with the analysis of all the samples collected during the reporting period were found to be within QC limits, and no qualifiers were applied for LCS recovery issues.

Data for the MS/MSD and post digestion spikes are generated to assess the effects of the sample matrix on analytical efficiency and to evaluate the analytical accuracy. QC deficiencies in MS/MSD and post-digestion spike recoveries that resulted in qualification of data are summarized below:

- Metals and SEM had %R outside QC limits in MS/MSDs associated with sediment samples IINY-TWS-SED-01, IINY-CHHRS-SU-07-SEDIS, IINY-CHMS-SU-02-SEDIS, and IINY-IHRS-DU-01A-SEDIS. Detected results for the affected metals were J qualified (qualifier reason code = M). Recoveries for some metals were high, and others were low; corresponding bias is indicated in Table 2.

- Metals (manganese and zinc) had a %R below QC limits in a MS/MSD associated with surface water sample IINY-CHMS-SW-17. The detected results for these two metals were J qualified (qualifier reason code = M). Low bias based on low %R is indicated in Table 2.

- TOC had a %R above QC limits in a MS/MSD associated with soil sample IINY-DU-19C-SSIS. The result for TOC in this sample was J qualified (qualifier reason code = M). High bias based on high %R is indicated in Table 2.

- Lead had a post spike %R outside QC limits for sediment sample IINY-IHRS-DU-01A-SEDIS, and SEM nickel and/or zinc had post spike %R outside QC limits for sediment samples IINY-RRDS-SED-01 and IINY-RRDS-FD1. Results for the affected metals were J qualified (qualifier reason code = M2).

Samples, blanks, and laboratory QC samples analyzed for organic compounds are spiked with surrogate compounds prior to extraction. Surrogate recoveries provide a means to evaluate the effects of individual sample matrices on analytical efficiencies. Surrogate recoveries outside QC limits can indicate that the sample matrix impacted analytical efficiency. The specific %Rs reported for each sample are evaluated to assess data quality and usability. There were no QC deficiencies in surrogate compound recoveries that resulted in qualification.

The stability of the analytical system is monitored by analysis of continuing calibration standards at concentrations near the mid-point of the instrument calibration range. The %D values between the relative response factor in the initial calibration and the relative response factor in the continuing calibration are reviewed to ensure instrument calibration criteria are within method control limits. There were no QC deficiencies in initial and continuing calibration verifications that resulted in qualification.

QA blanks, such as method, calibration, and preparation blanks, are prepared to identify any contamination that may have been introduced into the samples at the laboratory. The purpose of method blank analysis is to determine the presence and magnitude of contamination resulting from laboratory activities. Method blanks that indicate potential contamination during sample preparation or analysis and resulted in qualification of data are listed below:

- Metals were detected in the laboratory blanks associated with analysis of surface water samples. Results less than the LOQs were U qualified due to the blank contamination and results greater than the LOQ but less than 5 times the blank detection were J qualified with a high bias (qualifier reason code = L).

3.2.2.3 Representativeness

Representativeness is the measure of the degree to which data accurately and precisely represent a characteristic of a population, a parameter variation at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter that is dependent upon the proper design and implementation of the sampling program and proper laboratory protocol. In order to meet the needs of the data users, project data must meet the measurement performance criteria for sample representativeness specified in the UFP-QAPP Addendum Worksheets #12 and #28 (EA 2022). Representativeness of the samples submitted for analysis is ensured by adherence to standard sampling techniques and standard analytical method protocols. Exceedances of maximum holding times that may have affected representativeness and resulted in qualification of data are summarized below:

- Sediment samples were extracted outside of the maximum hold time for acid volatile sulfide (AVS). AVS extractions and analyses were performed outside the 7-day hold time. The AVS results were non-detect and were UJ qualified (qualifier reason code = H1; Table 2).

Issues with laboratory preparation of samples that could affect the representativeness of the samples were also identified, as summarized below:

- TOC results for several background ISM sediment samples from Con Hook were qualified due to improper preparation at the laboratory. The ISM samples were dried and ground at the laboratory and then subsampled per ISM protocols to produce 9-11 gram sample aliquots that were provided for TOC analysis. However, those aliquots had to be further subsampled prior to analysis due to high carbon content; this subsampling was performed by manually mixing the sample and then taking a grab sample, rather than in accordance with ISM protocols. Sample results were J qualified due to the additional subsampling, combined with the fact that field triplicates were not collected for the background samples; triplicates could have allowed evaluation of representativeness (qualifier reason code = P2; Table 2).

- The cation exchange capacity (CEC) results for soil samples were qualified due to concerns regarding how sample processing at the laboratory may have affected the results. Initially, the samples had to be reanalyzed due to an error in CEC preparation. When the results of the reanalysis were reviewed, the project team identified some uncertainty in the results based on the ISM sample preparation methodology. Specifically, although it was not expected that the air drying would impact the results, there was concern that the drying process could have affected the cation exchange properties of the soil. Therefore, CEC results for all samples were J qualified as estimated concentrations (qualifier reason code = P; Table 2).

3.2.2.4 Completeness

The completeness goal for this project is 100 percent for each DU. Completeness for each analyte is calculated as the percentage of usable data points relative to all data obtained. There were no rejected sample data; therefore, the analytical completeness for the Phase II data is 100 percent.

One triplicate ISM sample (IINY-DU-11C-SSIS) planned for analysis of TOC, CEC, and grain size was collected but was not analyzed. Means for these parameters were calculated using data from samples IINY-DU-11A-SSIS and IINY-DU-11B-SSIS. The overall completeness for TOC, CEC, and grain size data is 96%.

3.2.2.5 Comparability

Comparability is the degree to which different methods, data sets, and decisions agree or can be represented as similar. Comparability describes the confidence (expressed qualitatively or quantitatively) that two data sets can contribute to a common analysis and interpolation. In order to meet the needs of the data users, project data must meet the measurement performance criteria for comparability specified in the UFP-QAPP Addendum (EA 2022) Worksheets #12 and #28.

The extent to which the analytical data will be comparable depends on the similarity of sampling and analytical methods. This objective is met by using standard methods for sampling and analysis and by following techniques and methods set forth in the UFP-QAPP Addendum (EA 2022).

3.2.2.6 Sensitivity

Sensitivity is the capability of a test method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest. Examples of QC measures for determining sensitivity include laboratory fortified blanks, an MDL study, and calibration standards at the quantitation limit.

To meet the needs of the data users, the LODs for non-detects and LOQs for detections need to be less than the project action levels included in Worksheet #15 of the UFP-QAPP Addendum (EA 2022). Several results were reported from diluted analysis, and LODs and LOQs were adjusted accordingly for the diluted results. The dilutions were necessary to bring the target analytes within the calibration range. Additionally, the results for internal standards must meet the measurement performance criteria specified in Worksheet #12 of the UFP-QAPP Addendum. No sensitivity problems were noted for this Phase II dataset; therefore, the sensitivity objectives set forth in the project UFP-QAPP Addendum were met. Some metals were reported with LOQs greater than the project action limits, consistent with the UFP-QAPP Addendum. Uncertainties associated with these cases are addressed in Section F of the Human Health Risk Assessment (Appendix F to the RI Report) and Section 7.2.2 of the Ecological Risk Assessment (Appendix G).

3.3 SUMMARY OF VALIDATION RESULTS BY ANALYTE GROUP

The objective of the HTRW RI is to collect environmental analytical data at the Iona Island Naval Ammunition Depot FUDS that are scientifically defensible and representative of site conditions. The Phase II data will be used to evaluate the nature and extent of environmental impact and determine if concentrations of contaminants pose an unacceptable risk to human health and/or ecological receptors. The Phase II sampling was conducted to fill data gaps identified after completion of the Phase I sampling, as described in the QAPP Addendum (EA 2022).

3.3.1 Acid Volatile Sulfide

The sediment samples analyzed for AVS are indicated in Table 1. Sediment samples were extracted and analyzed outside the 7-day hold time. The results were non-detect and were UJ qualified. The total number of results for AVS is 10 and the total number of qualified results due to minor QC issues is 10. All results with the validation qualifiers and validation reason codes are included in Table 2.

3.3.2 Metals and Water Hardness

Metals were analyzed using Methods SW6010C, SW6010D, SW6020A, SW7471B, and SW7470A. Water hardness was calculated using Method SM2340B, from the results for calcium and magnesium by SW6010C. The samples analyzed by these methods are indicated in Table 1. Various results for metals, and one associated result for water hardness, were J qualified due to MS/MSD RPDs and %R, serial dilution %R, and field dup RPDs outside control limits. Several metals were detected in laboratory blanks associated with the surface water samples. Results less than the LOQ were U qualified due to the blank contamination and results greater than the LOQ but less than 5 times the blank detection were J qualified with a high bias as indicated on Table 2. The total number of results for metals Method SW6010C is 680 and the total number of qualified results due to minor QC issues is 85. The total number of SEM results for metals Method SW6010D is 50 and the total number of qualified results due to minor QC issues is 11. The total number of results for metals Method SW6020A is 2080 and the total number of qualified results due to minor QC issues is 53. The total number of results for mercury Method SW7471B is 25 and the total number of qualified results due to minor QC issues is 0. The total number of results for mercury Method SW7470A is 105 and the total number of qualified results due to minor QC issues is 0. The total number of results for hardness Method SM2340B is 105 and the total number of qualified results due to minor QC issues is 1. All results with the validation qualifiers and validation reason codes are included in Table 2.

3.3.3 Cation Exchange Capacity

CEC was analyzed using Method SW9081. Initial CEC analytical results for Phase II soil reported by the analytical laboratory (Eurofins TestAmerica, Corpus Christi, TX) ranged from 1,500 to 1,800 milliequivalents per 100 grams of soil (meq/100g). Typical values should be 0 to 100

meq/100g. These results were deemed abnormally high by several orders of magnitude by the EA ecological risk assessor. The analytical laboratory was informed of the issue with analytical results, which made the initial data unusable. The analytical laboratory conducted an internal audit and identified a discrepancy stemming from incorrect labeling for reagents used during the preparation of the samples. A corrective action was implemented, CEC samples were re-analyzed, and results were presented in a revised laboratory report.

The soil samples analyzed for CEC are listed in Table 1. CEC results were also qualified due to issues with sample handling. Two results for CEC were also qualified J due to lab replicate RPD outside QC limits. The total number of results for CEC is 23 and the total number of results qualified due to sample handling issues that could have affected results is 23. All results with the validation qualifiers and validation reason codes are included in Table 2.

3.3.4 Total Organic Carbon

TOC was analyzed using the Walkley-Black (WBLACK) method. The soil and sediment samples analyzed for TOC are listed in Table 1. One soil sample result for TOC was qualified J due to MS/MSD %R outside QC limits. TOC results for several background sediment samples were also qualified J due to improper preparation at the laboratory. The total number of results for TOC is 48 and the total number of qualified results due to minor QC issues is 17. All results with the validation qualifiers and validation reason codes are included in Table 2.

4. CHEMICAL DATA USABILITY ASSESSMENT

This section summarizes the usability of the Phase II data based on the data validation findings, the PARCCS data quality assessment, and achievement of data quality objectives.

As stated in Worksheet #11 Project Quality Objective of the UFP-QAPP (EA 2020), the purpose of the HTRW RI is to collect environmental analytical data at the Iona Island Naval Ammunition Depot FUDS that are scientifically defensible and representative of site conditions to:

- Evaluate the nature and extent of potential impacts associated with former structures and/or operations
- Evaluate potential risks to human health and ecological receptors
- Collect sufficient data to complete a feasibility study, if necessary.

Various data from Phase II were qualified as estimated (J or UJ) or non-detect (U) during data validation due to minor QC issues, as summarized in Section 3 and in the table below. Of the 3,126 results that were reported, 200 were qualified during validation due to minor QC issues. Overall, 6.4 percent of the dataset was qualified due to data quality issues. Reasons for data qualification included sample preparation and handling issues encountered during analyses by multiple laboratories, matrix interferences, and detections of metals in laboratory blanks associated with surface water samples. No results were rejected during data validation. Based on evaluation against the project DQOs specified in the UFP-QAPP Addendum (EA 2022), the Phase II data, as qualified are usable for the intended purposes. The potential impacts of data qualification will be addressed in uncertainty discussions in the human health and ecological risk assessments.

Summary of Results Qualified During Validation

Method/Analyte Group	Total Results	Rejected Results	Qualified Results	J Qualified Detected Results	Qualified Results Greater than LOQ	Bias of Qualified Results		
						Low Bias	High Bias	Unknown Bias
SM2340B/Water Hardness	105	0	1	1	1	0	0	1
AVS	10	0	10	0	0	0	0	10
SW6010C/Metals	680	0	85	5	12	0	7	78
SW6010D/SEM	50	0	11	11	10	4	0	7
SW6020A/Metals	2080	0	53	32	27	16	4	33
SW7470A/SW7471B/ Mercury	130	0	0	0	0	0	0	0
SW9081/CEC	23	0	23	23	23	0	0	23
WBLACK/TOC	48	0	17	17	17	0	1	16

5. REFERENCES

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Figures

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Tables

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D3
Phase II FUDSChem Data Usability Assessment Output

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Data Usability Summary

Facility:	C02NY0744-02, Iona Island Naval Ammunition Depot, SI
Event:	Iona Island Naval Ammunition Depot, HTRW Sampling Phase II
Guidance Document:	UFP-QAPP, Remedial Investigation, Iona Island Naval Ammunition Depot, Stony Point, NY, January 2020
Prime Contractor:	EA Engineering Science & Technology, Inc.
Organization Preparing DUA:	USACE, New England District
DUA Release Date:	2022-11-30
Project Manager:	ERIN KIRBY
Contract Laboratory(ies):	Eurofins Lancaster Laboratories Environmental, LLC, Lancaster, PA | Eurofins Environment Testing TestAmerica, Corpus Christi, TX | Eurofins Environment Testing TestAmerica, Arvada, CO | Katahdin Analytical Services, Scarborough, ME
Data Review Contractor:	EA Engineering Science and Technology, Inc | EA Engineering Science, and Technology | EA Engineering, Science, and Technology
Data Review Level:	S2BVEM
Sample Collection Date Range:	2022-04-18 to 2022-09-28

SDG	A2340B	AVS	SW6010C	SW6010D	SW6020A	SW7470A	SW7471B	SW9081	WBLACK
280-161283-1_52_2a_FUDSChem		X		X					
280-161296-2_52_2a_FUDSChem								X	
280-161297-1_52_2a_FUDSChem			X		X		X		
280-161368-1_52_2a_FUDSChem			X		X	X			
280-161368-2_52_2a_FUDSChem	X								
280-161371-1_52_2a_FUDSChem			X		X	X			
280-161371-2_52_2a_FUDSChem	X								
280-161477-1_52_2a_FUDSChem			X		X		X		
280-161508-1_52_2a_FUDSChem			X		X	X			
280-161508-2_52_2a_FUDSChem	X								
280-161508-3_52_2a_FUDSChem			X		X	X			
280-161508-4_52_2a_FUDSChem	X								
280-161508-5_52_2a_FUDSChem			X		X	X			
280-161508-6_52_2a_FUDSChem	X								
IONA-1									X
SP2022									X
SP2145									X

Data Usability Summary

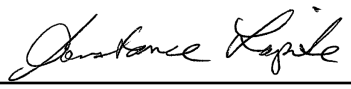
QA objectives for measuring data are expressed in terms of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS). The QA objectives provide a mechanism for ongoing control and evaluating and measuring data quality throughout the project.

A review of the collected data is necessary in order to identify if data measurement objectives established in the seven-step data quality objective (DQ.O) process have been met. In general, the following data measurement objectives were considered:

•Specification of particular analytical method and reporting detection limit requirements
•Identification of the appropriate laboratory analytical QC requirements
•Verify if appropriate levels of other PARCCS criteria for the data has been met
•Delineation of specific sample-handling issues or other project-specific issues

The data validation review of the QA objectives verifies if the collected data are of sufficient quality to support their intended use.

A total of 0 results (0.00 %) out of the 3126 results (sample and field QC samples) reported have had qualifiers modified during this Data Usability Assessment and 0 results (0.00 %) have been rejected or deemed a serious deficiency. 1980 results were qualified during the data review process. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count.



2022-11-30

Reviewed by , USACE, New England District

Data Usability Summary

No qualifiers applied

No qualification led to rejection of the data set.

Reason Code Definitions

Code	Definition
A	Serial dilution
D	MS RPD
D1	Lab Replicate RPD
D3	Field Duplicate RPD
H1	Test Hold Time
L	Lab Blank
M	MS Recovery
M2	Post Spike
P	Sample preservation/collection requirement not met.
P2	Improper preparation/extraction
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

Sample Type Code and Definitions

Type	Definition
BD	Blank Spike Duplicate
BS	Blank Spike
FD	Field Duplicate
FT	Field Triplicate
LB	Laboratory Blank
LR	Laboratory Replicate
MS	Matrix Spike

Data Usability Summary

N	Normal
SD	Matrix Spike Duplicate

Data Usability Summary

Narrative Comments

Iona Island Phase II Sampling April 2022

Review Questions	Yes	No	NA	Comment
Review Objective/Sampling Design				
Is the Final UFP QAPP associated with the event present in the Planning folder of the FUDSChem library for the project?	•			
Were key outputs defined during systematic planning (e.g.,PQOs or DQOs and MPCs) reviewed to make sure they are still applicable? Refer to the UFP QAPP for the projects, and to the worksheets found in REPORTS | UFP QAPP Worksheets.	•			
Refer to summary reports found in REPORTS | Event Tracking Reports | Event Status: All Data Types, Event Status: Chemistry Detail, and Unplanned Samples to review planned and unplanned samples and test methods.	•			ISM triplicate sample IINY-DU-11C-SSIS-041822 was collected, but the laboratory reported that it was not received; it was either lost during packing coolers or lost by the laboratory. CEC and TOC data for this triplicate sample are the only data that were planned but are not part of the final data set. In the FUDSChem Event Tracking: All Data Types report, there are 6 sediment samples shown as missing Environmental Measurement Information (EMI). These 6 sediment samples were collected for AVS/SEM analysis only and EMI was not planned for these locations. In the FUSDChem Chemistry Detail Report there are a few lab QC samples listed as awaiting data. These include a lab replicate for CEC, which was performed on a different sample, and MD/MSDs for water hardness, which were not required.
Was the sampling design reviewed for consistency with stated objectives? Refer to MAPS | Export to Google Earth to review sampling locations.	•			The sampling design was developed with the project team and is consistent with stated objectives. All Iona samples were collected at the planned locations/DUs. For background at Con Hook, the surface water sample locations had to be moved from planned locations due to lack of water at the planned locations. The field team moved samples to locations that had water and were consistent with observed conditions in Iona Marsh. Revised sampling locations are consistent with project objectives for background data collection.
Were data quality indicators (DQIs) from the DoD QSM used for this event? Review and discuss any DQIs that deviated from the DoD QSM. Refer to the UFP QAPP and to REPORTS | Environmental Setup Reports | Analyte Criteria, which highlights items that were modified from the original templates based on the DoD QSM.	•			DQIs from DoD QSM 5.3 were used for this event where available, as described in the QAPP.
Review Data				
If Event Planning was performed in FUDSChem, were all samples and measurements identified in REPORTS | Event Tracking Reports | Event Status: All Data Types completed and approved (all checked cells are green)?		•		There are 6 sediment samples shown in the Event Status: All Data Types Report as missing EMI. These 6 sediment samples were collected for AVS/SEM analysis only and EMI was not planned for these locations.

Data Usability Summary

Review Questions	Yes	No	NA	Comment
Review Data				
If Event Planning was performed in FUDSChem, were all samples identified in REPORTS | Event Tracking Reports | Event Status: Chemistry Detail collected and approved (all checked cells are green), or notated to explain discrepancies?	•			The Event Status: Chemistry Detail report shows MS/MSDs for water hardness as Awaiting Lab Data. However, this is a calculation method and does not require a MS/MSD. The Chemistry Detail report also indicates sample IINY-DU-11C-SSIS-041822 is awaiting lab data for CEC and TOC. This sample was lost while packing coolers or at the lab, and was therefore not analyzed.
If Event Planning was performed in FUDSChem, were all samples identified in REPORTS | Event Tracking Reports | Unplanned Samples reviewed to ensure correct completeness calculations?	•			No samples are listed in the unplanned samples report.
Were deviations from planned activities (e.g., number and locations of samples, holding time exceedances, damaged samples, non-compliant PT sample results, and SOP deviations) reviewed to determine their impacts on the data usability? If Event Planning was performed in FUDSChem, refer to REPORTS | Data Usability Assessment Reports | Project Completeness.	•			As indicated above, CEC and TOC data for one ISM triplicate sample are the only data that were planned but are not part of the final data set. Project completeness was 99.9%.
Have all Location related placeholders, such as centroid coordinates, been resolved? Review REPORTS | Data Assessment Reports | Locations.	•			
Were laboratory and data review reports for each Sample Delivery Group (SDG) associated with the event present in the FUDSChem library for the project? Refer to the list of SDGs listed on the cover page of the Data Usability Assessment Summary Report found under REPORTS | Data Usability Assessment Reports.	•			
Were all data review reports reviewed? Look for patterns, trends, and anomalies (e.g., unexpected results). Refer to the Data Review Reports in the project library as well as the event summary reports located in REPORTS | Data Usability Assessment Reports.	•			No anomalies were identified.
Were all data review reports associated with an approved eQAPP? Review the footer of the Data Review report in the Library to identify the version of the eQAPP that was used.	•			
Were there any implications of unacceptable QC sample results and does this impact sample results? If so, did any qualifiers require revision using the Sample Qualification tab of this interface?		•		Data were qualified as appropriate during data validation. No additional revision of qualifiers was required as part of this assessment.
Were sensitivity requirements met, as compared to regulatory Project Action or Screening Limits? Review REPORTS | Data Usability Assessment Reports | Sensitivity Summary.	•			LOQs were less than PALs except for certain metals in surface water, consistent with the QAPP.
Were any sample results recommended for rejection during validation (X qualified)? If so, have all X qualifiers been revised to R or J using the Sample Qualification tab of this interface?		•		
Were all LTM related parameters required for the project, such as groundwater measurements, environmental parameters, and well screen intervals found to be complete and correctly reported?			•	
Have all sections of the Dashboard linked Project Tracking Report been documented as complete?	•			

Data Usability Summary

Review Questions	Yes	No	NA	Comment
Document Usability/Draw Conclusions				
Based on the previous 'Review Data' documentation, are there any limitations on the use of the data associated with this event?		•		
Describe the conclusions reached during this Data Usability Assessment.	•			All data are usable as reported.
Lessons Learned/Recommendations				
Were any Program level Lessons Learned identified? (e.g., SW8330 was not the best fit for this site and MS/MS should be considered)	•			The lack of DoD certification for CEC analysis resulted in a lot of back and forth with the lab and minimal QC reporting. The lab reported unusable results with the first deliverable, but a corrective action was completed and the laboratory will conduct additional QC in the future.
Were any Project level Lessons Learned identified? (e.g., ISM sampling resulted in anomalies to be resolved in the future, or current locations not comparable to historical data)	•			CEC results were inconsistent with real-world values. The laboratory corrective action included review of results for reasonableness relative to these values, but it would avoid delay if validators are also made aware of expected ranges. Recommend either noting these in the QAPP or adding the question to the checklist for validation.
Are there any additional items associated with this sampling event that need clarification?		•		
Were any Sample level Lessons Learned identified? (e.g., a particular well may be expected to be dry in the future)		•		Conditions encountered in the field were appropriately accounted for in the QAPP (tidal influences on the shoreline, needing a boat to access Con Hook, etc.).

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Appendix E

Shoreline Reconnaissance Memorandum

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Appendix E

Shoreline Reconnaissance Memorandum

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15 April 2020

TECHNICAL MEMORANDUM

TO: Cheryl Montgomery, USACE ERDC
Erin Kirby, USACE NAE

FROM: Tom King, PWS, EA
Melissa Beauchemin, EA
Tim Reese, EA

CC: Todd Beckwith, USACE NAB
Dan Hinckley, EA
Amanda Kohn, EA

SUBJECT: Iona Island Shoreline Reconnaissance Survey

On 6-7 April 2020, two scientists from EA Engineering, Science, and Technology, Inc., PBC (EA) conducted a Shoreline Reconnaissance Survey at the Iona Island Naval Ammunition Depot, Formerly Used Defense Site. The project site is located in Stony Point, Rockland County, New York (Figure 1). Prior to conducting the survey, four "Recon Areas" were established (Figure 2) in the Hazardous Toxic and Radioactive Waste (HTRW) Remedial Investigation (RI) Uniform Federal Policy (UFP) - Quality Assurance Project Plan (QAPP) for the project site (EA, 2020). These areas include:

- Area 1 – Hudson River Shoreline
- Area 2 – Iona Marsh Shoreline
- Area 3 – Western Shoreline between Iona and Round Island
- Area 4 – CSX Railroad Tracks (West and East side)

In addition to surveying the four identified shoreline Recon Areas, EA personnel also generally characterized the upland conditions throughout Iona and Round Islands and conducted a reconnaissance of potential background sediment sampling locations.

The purpose of the Shoreline Reconnaissance Survey was to identify potential areas of sediment accumulation that could be suitable for sampling along the shoreline, identify and document habitat areas for potential ecological receptors, and identify potential preferential pathways to the shoreline from the upland portion of the island.

Should the results of the Phase I soil sampling investigation on the uplands portion of Iona Island indicate source-pathway-receptor interaction, including a pathway from Iona Island to the shoreline, potential habitat and/or receptors, and if physical parameters indicate a sink of contaminants, then sediments samples will be collected for chemical parameters as part of the Phase II investigation to evaluate potential site impacts to the Iona Island shoreline that are representative of significant habitat, could present a potential exposure pathway to human or ecological receptors, and could potentially be impacted by site-related contaminants.

During the survey, EA personnel traversed the shoreline areas on foot to identify potential areas of interest. EA marked areas of interest with orange and white survey flagging which were also recorded with a sub-meter accurate GPS unit. The areas of interest were geo-referenced on an aerial photograph provided in Attachment A (Figure 3). Photographs of key features are presented in Attachment B and the location of each photograph was mapped on Figure 4.

Area 1 – Hudson River Shoreline

Recon Area 1 consists of the shoreline along the Hudson River, which is located on the east side of Iona Island. The majority of the shoreline in this Recon Area consists of a stone river wall which was measured as approximately 6 feet in height (Photo 5). EA identified approximately 1,100 feet of river wall, although the wall is not contiguous along the shoreline—three large breaks in the wall were identified where the wall has partially collapsed (Photo 6). Additionally, small gaps between the stones were also observed along the length of the wall where the Hudson River passes through the wall at high tide and forms pockets of water behind the wall. EA observed large areas of cobble and boulder-sized stone at the northern and southern ends of the river wall as well as at the identified wall breaks. The large stones were mostly submerged during high tide but exposed during low tide (Photos 1 and 2). EA identified amphipods and aquatic snails on the underside of many of the large stones when flipped over (Photos 3 and 4). However, there was little silty or fine sediment in this area, with the majority of the substrate consisting of cobble and course-grained sand.

The majority of the area along the river wall consists of exposed bedrock (Photo 11) and gravel with the exception of some small pockets of sediment deposition. EA identified three small distinct areas of sediment deposition along the shoreline of Recon Area 1 (Photos 14 and 17). Each of these areas was identified for sediment sampling for grain size and total organic carbon (TOC). Sediment sampling was conducted on 7 April 2020.

EA also identified 6 potential outfall pipes along the river wall area of Recon Area 1. Pipe 1 was identified as an 18-inch concrete pipe located on the northern end of the river wall (Photo 6). This outfall pipe extends approximately 8 feet into the Hudson River during high tide. Pipe 2 was identified as a 12-inch steel pipe located in the central portion of Recon Area 1, near the historic causeway/pier (Photo 8). Additional steel piping and cables were observed in this area. It was unclear during the survey if this 12-inch pipe was part of the causeway road infrastructure (conduit piping) or an outfall discharge pipe. Approximately 30 feet south of Pipe 2, three additional discharge pipes were observed—two 8-inch steel pipes were identified in the wall and one 10-inch terracotta pipe was identified partially exposed in the ground above the wall (Photos 9 and 10). Lastly, Pipe 3 is a 14-inch concrete pipe identified at the southern end of the wall (Photo 12).

The pipes were identified as potential preferential pathways leading to the shoreline although their origins could not be identified at the time of the field survey. Based on the locations of mapped former buildings/structures identified on Figure 2, Pipes 1 and 3 appear to be in the areas of former buildings/structures. Pipe 2 does not appear to be in an area with former buildings/structures.

Area 2 – Iona Marsh Shoreline

Recon Area 2 consists of the shoreline area along the west side of Iona Island. This area is divided by a railroad embankment which supports an active CSX rail line. The western side of the railroad tracks and south of the entrance road consists of a tidal marsh (Photo 23) dominated by cattails (*Typha spp.*); the area east of the railroad tracks (Photo 18) is dominated by an extremely dense monotypic stand of common reed (*Phragmites australis*). The western side of the railroad tracks and north of the entrance road is dominated by phragmites as well. Recon Area 2 consists of typical tidal marsh areas common along the Hudson River. A fine-grained sediment bottom is present throughout the marsh (Photo 30). Three sediment sample locations were selected in this area to document sediment characteristics.

Although no outfall pipes were identified during the recon survey along the shoreline of Recon Area 2, a potential preferential pathway was identified. One groundwater seep was observed on the northwestern portion of Recon Area 2, in the vicinity of the entrance road to Iona Island (Photo 23). This groundwater seep was identified along the upland slope between the marsh and the existing railroad tracks. EA staff observed groundwater discharge along the upland slope into the marsh and a sediment sample was taken at this location. An outfall pipe was not observed in this location.

Area 3 – Western Shoreline Between Iona and Round Island

Recon Area 3 consists of the shoreline area on the southwest side of Iona Island and western portion of Round Island. This area includes the low portion of land between the two islands. Unlike Recon Areas 1 and 2, this area is not a true shoreline, as historic fill and disturbance has significantly altered this area. Recon Area 3 consists of a mix of *Phragmites* tidal wetland on the southern and western end of the area, a tidal wetland swale consisting of various plant species, and a rip-rap filled drainage swale.

Although no outfall pipes were identified during the survey along the shoreline of Recon Area 3, two potential preferential pathways were identified. The southern end of Iona Island appears to drain down towards the *Phragmites* dominated low point between Iona Island and Round Island. This area slopes slightly to the south east to a rip-rap filled drainage swale (Photo 20) that directs flow to the south, towards the tidal marsh associated with Recon Area 2. A tidal wetland swale also identified along Recon Area 3 appears to convey flow to the west toward the tidal marsh associated with Recon Area 2.

Just north of Recon Area 3, EA identified a *Phragmites* filled wetland depression on the north side of the Iona Island perimeter road. This depression appears to collect surface runoff from Iona Island, but EA staff were unable to identify a culvert beneath the road connecting this depression to the tidal wetland swale within Recon Area 3.

Area 4 – CSX Railroad Tracks (West and East Side)

Recon Area 4 includes the areas along the east and west side of the railroad track embankment and primarily consists of rip-rap along an upland embankment. The northern portion of Recon Area 4 includes a scrub-shrub upland along the edge of the rip-rap (Photo 24); the southern end of the recon area includes a transition from rip-rap to existing marsh areas associated with Recon Area 2 (Photo 19).

EA did not identify any discharge outfall pipes along Recon Area 4. No culverts were identified beneath the railroad embankment that could connect drainage from Iona Island on the east of the railroad embankment to the marsh on the western side of the railroad embankment. EA identified only one hydrological connection through the railroad embankment, connecting the cattail marsh to the west with the *Phragmites* marsh on the east. This connection is located outside the project area at an embankment opening (i.e., shallow bridge) approximately 1,500 feet away, across the marsh from Round Island.

Flora and Fauna Observations

In addition to identifying potential pathways and characterizing the shoreline conditions of the site, EA's environmental scientists also documented wildlife to determine potential ecological receptors at the site. Wildlife observations included incidental observations and did not include a formal survey for specific species. In general, the observations made are consistent of what would be expected for the habitat areas described above. A list of wildlife observations along with the general recon area depicting where each species was identified is provided in Table 1.

Table 1. Wildlife Observations

Common Name	Scientific Name	Recon Area Observed				
		Area 1	Area 2	Area 3	Area 4	Upland
White tailed deer	*Odocoileus virginianus*		X	X		X
Grey squirrel	*Sciurus carolinensis*				X	X
Northern water snake	*Nerodia sipedon*			X		
Black rat snake	*Panthrophis obsoletus*		X	X		
Painted turtle	*Chrysemys picta*		X			
Terrestrial snail	--	X				
Aquatic snail	--	X				
Amphipod	--	X				
Turkey vulture	*Cathartes aura*	X	X	X	X	X
Osprey	*Pandion haliaethus*	X	X	X		X
American crow	*Corvus brachyrhynchos*	X			X	X
Red-winged blackbird	*Agelaius phoeniceus*		X	X		
Mourning dove	*Agelaius phoeniceus*					X
Northern cardinal	*Cardinalis cardinalis*					X
Northern bluejay	*Cyanocitta cristata*			X		X
Great scaup	*Aythya marila*	X				
Pileated woodpecker	*Dryocopus pileatus*					X
Ring-billed gull	*Larus delawarensis*	X				X

As previously mentioned, *Phragmites* and cattail were the dominant aquatic vegetation. The upland habitat consists primarily of invasive species including Japanese barberry (*Berberis thunbergii*), multiflora rose (*Rosa multiflora*), wineberry (*Rubus phoenicolasius*), and Japanese honeysuckle (*Lonicera japonica*). Other dominant species located within the upland areas included maples (*Acer spp.*), *Forsythia spp*., devil's walkingstick (*Aralia spinosa*), and red cedar (*Juniperus virginiana*). Milkweed (*Asclepias syriaca*) was also identified.

Sediment Sampling

EA collected sediment samples on 7 April 2020 from areas identified as depositional. EA identified seven sediment sampling locations, including three locations in Recon Area 1 (SD 04, SD 05, and SD 06), three locations in Recon Area 2 (SD 01, SD 02, SD 03), and one location in Recon Area 3 (SD 07). The seven sediment locations are depicted on Figure 3. Sediment samples were collected for analysis of grain size and TOC. Grain size appears to vary from coarse sand and cobbles in Recon Area 1 to fine silts and clays in Recon Areas 2 and 3.

Potential Sediment Background Locations

EA identified two potential upstream background sediment sampling locations (Figure 5). The first potential background sampling location was identified as Constitution Island, which is located approximately 7 miles upstream of Iona Island on the eastern bank of the Hudson River. The island consists of approximately 175 acres of upland habitat and another 240 acres of marsh, similar to that of Iona Island. A gate prevented access to the island and signs indicated it is government property with restricted access and is believed to be part of West Point Military Academy.

The second potential background location was identified as Con Hook, which is a peninsula located approximately 3 miles upstream of Iona Island on the western side of the Hudson River. It consists of approximately 7 acres of upland

habitat and another 12 acres of a *Phragmites*-dominated marsh land, similar to that of Iona Island. Access appears only possible via boat. A boat ramp is located approximately 2 miles south of Con Hook in Mine Dock Park.

Reference

EA Engineering, Science, and Technology Inc., PBC (EA). 2020. *Uniform Federal Policy -Quality Assurance Project Plan, Hazardous Toxic and Radioactive Waste Remedial Investigation, Iona Island Naval Ammunition Depot* - Formerly Used Defense Site. January 2020.

Attachments

A	Figures
B	Site Photographs

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ATTACHMENT
A FIGURES

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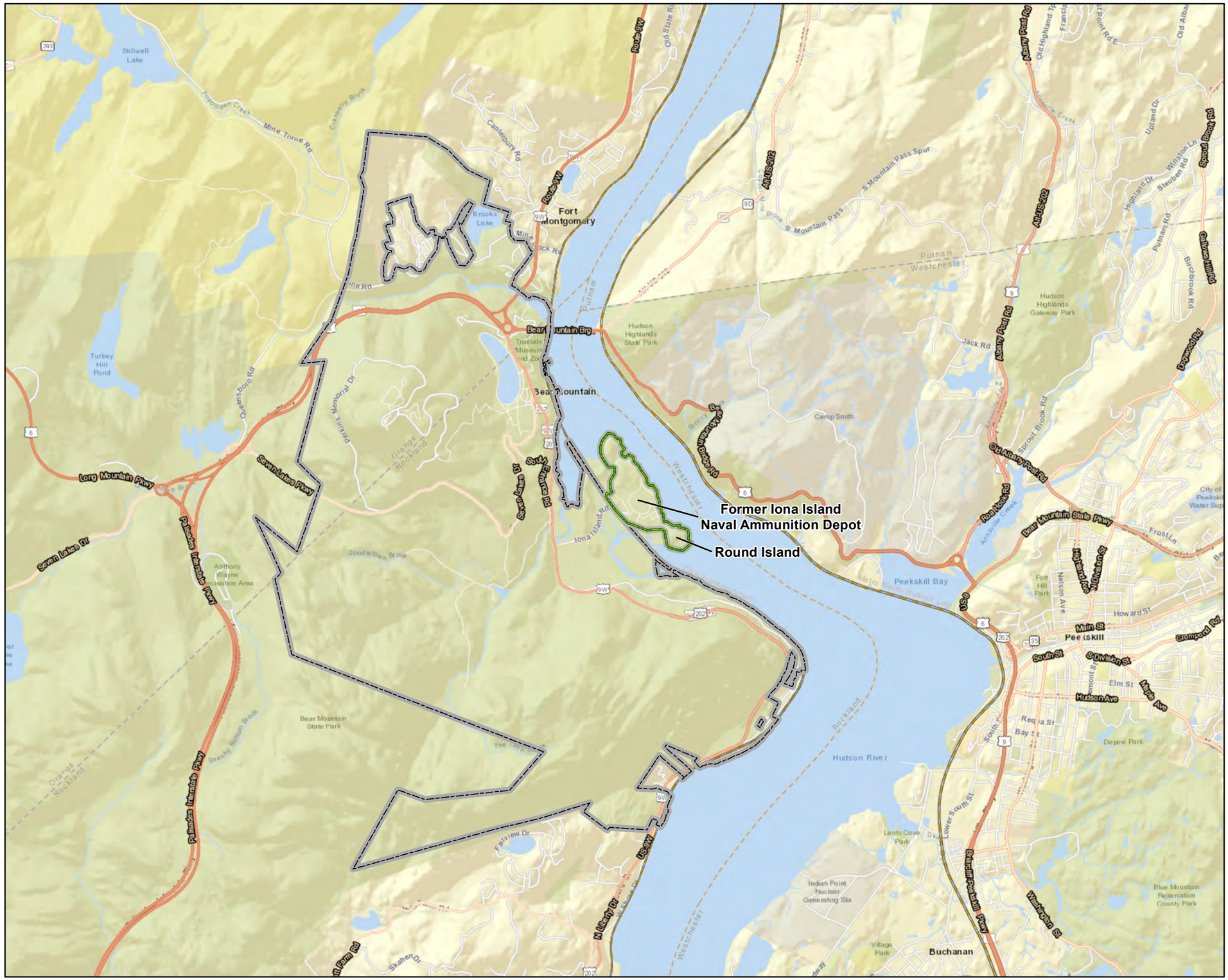


VICINITY MAP

Legend

- FUDS Boundary
- Bear Mountain State Park Boundary

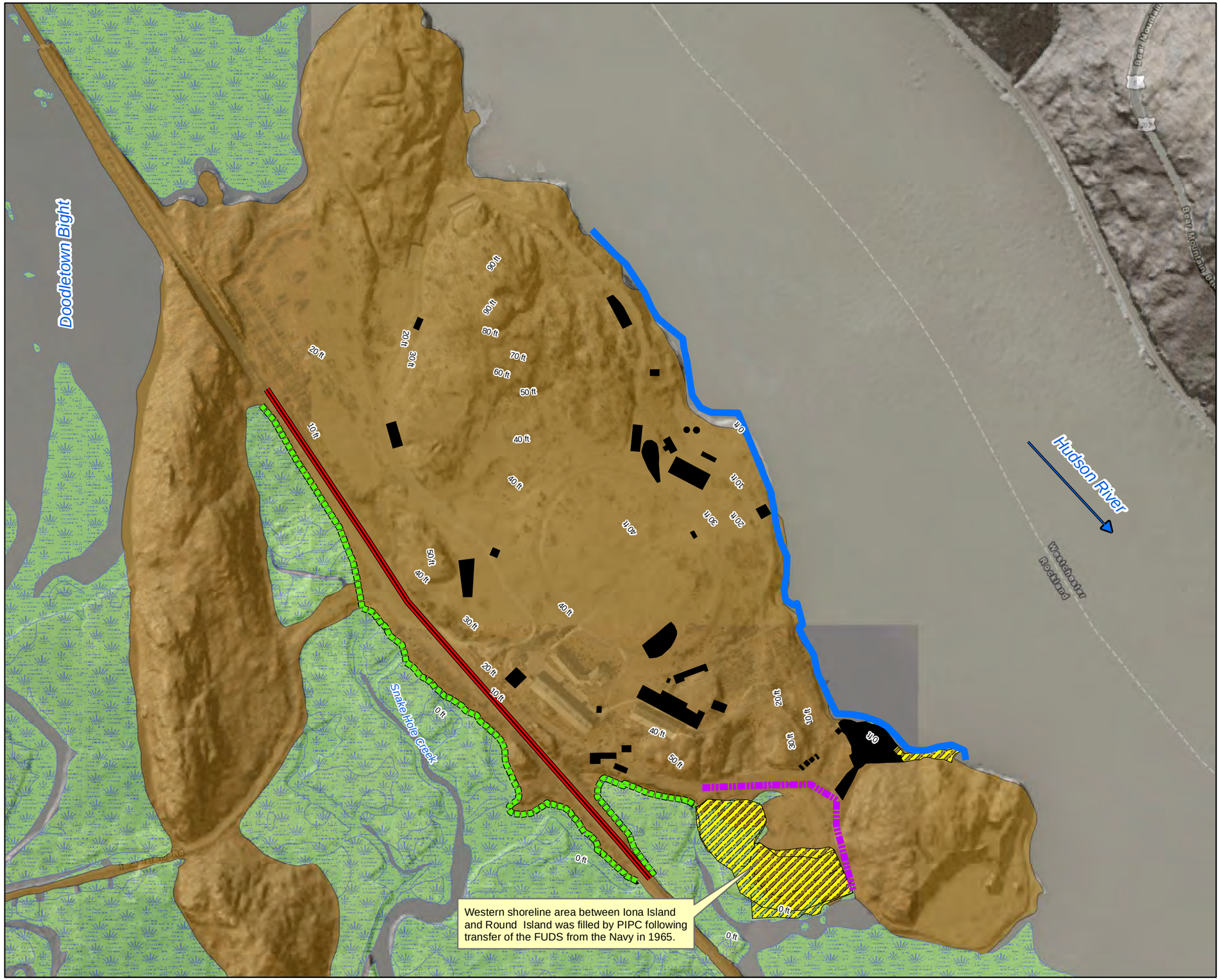
0 0.5 1
Miles
1 in = 1 miles

N

FIGURE 1
Vicinity Map
IONA ISLAND NAVAL AMMUNITION DEPOT FUDS
ROCKLAND COUNTY, NY

Aerial: ESRI ArcGIS Online Map Service

Map Date: 4/11/2020



VICINITY MAP

Legend

- HTRW RI Footprints of Former Buildings/Structures
- Disturbed Ground/Fill Area
- Upland
- Marsh/Wetland

Phase I Shoreline Reconnaissance Areas

- Recon Area 1 Hudson River Shoreline
- Recon Area 2 Iona Marsh Shoreline
- Recon Area 3 Western Shoreline Between Iona and Round Island
- Recon Area 4 CSX Railroad Tracks (East and West Sides)

0 400 800
Feet
1 in = 400 ft

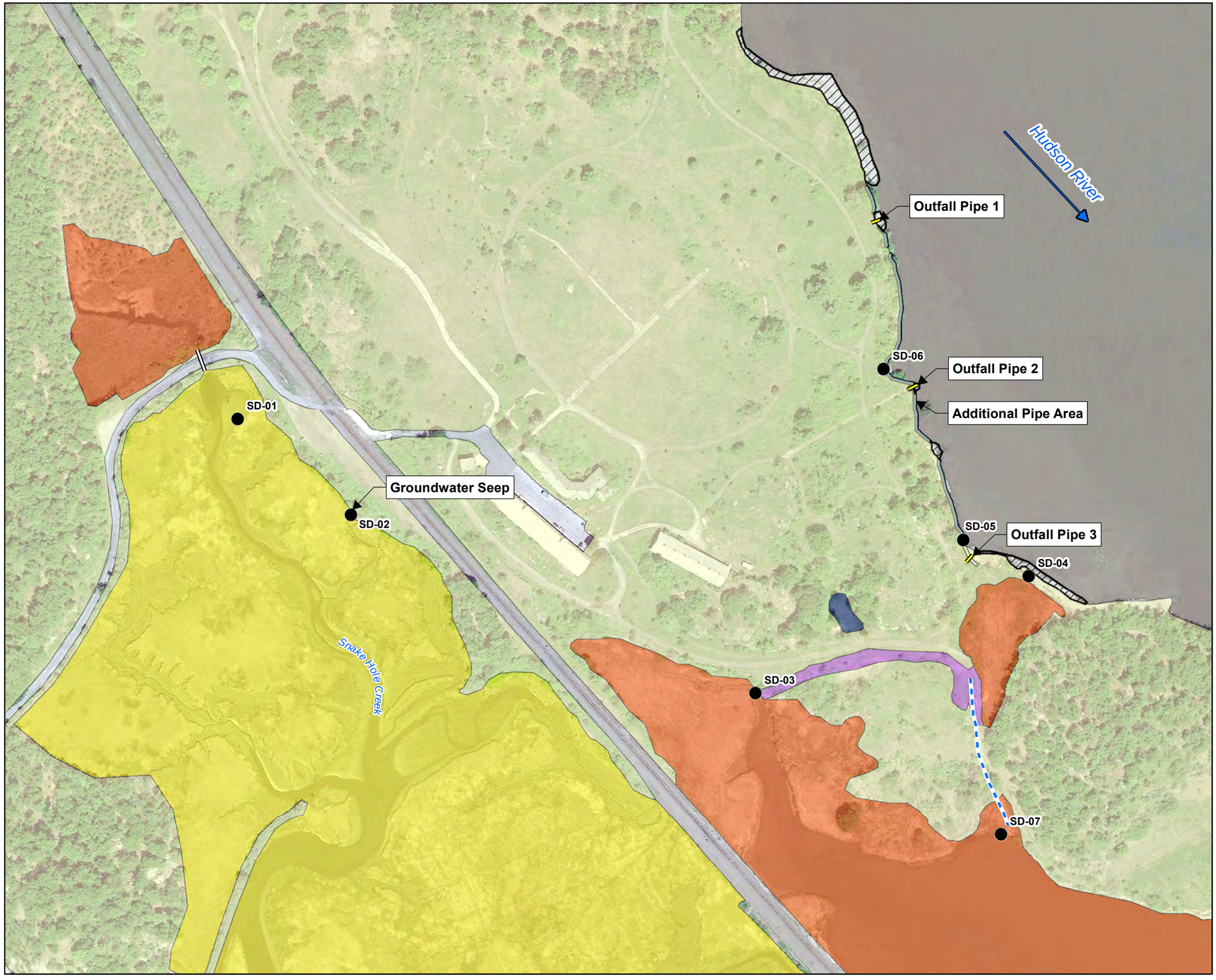
N

FIGURE 2
Phase I Shoreline Reconnaissance Survey Areas

IONA ISLAND NAVAL AMMUNITION DEPOT FUDS
ROCKLAND COUNTY, NY

Aerial: ESRI ArcGIS Online Map Service

Map Date: 4/11/2020



VICINITY MAP

Legend

- Sediment Sample Location
- Potential Preferential Pathway
- Culvert
- Outfall Pipe
- River Wall
- Upland
- Phragmites Wetland (Nontidal)
- Phragmites Tidal Wetland
- Cattail Tidal Wetland
- Tidal Wetland Swale
- Macroinvertebrate Observation Areas (Cobble and large gravel)

0 250 500
Feet
1 in = 250 ft

N

FIGURE 3
Phase I Shoreline Reconnaissance Observations

IONA ISLAND NAVAL AMMUNITION DEPOT FUDS
ROCKLAND COUNTY, NY

Aerial: Google Earth Aerial 2018

Map Date: 4/13/2020

VICINITY MAP

Legend

- Photo Location
- Photo Location Direction

0 250 500
Feet
1 in = 250 ft

N

FIGURE 4
Photo Location Map

IONA ISLAND NAVAL AMMUNITION DEPOT FUDS
ROCKLAND COUNTY, NY

Aerial: Google Earth Aerial 2018

Map Date: 4/13/2020

VICINITY MAP

Legend

- Possible Sediment Background Sample Location
- FUDS Boundary

FIGURE 5
Possible Sediment Background Sample Locations

IONA ISLAND NAVAL AMMUNITION DEPOT FUDS
ROCKLAND COUNTY, NY

Map Date: 4/13/2020
Source: ESRI Aerial 2018
Projection: NAD 1983 State Plane New York East US Foot

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ATTACHMENT B
SITE PHOTOGRAPHS

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Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

1. Northernmost portion of Recon Area 1 at high tide, before start of river wall.

2. Northernmost portion of Recon Area 1 at low tide.

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

3. Amphipod observed under shoreline rocks during low tide.

4. Snail observed under shoreline rocks during low tide.

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

5. River wall located along the majority of Recon Area 1.

6. Pipe #1 identified along the northern portion of Recon Area 1.

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

7. Sediment area observed at low tide at sample area SD-06.

8. Pipe #2 observed along Recon Area 1.

Photographic Record

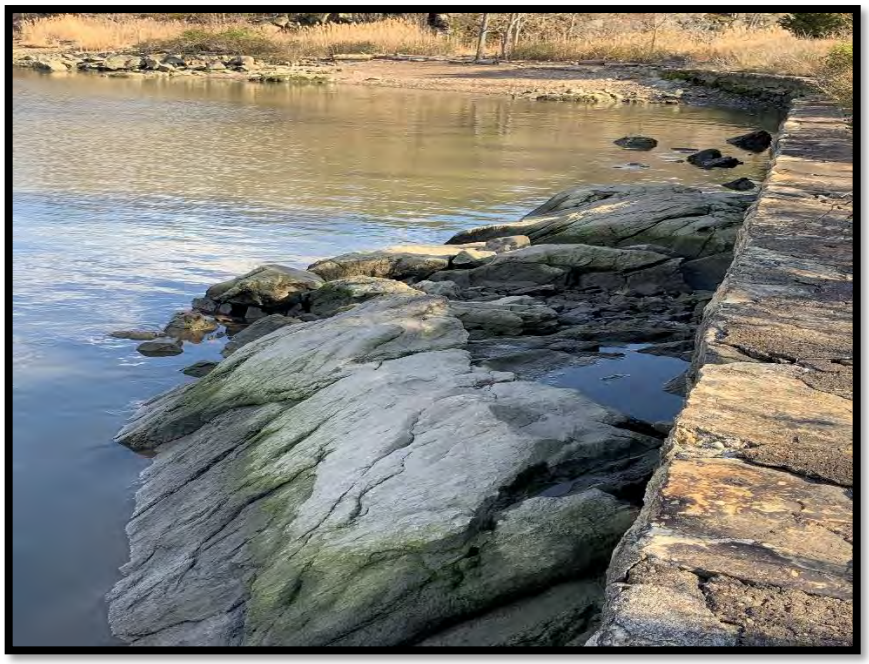
Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

9. Terracotta pipe identified partially buried near the historic causeway in Recon Area 1.

10. Two additional metal pipes identified along the river wall, near the historic causeway in Recon Area 1.

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020



11. Sample location SD-05 located between the exposed bedrock and beach area in Recon Area 1.

12. Pipe #3 located along the river wall in Recon Area 1.

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

13. Coarse sand, beach glass and pebble material along the beach area on the southern portion of Recon Area 1.

14. Southernmost portion of Recon Area 1 at high tide at sediment location SD-04.

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

15. Southernmost portion of Recon Area 1 at low tide.

16. Water depth of approximately 5 feet along the river wall in Recon Area 1 at high tide.

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

17. Northern shoreline of Round Island.

18. *Phragmites* dominated marsh in Recon Area 2, on the eastern side of railroad tracks.

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

19. Rip-rap slope and water depth of three feet along the eastern side of railroad tracks, across from Round Island.

20. Potential pathway located between Round Island and the existing fill area.

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

21. View of Recon Area 3 from Round Island.

22. View of *Phragmites* dominated marsh between Iona Island and Round Island.

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

23. Potential groundwater seep area along Recon Area 2 (Location of SD 02).

24. Typical view of railroad tracks in Recon Area 4.

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

25. Top of river wall with evidence of historic railing or fence posts.

26. Typical metal piping observed in Recon Areas 1 and 3 which appear to be from historic railing or fence structure.

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

27. Observed fence and wall drainpipe identified on Round Island.

28. Sediment sample location SD-01.

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

29. Sediment Sample Location SD-03 at hightide.

30. Sediment sample location SD-07 at low tide.

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Appendix F

Background Comparison Data

F1: Phase I Soil Background Comparison Permutation Tests
F2: Phase II Surface Water Background Comparison Permutation Tests
F3: Phase II Sediment Background Comparison Permutation Tests

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Appendix F1

Phase I Soil Background Comparison Permutation Tests

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Phase I Soil Background Comparison Permutation Tests

Matrix	Analyte Name	Analyte Code	CAS	Units	Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
					DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-01	3	3	0.004608154	8	8	0.013412476	-0.008804321	0.96	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-02	3	3	0.052322388	8	8	0.013412476	0.038909912	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-03	3	3	0.010696411	8	8	0.013412476	-0.002716064	0.67	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-04	3	2	0.041000366	8	8	0.013412476	0.027587891	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-05	3	3	0.007843018	8	8	0.013412476	-0.005569458	0.88	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-09	3	3	0.00630188	8	8	0.013412476	-0.007110596	0.94	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-11	3	3	0.026000977	8	8	0.013412476	0.012588501	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-12	3	3	0.056671143	8	8	0.013412476	0.043258667	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-13	3	3	0.363327026	8	8	0.013412476	0.349914551	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-16	3	3	0.020568848	8	8	0.013412476	0.007156372	0.13	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-17	3	3	0.031005859	8	8	0.013412476	0.017593384	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-18	3	3	0.040328979	8	8	0.013412476	0.026916504	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-19	3	3	0.017333984	8	8	0.013412476	0.003921509	0.23	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-20	3	3	0.008728027	8	8	0.013412476	-0.004684448	0.84	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-21	3	3	0.005599976	8	8	0.013412476	-0.0078125	0.96	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-22	3	3	0.040664673	8	8	0.013412476	0.027252197	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-01	3	3	0.007095337	8	8	0.012390137	-0.0052948	0.93	Do Not Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-02	3	3	0.042007446	8	8	0.012390137	0.02961731	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-03	3	3	0.012268066	8	8	0.012390137	-0.00012207	0.55	Do Not Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-04	3	2	0.054000854	8	8	0.012390137	0.041610718	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-05	3	3	0.010131836	8	8	0.012390137	-0.002258301	0.72	Do Not Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-09	3	3	0.008651733	8	8	0.012390137	-0.003738403	0.84	Do Not Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-11	3	3	0.041000366	8	8	0.012390137	0.028610229	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-12	3	3	0.068664551	8	8	0.012390137	0.056274414	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-13	3	3	0.413330078	8	8	0.012390137	0.400939941	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-16	3	3	0.027404785	8	8	0.012390137	0.015014648	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-17	3	3	0.046340942	8	8	0.012390137	0.033950806	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-18	3	3	0.067337036	8	8	0.012390137	0.054946899	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-19	3	3	0.027008057	8	8	0.012390137	0.01461792	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-20	3	3	0.013000488	8	8	0.012390137	0.000610352	0.40	Do Not Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-21	3	3	0.007659912	8	8	0.012390137	-0.004730225	0.90	Do Not Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-22	3	3	0.061340332	8	8	0.012390137	0.048950195	<0.05	Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-01	3	3	0.006393433	8	8	0.038757324	-0.032363892	0.97	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-02	3	3	0.17666626	8	8	0.038757324	0.137908936	<0.05	Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-03	3	3	0.02633667	8	8	0.038757324	-0.012420654	0.68	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-04	3	3	0.101654053	8	8	0.038757324	0.062896729	0.09	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-05	3	3	0.016326904	8	8	0.038757324	-0.02243042	0.86	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-09	3	3	0.010604858	8	8	0.038757324	-0.028152466	0.94	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-11	3	3	0.021347046	8	8	0.038757324	-0.017410278	0.78	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-12	3	3	0.430007935	8	8	0.038757324	0.39125061	<0.05	Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-13	3	3	3.933334351	8	8	0.038757324	3.894577026	<0.05	Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-16	3	3	0.108657837	8	8	0.038757324	0.069900513	<0.05	Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-17	3	3	0.035675049	8	8	0.038757324	-0.003082275	0.54	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-18	3	3	0.050994873	8	8	0.038757324	0.012237549	0.28	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-19	3	3	0.037658691	8	8	0.038757324	-0.001098633	0.50	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-20	3	3	0.011444092	8	8	0.038757324	-0.027313232	0.94	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-21	3	3	0.011672974	8	8	0.038757324	-0.027084351	0.89	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-22	3	3	0.095657349	8	8	0.038757324	0.056900024	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-01	3	3	0.031326294	8	8	0.033493042	-0.002166748	0.52	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-02	3	3	0.11000061	8	8	0.033493042	0.076507568	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-03	3	3	0.039657593	8	8	0.033493042	0.006164551	0.31	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-04	3	3	0.209991455	8	8	0.033493042	0.176498413	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-05	3	3	0.019668579	8	8	0.033493042	-0.013824463	0.83	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-09	3	3	0.030670166	8	8	0.033493042	-0.002822876	0.45	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-11	3	3	0.186676025	8	8	0.033493042	0.153182983	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-12	3	3	0.059661865	8	8	0.033493042	0.026168823	0.06	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-13	3	1	0.566665649	8	8	0.033493042	0.533172607	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-16	3	3	0.031341553	8	8	0.033493042	-0.002151489	0.48	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-17	3	3	0.13999939	8	8	0.033493042	0.106506348	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-18	3	3	0.084335327	8	8	0.033493042	0.050842285	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-19	3	3	0.203338623	8	8	0.033493042	0.169845581	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-20	3	3	0.034011841	8	8	0.033493042	0.000518799	0.47	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-21	3	3	0.022659302	8	8	0.033493042	-0.01083374	0.76	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-22	3	3	0.196670532	8	8	0.033493042	0.16317749	<0.05	Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-01	3	3	11000	8	8	12162.5	-1162.5	0.76	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-02	3	3	13000	8	8	12162.5	837.5	0.40	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-03	3	3	13000	8	8	12162.5	837.5	0.38	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-04	3	3	10000	8	8	12162.5	-2162.5	0.87	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-05	3	3	13000	8	8	12162.5	837.5	0.41	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-06	3	3	10666.66667	8	8	12162.5	-1495.833328	0.83	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-07	3	3	10666.66667	8	8	12162.5	-1495.833328	0.87	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-09	3	3	10666.66667	8	8	12162.5	-1495.833328	0.87	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-10	3	3	10433.33333	8	8	12162.5	-1729.166672	0.89	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-11	3	3	10233.33333	8	8	12162.5	-1929.166672	0.91	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-12	3	3	11000	8	8	12162.5	-1162.5	0.76	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-13	3	3	11333.33333	8	8	12162.5	-829.1666718	0.68	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-14	3	3	10333.33333	8	8	12162.5	-1829.166672	0.91	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-15	3	3	11000	8	8	12162.5	-1162.5	0.78	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-16	3	3	14000	8	8	12162.5	1837.5	0.21	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-17	3	3	5900	8	8	12162.5	-6262.5	1.00	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-18	3	3	9500	8	8	12162.5	-2662.5	0.91	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-19	3	3	20333.33334	8	8	12162.5	8170.833344	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-01	3	3	0.028320313	8	8	0.059188843	-0.03086853	0.83	Do Not Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-02	3	3	0.476669312	8	8	0.059188843	0.417480469	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-03	3	3	0.091339111	8	8	0.059188843	0.032150269	0.17	Do Not Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-04	3	3	0.313323975	8	8	0.059188843	0.254135132	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-05	3	3	0.060668945	8	8	0.059188843	0.001480103	0.52	Do Not Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-09	3	3	0.03666687	8	8	0.059188843	-0.022521973	0.70	Do Not Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-11	3	3	0.125671387	8	8	0.059188843	0.066482544	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-12	3	3	0.733337402	8	8	0.059188843	0.67414856	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-13	3	3	6.166656494	8	8	0.059188843	6.107467651	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-16	3	3	0.134338379	8	8	0.059188843	0.075149536	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-17	3	3	0.186660767	8	8	0.059188843	0.127471924	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-18	3	3	0.169998169	8	8	0.059188843	0.110809326	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-19	3	3	0.28666687	8	8	0.059188843	0.227478027	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-20	3	3	0.04133606	8	8	0.059188843	-0.017852783	0.73	Do Not Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-21	3	3	0.040664673	8	8	0.059188843	-0.01852417	0.72	Do Not Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-22	3	3	0.333328247	8	8	0.059188843	0.274139404	<0.05	Reject H0

Phase I Soil Background Comparison Permutation Tests

Matrix	Analyte Name	Analyte Code	CAS	Units	Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
					DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-01	3	3	0.5	8	8	0.986236572	-0.486236572	1.00	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-02	3	3	0.636672974	8	8	0.986236572	-0.349563599	0.98	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-03	3	3	0.659988403	8	8	0.986236572	-0.326248169	0.98	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-04	3	3	1.699996948	8	8	0.986236572	0.713760376	<0.05	Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-05	3	3	0.516662598	8	8	0.986236572	-0.469573975	1.00	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-06	3	3	0.866653442	8	8	0.986236572	-0.11958313	0.76	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-07	3	3	1.616668701	8	8	0.986236572	0.630432129	0.07	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-09	3	3	0.433334351	8	8	0.986236572	-0.552902222	1.00	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-10	3	3	0.38999939	8	8	0.986236572	-0.596237183	1.00	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-11	3	3	0.82333374	8	8	0.986236572	-0.162902832	0.86	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-12	3	3	0.636672974	8	8	0.986236572	-0.349563599	0.98	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-13	3	3	1.699996948	8	8	0.986236572	0.713760376	<0.05	Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-14	3	3	0.583343506	8	8	0.986236572	-0.402893066	0.98	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-15	3	3	0.833328247	8	8	0.986236572	-0.152908325	0.83	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-16	3	3	0.419998169	8	8	0.986236572	-0.566238403	1.00	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-17	3	3	7.900009155	8	8	0.986236572	6.913772583	<0.05	Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-18	3	3	6.533325195	8	8	0.986236572	5.547088623	<0.05	Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-19	3	3	0.42666626	8	8	0.986236572	-0.559570313	1.00	Do Not Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-01	3	3	10.6333313	8	8	5.325012207	5.308319092	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-02	3	3	13.66667175	8	8	5.325012207	8.341659546	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-03	3	3	13.33334351	8	8	5.325012207	8.008331299	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-04	3	3	31.33334351	8	8	5.325012207	26.0083313	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-05	3	3	11.33332825	8	8	5.325012207	6.00831604	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-06	3	3	9.666656494	8	8	5.325012207	4.341644287	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-07	3	3	17.33332825	8	8	5.325012207	12.00831604	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-09	3	3	7.066665649	8	8	5.325012207	1.741653442	0.14	Do Not Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-10	3	3	7.066665649	8	8	5.325012207	1.741653442	0.15	Do Not Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-11	3	3	39.66665649	8	8	5.325012207	34.34164429	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-12	3	3	13.66667175	8	8	5.325012207	8.341659546	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-13	3	3	10.56666565	8	8	5.325012207	5.241653442	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-14	3	3	17	8	8	5.325012207	11.67498779	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-15	3	3	6.866668701	8	8	5.325012207	1.541656494	0.16	Do Not Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-16	3	3	7.033325195	8	8	5.325012207	1.708312988	0.13	Do Not Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-17	3	3	6.566665649	8	8	5.325012207	1.241653442	0.20	Do Not Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-18	3	3	12.6000061	8	8	5.325012207	7.274993896	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-19	3	3	9.466674805	8	8	5.325012207	4.141662598	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-01	3	3	67.33334351	8	8	33.375	33.95834351	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-02	3	3	73.66667175	8	8	33.375	40.29167175	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-03	3	3	79.66667175	8	8	33.375	46.29167175	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-04	3	3	85	8	8	33.375	51.625	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-05	3	3	72.66667175	8	8	33.375	39.29167175	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-06	3	3	65.66667175	8	8	33.375	32.29167175	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-07	3	3	104.3333282	8	8	33.375	70.95832825	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-09	3	3	61.66665649	8	8	33.375	28.29165649	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-10	3	3	57	8	8	33.375	23.625	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-11	3	3	77.66665649	8	8	33.375	44.29165649	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-12	3	3	80.66667175	8	8	33.375	47.29167175	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-13	3	3	90	8	8	33.375	56.625	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-14	3	3	78.33332825	8	8	33.375	44.95832825	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-15	3	3	60.33332825	8	8	33.375	26.95832825	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-16	3	3	58.66667175	8	8	33.375	25.29167175	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-17	3	3	133.3333435	8	8	33.375	99.95834351	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-18	3	3	276.6666718	8	8	33.375	243.2916718	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-19	3	3	75.66667175	8	8	33.375	42.29167175	<0.05	Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-01	3	3	0.130004883	8	8	0.307479858	-0.177474976	0.76	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-02	3	3	2.066665649	8	8	0.307479858	1.759185791	<0.05	Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-03	3	3	0.38999939	8	8	0.307479858	0.082519531	0.34	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-04	3	3	1.130004883	8	8	0.307479858	0.822525024	<0.05	Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-05	3	3	0.316665649	8	8	0.307479858	0.009185791	0.51	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-09	3	3	0.156661987	8	8	0.307479858	-0.150817871	0.72	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-11	3	3	0.720001221	8	8	0.307479858	0.412521362	<0.05	Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-12	3	3	1.933334351	8	8	0.307479858	1.625854492	<0.05	Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-13	3	3	14.1333313	8	8	0.307479858	13.82585144	<0.05	Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-16	3	3	0.383346558	8	8	0.307479858	0.075866699	0.38	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-17	3	3	0.649993896	8	8	0.307479858	0.342514038	0.05	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-18	3	3	0.706680298	8	8	0.307479858	0.399200439	0.07	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-19	3	3	1.566665649	8	8	0.307479858	1.259185791	<0.05	Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-20	3	3	0.14666748	8	8	0.307479858	-0.160812378	0.73	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-21	3	3	0.148666382	8	8	0.307479858	-0.158813477	0.80	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-22	3	3	1.5	8	8	0.307479858	1.192520142	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-01	3	3	0.149993896	8	8	0.329742432	-0.179748535	0.79	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-02	3	3	1.733322144	8	8	0.329742432	1.403579712	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-03	3	3	0.403335571	8	8	0.329742432	0.07359314	0.37	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-04	3	3	1.100006104	8	8	0.329742432	0.770263672	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-05	3	3	0.279998779	8	8	0.329742432	-0.049743652	0.59	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-09	3	3	0.17666626	8	8	0.329742432	-0.153076172	0.77	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-11	3	3	0.940002441	8	8	0.329742432	0.61026001	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-12	3	3	1.600006104	8	8	0.329742432	1.270263672	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-13	3	3	10.69999695	8	8	0.329742432	10.37025452	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-16	3	3	0.380004883	8	8	0.329742432	0.050262451	0.38	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-17	3	3	0.553329468	8	8	0.329742432	0.223587036	0.17	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-18	3	3	0.64666748	8	8	0.329742432	0.316925049	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-19	3	3	1.259994507	8	8	0.329742432	0.930252075	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-20	3	3	0.159988403	8	8	0.329742432	-0.169754028	0.76	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-21	3	3	0.13633728	8	8	0.329742432	-0.193405151	0.81	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-22	3	3	1.433334351	8	8	0.329742432	1.103591919	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-01	3	3	0.233337402	8	8	0.523986816	-0.290649414	0.76	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-02	3	3	2.466659546	8	8	0.523986816	1.942672729	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-03	3	3	0.593322754	8	8	0.523986816	0.069335938	0.42	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-04	3	3	2.566665649	8	8	0.523986816	2.042678833	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-05	3	3	0.410003662	8	8	0.523986816	-0.113983154	0.61	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-09	3	3	0.279998779	8	8	0.523986816	-0.243988037	0.74	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-11	3	3	1.300003052	8	8	0.523986816	0.776016235	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-12	3	3	2.333343506	8	8	0.523986816	1.809356689	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-13	3	3	14.56666565	8	8	0.523986816	14.04267883	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-16	3	3	0.563339233	8	8	0.523986816	0.039352417	0.46	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-17	3	3	0.96333313	8	8	0.523986816	0.439346313	0.09	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-18	3	3	1.186676025	8	8	0.523986816	0.662689209	<0.05	Reject H0

Phase I Soil Background Comparison Permutation Tests

Matrix	Analyte Name	Analyte Code	CAS	Units	Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
					DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-19	3	3	2.266662598	8	8	0.523986816	1.742675781	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-20	3	3	0.253326416	8	8	0.523986816	-0.2706604	0.76	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-21	3	3	0.226669312	8	8	0.523986816	-0.297317505	0.76	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-22	3	3	2.266677856	8	8	0.523986816	1.74269104	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-01	3	3	0.116668701	8	8	0.261871338	-0.145202637	0.80	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-02	3	3	0.976669312	8	8	0.261871338	0.714797974	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-03	3	3	0.289993286	8	8	0.261871338	0.028121948	0.36	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-04	3	3	0.880004883	8	8	0.261871338	0.618133545	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-05	3	3	0.179992676	8	8	0.261871338	-0.081878662	0.67	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-09	3	3	0.120010376	8	8	0.261871338	-0.141860962	0.77	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-11	3	3	0.933334351	8	8	0.261871338	0.671463013	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-12	3	3	1.129989624	8	8	0.261871338	0.868118286	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-13	3	3	6.433334351	8	8	0.261871338	6.171463013	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-16	3	3	0.25	8	8	0.261871338	-0.011871338	0.53	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-17	3	3	0.35333252	8	8	0.261871338	0.091461182	0.23	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-18	3	3	0.449996948	8	8	0.261871338	0.18812561	0.14	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-19	3	3	0.763336182	8	8	0.261871338	0.501464844	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-20	3	3	0.123336792	8	8	0.261871338	-0.138534546	0.76	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-21	3	3	0.080337524	8	8	0.261871338	-0.181533813	0.88	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-22	3	3	0.806671143	8	8	0.261871338	0.544799805	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-01	3	3	0.077667236	8	8	0.191375732	-0.113708496	0.86	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-02	3	3	0.763336182	8	8	0.191375732	0.571960449	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-03	3	3	0.186676025	8	8	0.191375732	-0.004699707	0.49	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-04	3	3	0.803329468	8	8	0.191375732	0.611953735	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-05	3	3	0.133331299	8	8	0.191375732	-0.058044434	0.66	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-09	3	3	0.094665527	8	8	0.191375732	-0.096710205	0.76	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-11	3	3	0.453338623	8	8	0.191375732	0.261962891	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-12	3	3	0.89666748	8	8	0.191375732	0.705291748	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-13	3	3	5.866653442	8	8	0.191375732	5.67527771	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-16	3	3	0.203323364	8	8	0.191375732	0.011947632	0.41	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-17	3	3	0.300003052	8	8	0.191375732	0.108627319	0.17	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-18	3	3	0.32333374	8	8	0.191375732	0.131958008	0.12	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-19	3	3	0.793334961	8	8	0.191375732	0.601959229	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-20	3	3	0.082000732	8	8	0.191375732	-0.109375	0.78	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-21	3	3	0.075668335	8	8	0.191375732	-0.115707397	0.83	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-22	3	3	0.759994507	8	8	0.191375732	0.568618774	<0.05	Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-01	3	3	0.523330688	8	8	0.43963623	0.083694458	0.36	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-02	3	3	0.579986572	8	8	0.43963623	0.140350342	0.27	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-03	3	3	0.556671143	8	8	0.43963623	0.117034912	0.27	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-04	3	3	0.483337402	8	8	0.43963623	0.043701172	0.46	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-05	3	3	0.580001831	8	8	0.43963623	0.140365601	0.23	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-06	3	3	0.529998779	8	8	0.43963623	0.090362549	0.36	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-07	3	3	0.53666687	8	8	0.43963623	0.09703064	0.34	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-09	3	3	0.496658325	8	8	0.43963623	0.057022095	0.44	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-10	3	3	0.553329468	8	8	0.43963623	0.113693237	0.29	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-11	3	3	0.550003052	8	8	0.43963623	0.110366821	0.29	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-12	3	3	0.64666748	8	8	0.43963623	0.20703125	0.18	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-13	3	3	0.599990845	8	8	0.43963623	0.160354614	0.24	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-14	3	3	0.550003052	8	8	0.43963623	0.110366821	0.30	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-15	3	3	0.479995728	8	8	0.43963623	0.040359497	0.44	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-16	3	3	0.576675415	8	8	0.43963623	0.137039185	0.29	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-17	3	3	0.35333252	8	8	0.43963623	-0.086303711	0.68	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-18	3	3	0.590011597	8	8	0.43963623	0.150375366	0.25	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-19	3	3	0.406661987	8	8	0.43963623	-0.032974243	0.58	Do Not Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-01	3	3	0.283325195	8	8	0.174987793	0.108337402	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-02	3	3	0.226669312	8	8	0.174987793	0.051681519	0.13	Do Not Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-03	3	3	0.253326416	8	8	0.174987793	0.078338623	0.06	Do Not Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-04	3	3	0.986679077	8	8	0.174987793	0.811691284	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-05	3	3	0.209991455	8	8	0.174987793	0.035003662	0.22	Do Not Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-06	3	0	1.7	8	8	0.174987793	1.525012207	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-07	3	3	0.563323975	8	8	0.174987793	0.388336182	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-09	3	3	0.236663818	8	8	0.174987793	0.061676025	0.12	Do Not Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-10	3	2	0.179992676	8	8	0.174987793	0.005004883	0.44	Do Not Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-11	3	3	0.366668701	8	8	0.174987793	0.191680908	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-12	3	3	0.35333252	8	8	0.174987793	0.178344727	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-13	3	3	0.753341675	8	8	0.174987793	0.578353882	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-14	3	3	0.276672363	8	8	0.174987793	0.10168457	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-15	3	3	0.513336182	8	8	0.174987793	0.338348389	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-16	3	3	0.283340454	8	8	0.174987793	0.108352661	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-17	3	3	13.66665649	8	8	0.174987793	13.4916687	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-18	3	3	4.633331299	8	8	0.174987793	4.458343506	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-19	3	3	0.293334961	8	8	0.174987793	0.118347168	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-01	3	3	4533.333328	8	8	1222.5	3310.833328	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-02	3	3	10600	8	8	1222.5	9377.5	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-03	3	3	6233.333344	8	8	1222.5	5010.833344	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-04	3	3	9666.666656	8	8	1222.5	8444.166656	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-05	3	3	3233.333344	8	8	1222.5	2010.833344	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-06	3	3	14333.33333	8	8	1222.5	13110.83333	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-07	3	3	16000	8	8	1222.5	14777.5	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-09	3	3	7366.666672	8	8	1222.5	6144.166672	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-10	3	3	15000	8	8	1222.5	13777.5	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-11	3	3	26666.66666	8	8	1222.5	25444.16666	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-12	3	3	11333.33334	8	8	1222.5	10110.83334	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-13	3	3	8866.666672	8	8	1222.5	7644.166672	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-14	3	3	8400	8	8	1222.5	7177.5	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-15	3	3	8166.666672	8	8	1222.5	6944.166672	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-16	3	3	7600	8	8	1222.5	6377.5	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-17	3	3	58333.33333	8	8	1222.5	57110.83333	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-18	3	3	12333.33333	8	8	1222.5	11110.83333	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-19	3	3	12333.33333	8	8	1222.5	11110.83333	<0.05	Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-01	3	3	13.33332825	8	8	14.6625061	-1.329177856	0.57	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-02	3	3	15	8	8	14.6625061	0.337493896	0.44	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-03	3	3	15.33332825	8	8	14.6625061	0.670822144	0.43	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-04	3	3	17	8	8	14.6625061	2.337493896	0.36	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-05	3	3	15	8	8	14.6625061	0.337493896	0.45	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-06	3	3	13	8	8	14.6625061	-1.662506104	0.62	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-07	3	3	16	8	8	14.6625061	1.337493896	0.40	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-09	3	3	13	8	8	14.6625061	-1.662506104	0.66	Do Not Reject H0

Phase I Soil Background Comparison Permutation Tests

Matrix	Analyte Name	Analyte Code	CAS	Units	Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
					DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-10	3	3	13.66667175	8	8	14.6625061	-0.995834351	0.55	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-11	3	3	15	8	8	14.6625061	0.337493896	0.45	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-12	3	3	15	8	8	14.6625061	0.337493896	0.45	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-13	3	3	14.66667175	8	8	14.6625061	0.004165649	0.46	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-14	3	3	13.66667175	8	8	14.6625061	-0.995834351	0.58	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-15	3	3	15	8	8	14.6625061	0.337493896	0.42	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-16	3	3	14.66667175	8	8	14.6625061	0.004165649	0.49	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-17	3	3	16.96665955	8	8	14.6625061	2.304153442	0.39	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-18	3	3	95.66667175	8	8	14.6625061	81.00416565	<0.05	Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-19	3	3	10.33332825	8	8	14.6625061	-4.329177856	0.80	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-01	3	3	0.143325806	8	8	0.424224854	-0.280899048	0.89	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-02	3	3	1.966674805	8	8	0.424224854	1.542449951	<0.05	Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-03	3	3	0.403335571	8	8	0.424224854	-0.020889282	0.51	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-04	3	3	1.833328247	8	8	0.424224854	1.409103394	<0.05	Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-05	3	3	0.313339233	8	8	0.424224854	-0.11088562	0.64	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-09	3	3	0.17666626	8	8	0.424224854	-0.247558594	0.81	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-11	3	3	1.003326416	8	8	0.424224854	0.579101563	<0.05	Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-12	3	3	2.033325195	8	8	0.424224854	1.609100342	<0.05	Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-13	3	3	13.7666626	8	8	0.424224854	13.34243774	<0.05	Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-16	3	3	0.380004883	8	8	0.424224854	-0.044219971	0.58	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-17	3	3	0.743331909	8	8	0.424224854	0.319107056	0.08	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-18	3	3	1.153335571	8	8	0.424224854	0.729110718	<0.05	Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-19	3	3	1.459991455	8	8	0.424224854	1.035766602	<0.05	Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-20	3	3	0.173339844	8	8	0.424224854	-0.25088501	0.83	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-21	3	3	0.152328491	8	8	0.424224854	-0.271896362	0.88	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-22	3	3	1.599990845	8	8	0.424224854	1.175765991	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-01	3	3	7.100006104	8	8	3.748733521	3.351272583	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-02	3	3	7.566665649	8	8	3.748733521	3.817932129	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-03	3	3	7.633331299	8	8	3.748733521	3.884597778	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-04	3	3	7.300003052	8	8	3.748733521	3.551269531	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-05	3	3	7.799987793	8	8	3.748733521	4.051254272	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-06	3	3	7.233337402	8	8	3.748733521	3.484603882	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-07	3	3	6.100006104	8	8	3.748733521	2.351272583	0.13	Do Not Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-09	3	3	7.433334351	8	8	3.748733521	3.68460083	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-10	3	3	7.800003052	8	8	3.748733521	4.051269531	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-11	3	3	6.800003052	8	8	3.748733521	3.051269531	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-12	3	3	7.666656494	8	8	3.748733521	3.917922974	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-13	3	3	8.433334351	8	8	3.748733521	4.68460083	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-14	3	3	7	8	8	3.748733521	3.251266479	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-15	3	3	6.766662598	8	8	3.748733521	3.017929077	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-16	3	3	8.300003052	8	8	3.748733521	4.551269531	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-17	3	3	5.933334351	8	8	3.748733521	2.18460083	0.12	Do Not Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-18	3	3	7.266662598	8	8	3.748733521	3.517929077	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-19	3	3	16	8	8	3.748733521	12.25126648	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-01	3	3	21.33332825	8	8	14.92500305	6.408325195	0.14	Do Not Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-02	3	3	27	8	8	14.92500305	12.07499695	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-03	3	3	26.66665649	8	8	14.92500305	11.74165344	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-04	3	3	56	8	8	14.92500305	41.07499695	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-05	3	3	24.66667175	8	8	14.92500305	9.741668701	0.07	Do Not Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-06	3	3	36.66665649	8	8	14.92500305	21.74165344	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-07	3	3	49	8	8	14.92500305	34.07499695	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-09	3	3	28.33334351	8	8	14.92500305	13.40834045	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-10	3	3	23	8	8	14.92500305	8.074996948	0.09	Do Not Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-11	3	3	33.33332825	8	8	14.92500305	18.4083252	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-12	3	3	48.66667175	8	8	14.92500305	33.7416687	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-13	3	3	360	8	8	14.92500305	345.0749969	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-14	3	3	24.66665649	8	8	14.92500305	9.741653442	0.06	Do Not Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-15	3	3	31.33334351	8	8	14.92500305	16.40834045	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-16	3	3	36.66665649	8	8	14.92500305	21.74165344	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-17	3	3	191	8	8	14.92500305	176.0749969	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-18	3	3	913.3333282	8	8	14.92500305	898.4083252	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-19	3	3	150	8	8	14.92500305	135.0749969	<0.05	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-01	3	3	0.030334473	7	6	0.06703186	-0.0367	0.82	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-02	3	3	0.316665649	7	6	0.06703186	0.249633789	0.01	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-03	3	3	0.076324463	7	6	0.06703186	0.00929	0.37	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-04	3	3	0.279998779	7	6	0.06703186	0.212966919	0.01	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-05	3	3	0.054000854	7	6	0.06703186	-0.013031006	0.65	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-09	3	3	0.030990601	7	6	0.06703186	-0.03604126	0.81	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-11	3	3	0.189987183	7	6	0.06703186	0.122955322	0.02	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-12	3	3	0.316665649	7	6	0.06703186	0.249633789	<0.01	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-13	3	3	1.966659546	7	6	0.06703186	1.899627686	<0.01	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-16	3	3	0.075683594	7	6	0.06703186	0.00865	0.44	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-17	3	3	0.120986938	7	6	0.06703186	0.053955078	0.10	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-18	3	3	0.153335571	7	6	0.06703186	0.086303711	0.04	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-19	3	3	0.313323975	7	6	0.06703186	0.246292114	<0.01	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-20	3	3	0.028671265	7	6	0.06703186	-0.038360596	0.81	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-21	3	3	0.024337769	7	6	0.06703186	-0.042694092	0.84	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-22	3	3	0.270004272	7	6	0.06703186	0.202972412	0.02	Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-01	3	3	0.233337402	8	8	0.907501221	-0.674163818	0.91	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-02	3	3	3.633346558	8	8	0.907501221	2.725845337	<0.05	Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-03	3	3	0.726669312	8	8	0.907501221	-0.180831909	0.61	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-04	3	3	4.466674805	8	8	0.907501221	3.559173584	<0.05	Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-05	3	3	0.539993286	8	8	0.907501221	-0.367507935	0.73	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-09	3	3	0.350006104	8	8	0.907501221	-0.557495117	0.85	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-11	3	3	1.03666687	8	8	0.907501221	0.129165649	0.41	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-12	3	3	3.866668701	8	8	0.907501221	2.95916748	<0.05	Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-13	3	3	31	8	8	0.907501221	30.09249878	<0.05	Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-16	3	3	0.790008545	8	8	0.907501221	-0.117492676	0.59	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-17	3	3	1.213348389	8	8	0.907501221	0.305847168	0.28	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-18	3	3	1.290008545	8	8	0.907501221	0.382507324	0.24	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-19	3	3	2.433334351	8	8	0.907501221	1.52583313	<0.05	Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-20	3	3	0.290008545	8	8	0.907501221	-0.617492676	0.89	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-21	3	3	0.269989014	8	8	0.907501221	-0.637512207	0.92	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-22	3	3	2.599990845	8	8	0.907501221	1.692489624	<0.05	Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-01	3	3	0.008239746	8	8	0.055587769	-0.047348022	0.97	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-02	3	3	0.150009155	8	8	0.055587769	0.094421387	<0.05	Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-03	3	3	0.027999878	8	8	0.055587769	-0.027587891	0.92	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-04	3	3	0.140991211	8	8	0.055587769	0.085403442	0.08	Do Not Reject H0

Phase I Soil Background Comparison Permutation Tests

Matrix	Analyte Name	Analyte Code	CAS	Units	Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
					DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-05	3	3	0.018325806	8	8	0.055587769	-0.037261963	0.96	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-09	3	3	0.013290405	8	8	0.055587769	-0.042297363	0.95	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-11	3	3	0.043991089	8	8	0.055587769	-0.01159668	0.67	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-12	3	3	0.346664429	8	8	0.055587769	0.29107666	<0.05	Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-13	3	3	3.033340454	8	8	0.055587769	2.977752686	<0.05	Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-16	3	3	0.075668335	8	8	0.055587769	0.020080566	0.18	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-17	3	3	0.04598999	8	8	0.055587769	-0.009597778	0.67	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-18	3	3	0.066665649	8	8	0.055587769	0.011077881	0.29	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-19	3	3	0.04800415	8	8	0.055587769	-0.007583618	0.66	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-20	3	3	0.015258789	8	8	0.055587769	-0.040328979	0.95	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-21	3	3	0.014831543	8	8	0.055587769	-0.040756226	0.98	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-22	3	3	0.106338501	8	8	0.055587769	0.050750732	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-01	3	3	1.558258057	8	8	4.054122925	-2.495864868	0.86	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-02	3	3	20.1000061	8	8	4.054122925	16.04588318	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-03	3	3	4.350631714	8	8	4.054122925	0.296508789	0.44	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-04	3	3	18.022995	8	8	4.054122925	13.96887207	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-05	3	3	3.140960693	8	8	4.054122925	-0.913162231	0.62	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-09	3	3	1.931427002	8	8	4.054122925	-2.122695923	0.78	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-11	3	3	9.054000854	8	8	4.054122925	4.99987793	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-12	3	3	21.84367371	8	8	4.054122925	17.78955078	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-13	3	3	157.843338	8	8	4.054122925	153.7892151	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-16	3	3	4.701965332	8	8	4.054122925	0.647842407	0.43	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-17	3	3	6.504333496	8	8	4.054122925	2.450210571	0.16	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-18	3	3	7.623336792	8	8	4.054122925	3.569213867	0.06	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-19	3	3	13.85333252	8	8	4.054122925	9.799209595	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-20	3	3	1.66734314	8	8	4.054122925	-2.386779785	0.80	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-21	3	3	1.495666504	8	8	4.054122925	-2.558456421	0.85	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-22	3	3	14.82000732	8	8	4.054122925	10.7658844	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-01	3	3	0.136657715	8	8	0.287521362	-0.150863647	0.77	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-02	3	3	1.14666748	8	8	0.287521362	0.859146118	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-03	3	3	0.306671143	8	8	0.287521362	0.01914978	0.45	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-04	3	3	1.033340454	8	8	0.287521362	0.745819092	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-05	3	3	0.210006714	8	8	0.287521362	-0.077514648	0.64	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-09	3	3	0.14666748	8	8	0.287521362	-0.140853882	0.72	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-11	3	3	0.873336792	8	8	0.287521362	0.58581543	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-12	3	3	1.220001221	8	8	0.287521362	0.932479858	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-13	3	3	7.333328247	8	8	0.287521362	7.045806885	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-16	3	3	0.306671143	8	8	0.287521362	0.01914978	0.43	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-17	3	3	0.399993896	8	8	0.287521362	0.112472534	0.27	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-18	3	3	0.490005493	8	8	0.287521362	0.202484131	0.15	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-19	3	3	1.030014038	8	8	0.287521362	0.742492676	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-20	3	3	0.133331299	8	8	0.287521362	-0.154190063	0.77	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-21	3	3	0.098007202	8	8	0.287521362	-0.18951416	0.88	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-22	3	3	0.949996948	8	8	0.287521362	0.662475586	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-01	3	3	15666.66667	8	8	14200	1466.666672	0.29	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-02	3	3	18666.66667	8	8	14200	4466.666672	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-03	3	3	18666.66667	8	8	14200	4466.666672	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-04	3	3	19333.33333	8	8	14200	5133.333328	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-05	3	3	19666.66667	8	8	14200	5466.666672	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-06	3	3	17333.33334	8	8	14200	3133.333344	0.12	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-07	3	3	18666.66667	8	8	14200	4466.666672	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-09	3	3	16333.33333	8	8	14200	2133.333328	0.19	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-10	3	3	17333.33333	8	8	14200	3133.333328	0.11	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-11	3	3	18333.33333	8	8	14200	4133.333328	0.05	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-12	3	3	17000	8	8	14200	2800	0.15	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-13	3	3	18333.33333	8	8	14200	4133.333328	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-14	3	3	16333.33333	8	8	14200	2133.333328	0.21	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-15	3	3	18333.33333	8	8	14200	4133.333328	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-16	3	3	21000	8	8	14200	6800	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-17	3	3	16333.33333	8	8	14200	2133.333328	0.23	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-18	3	3	32333.33333	8	8	14200	18133.33333	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-19	3	3	29333.33333	8	8	14200	15133.33333	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-01	3	3	64.33332825	8	8	55	9.333328247	0.27	Do Not Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-02	3	3	93.66667175	8	8	55	38.66667175	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-03	3	3	130	8	8	55	75	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-04	3	3	296.6666718	8	8	55	241.6666718	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-05	3	3	86	8	8	55	31	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-06	3	3	98.33332825	8	8	55	43.33332825	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-07	3	3	1086.666672	8	8	55	1031.666672	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-09	3	3	58.33334351	8	8	55	3.333343506	0.31	Do Not Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-10	3	3	34.33334351	8	8	55	-20.66665649	1.00	Do Not Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-11	3	3	123.3333282	8	8	55	68.33332825	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-12	3	3	84.66667175	8	8	55	29.66667175	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-13	3	3	166.6666718	8	8	55	111.6666718	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-14	3	3	108.6666565	8	8	55	53.66665649	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-15	3	3	126.6666718	8	8	55	71.66667175	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-16	3	3	42	8	8	55	-13	0.94	Do Not Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-17	3	3	1866.666672	8	8	55	1811.666672	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-18	3	3	1433.333328	8	8	55	1378.333328	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-19	3	3	55.33332825	8	8	55	0.333328247	0.41	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-01	3	3	0.306930542	8	8	0.668014526	-0.361083984	0.86	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-02	3	3	5.030014038	8	8	0.668014526	4.361999512	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-03	3	3	0.974304199	8	8	0.668014526	0.306289673	0.21	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-04	3	3	3.929672241	8	8	0.668014526	3.261657715	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-05	3	3	0.70362854	8	8	0.668014526	0.035614014	0.42	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-09	3	3	0.399108887	8	8	0.668014526	-0.26890564	0.77	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-11	3	3	1.604003906	8	8	0.668014526	0.93598938	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-12	3	3	6.513671875	8	8	0.668014526	5.845657349	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-13	3	3	52.07666016	8	8	0.668014526	51.40864563	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-16	3	3	1.369628906	8	8	0.668014526	0.70161438	0.06	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-17	3	3	1.107666016	8	8	0.668014526	0.439651489	0.10	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-18	3	3	1.473007202	8	8	0.668014526	0.804992676	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-19	3	3	1.552337646	8	8	0.668014526	0.88432312	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-20	3	3	0.260437012	8	8	0.668014526	-0.407577515	0.91	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-21	3	3	0.260101318	8	8	0.668014526	-0.407913208	0.86	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-22	3	3	1.964660645	8	8	0.668014526	1.296646118	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-01	3	3	4266.666656	8	8	1712.5	2554.166656	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-02	3	3	8766.666656	8	8	1712.5	7054.166656	<0.05	Reject H0

Phase I Soil Background Comparison Permutation Tests

Matrix	Analyte Name	Analyte Code	CAS	Units	Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
					DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-03	3	3	6066.666672	8	8	1712.5	4354.166672	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-04	3	3	6466.666656	8	8	1712.5	4754.166656	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-05	3	3	4966.666656	8	8	1712.5	3254.166656	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-06	3	3	10333.33333	8	8	1712.5	8620.833328	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-07	3	3	11000	8	8	1712.5	9287.5	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-09	3	3	6000	8	8	1712.5	4287.5	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-10	3	3	10300	8	8	1712.5	8587.5	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-11	3	3	18000	8	8	1712.5	16287.5	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-12	3	3	7633.333344	8	8	1712.5	5920.833344	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-13	3	3	5533.333344	8	8	1712.5	3820.833344	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-14	3	3	6466.666672	8	8	1712.5	4754.166672	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-15	3	3	6533.333344	8	8	1712.5	4820.833344	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-16	3	3	6266.666672	8	8	1712.5	4554.166672	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-17	3	3	35000	8	8	1712.5	33287.5	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-18	3	3	7866.666672	8	8	1712.5	6154.166672	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-19	3	3	6900	8	8	1712.5	5187.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-01	3	3	473.3333282	8	8	211.5	261.8333282	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-02	3	3	640	8	8	211.5	428.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-03	3	3	626.6666565	8	8	211.5	415.1666565	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-04	3	3	473.3333282	8	8	211.5	261.8333282	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-05	3	3	730	8	8	211.5	518.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-06	3	3	690	8	8	211.5	478.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-07	3	3	523.3333282	8	8	211.5	311.8333282	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-09	3	3	493.3333282	8	8	211.5	281.8333282	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-10	3	3	546.6666718	8	8	211.5	335.1666718	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-11	3	3	600	8	8	211.5	388.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-12	3	3	850	8	8	211.5	638.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-13	3	3	976.6666565	8	8	211.5	765.1666565	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-14	3	3	696.6666718	8	8	211.5	485.1666718	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-15	3	3	440	8	8	211.5	228.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-16	3	3	440	8	8	211.5	228.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-17	3	3	406.6666565	8	8	211.5	195.1666565	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-18	3	3	513.3333282	8	8	211.5	301.8333282	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-19	3	3	430	8	8	211.5	218.5	<0.05	Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-01	3	3	0.080657959	8	8	0.227493286	-0.146835327	1.00	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-02	3	3	0.09765625	8	8	0.227493286	-0.129837036	1.00	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-03	3	3	0.126663208	8	8	0.227493286	-0.100830078	0.98	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-04	3	3	0.286651611	8	8	0.227493286	0.059158325	0.13	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-05	3	3	0.153335571	8	8	0.227493286	-0.074157715	0.92	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-09	3	3	0.076004028	8	8	0.227493286	-0.151489258	1.00	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-11	3	3	0.183334351	8	8	0.227493286	-0.044158936	0.81	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-12	3	3	0.243331909	8	8	0.227493286	0.015838623	0.40	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-13	3	3	0.316665649	8	8	0.227493286	0.089172363	0.07	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-14	3	3	0.17666626	8	8	0.227493286	-0.050827026	0.82	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-15	3	3	0.21333313	8	8	0.227493286	-0.014160156	0.63	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-16	3	3	0.096328735	8	8	0.227493286	-0.131164551	1.00	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-17	3	3	0.78666687	8	8	0.227493286	0.559173584	<0.05	Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-18	3	3	2.700012207	8	8	0.227493286	2.472518921	<0.05	Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-19	3	3	0.333343506	8	8	0.227493286	0.10585022	0.13	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-01	3	3	0.008270264	8	8	0.017593384	-0.00932312	0.95	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-02	3	3	0.055664063	8	8	0.017593384	0.038070679	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-03	3	3	0.015991211	8	8	0.017593384	-0.001602173	0.57	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-04	3	1	0.050994873	8	8	0.017593384	0.033401489	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-05	3	3	0.01399231	8	8	0.017593384	-0.003601074	0.76	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-09	3	3	0.011245728	8	8	0.017593384	-0.006347656	0.94	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-11	3	3	0.085998535	8	8	0.017593384	0.068405151	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-12	3	3	0.151992798	8	8	0.017593384	0.134399414	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-13	3	3	0.933334351	8	8	0.017593384	0.915740967	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-16	3	3	0.054992676	8	8	0.017593384	0.037399292	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-17	3	3	0.078674316	8	8	0.017593384	0.061080933	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-18	3	3	0.226669312	8	8	0.017593384	0.209075928	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-19	3	3	0.065673828	8	8	0.017593384	0.048080444	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-20	3	3	0.013320923	8	8	0.017593384	-0.004272461	0.82	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-21	3	3	0.008987427	8	8	0.017593384	-0.008605957	0.97	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-22	3	3	0.060653687	8	8	0.017593384	0.043060303	<0.05	Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-01	3	3	14	8	8	13.02500916	0.974990845	0.41	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-02	3	3	17	8	8	13.02500916	3.974990845	0.24	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-03	3	3	16.66667175	8	8	13.02500916	3.641662598	0.23	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-04	3	3	15.66665649	8	8	13.02500916	2.641647339	0.28	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-05	3	3	18	8	8	13.02500916	4.974990845	0.20	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-06	3	3	15	8	8	13.02500916	1.974990845	0.32	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-07	3	3	14	8	8	13.02500916	0.974990845	0.40	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-09	3	3	14.66667175	8	8	13.02500916	1.641662598	0.39	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-10	3	3	15.66667175	8	8	13.02500916	2.641662598	0.30	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-11	3	3	16	8	8	13.02500916	2.974990845	0.25	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-12	3	3	15	8	8	13.02500916	1.974990845	0.33	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-13	3	3	16.33332825	8	8	13.02500916	3.308319092	0.29	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-14	3	3	15.66667175	8	8	13.02500916	2.641662598	0.29	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-15	3	3	14.33332825	8	8	13.02500916	1.308319092	0.37	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-16	3	3	16	8	8	13.02500916	2.974990845	0.26	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-17	3	3	13.96665955	8	8	13.02500916	0.941650391	0.49	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-18	3	3	25	8	8	13.02500916	11.97499084	0.07	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-19	3	3	16.66667175	8	8	13.02500916	3.641662598	0.27	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-01	3	3	0.082672119	8	8	0.43762207	-0.354949951	0.97	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-02	3	3	1.899993896	8	8	0.43762207	1.462371826	<0.05	Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-03	3	3	0.36000061	8	8	0.43762207	-0.07762146	0.61	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-04	3	3	1.953338623	8	8	0.43762207	1.515716553	<0.05	Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-05	3	3	0.240005493	8	8	0.43762207	-0.197616577	0.75	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-09	3	3	0.125	8	8	0.43762207	-0.31262207	0.91	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-11	3	3	0.35333252	8	8	0.43762207	-0.084289551	0.60	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-12	3	3	2.733337402	8	8	0.43762207	2.295715332	<0.05	Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-13	3	3	22.66665649	8	8	0.43762207	22.22903442	<0.05	Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-16	3	3	0.533340454	8	8	0.43762207	0.095718384	0.34	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-17	3	3	0.543334961	8	8	0.43762207	0.105712891	0.32	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-18	3	3	0.766662598	8	8	0.43762207	0.329040527	0.09	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-19	3	3	0.866668701	8	8	0.43762207	0.429046631	0.12	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-20	3	3	0.123336792	8	8	0.43762207	-0.314285278	0.93	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-21	3	3	0.147994995	8	8	0.43762207	-0.289627075	0.90	Do Not Reject H0

Phase I Soil Background Comparison Permutation Tests

Matrix	Analyte Name	Analyte Code	CAS	Units	Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
					DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-22	3	3	1.069992065	8	8	0.43762207	0.632369995	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-01	3	3	1200	8	8	727.5	472.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-02	3	3	1300	8	8	727.5	572.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-03	3	3	1300	8	8	727.5	572.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-04	3	3	1266.666672	8	8	727.5	539.1666718	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-05	3	3	1233.333328	8	8	727.5	505.8333282	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-06	3	3	1200	8	8	727.5	472.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-07	3	3	1033.333328	8	8	727.5	305.8333282	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-09	3	3	1266.666672	8	8	727.5	539.1666718	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-10	3	3	1333.333328	8	8	727.5	605.8333282	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-11	3	3	956.6666565	8	8	727.5	229.1666565	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-12	3	3	1100	8	8	727.5	372.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-13	3	3	1400	8	8	727.5	672.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-14	3	3	993.3333282	8	8	727.5	265.8333282	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-15	3	3	1200	8	8	727.5	472.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-16	3	3	1566.666656	8	8	727.5	839.1666565	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-17	3	3	1200	8	8	727.5	472.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-18	3	3	1840	8	8	727.5	1112.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-19	3	3	1433.333328	8	8	727.5	705.8333282	<0.05	Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-01	3	3	0.233337402	8	8	0.762481689	-0.529144287	0.88	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-02	3	3	3.566665649	8	8	0.762481689	2.80418396	<0.05	Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-03	3	3	0.730010986	8	8	0.762481689	-0.032470703	0.51	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-04	3	3	3.433334351	8	8	0.762481689	2.670852661	<0.05	Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-05	3	3	0.576675415	8	8	0.762481689	-0.185806274	0.61	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-09	3	3	0.326675415	8	8	0.762481689	-0.435806274	0.84	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-11	3	3	1.223327637	8	8	0.762481689	0.460845947	0.15	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-12	3	3	3.200012207	8	8	0.762481689	2.437530518	<0.05	Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-13	3	3	24.66667175	8	8	0.762481689	23.90419006	<0.05	Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-16	3	3	0.670013428	8	8	0.762481689	-0.092468262	0.55	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-17	3	3	1.206680298	8	8	0.762481689	0.444198608	0.15	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-18	3	3	1.223327637	8	8	0.762481689	0.460845947	0.17	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-19	3	3	1.966674805	8	8	0.762481689	1.204193115	0.05	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-20	3	3	0.276672363	8	8	0.762481689	-0.485809326	0.86	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-21	3	3	0.283340454	8	8	0.762481689	-0.479141235	0.85	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-22	3	3	2.633331299	8	8	0.762481689	1.870849609	<0.05	Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-01	3	3	0.356658936	8	8	0.959991455	-0.60333252	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-02	3	3	0.319992065	8	8	0.959991455	-0.63999939	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-03	3	3	0.416671753	8	8	0.959991455	-0.543319702	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-04	3	3	0.486679077	8	8	0.959991455	-0.473312378	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-05	3	3	0.28666687	8	8	0.959991455	-0.673324585	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-06	3	3	0.350006104	8	8	0.959991455	-0.609985352	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-07	3	3	0.386672974	8	8	0.959991455	-0.573318481	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-09	3	3	0.289993286	8	8	0.959991455	-0.669998169	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-10	3	3	0.276657104	8	8	0.959991455	-0.683334351	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-11	3	3	0.550003052	8	8	0.959991455	-0.409988403	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-12	3	3	0.429992676	8	8	0.959991455	-0.529998779	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-13	3	3	0.61000061	8	8	0.959991455	-0.349990845	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-14	3	3	0.386672974	8	8	0.959991455	-0.573318481	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-15	3	3	0.53666687	8	8	0.959991455	-0.423324585	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-16	3	3	0.383331299	8	8	0.959991455	-0.576660156	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-17	3	3	0.466659546	8	8	0.959991455	-0.493331909	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-18	3	3	0.559997559	8	8	0.959991455	-0.399993896	0.98	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-19	3	3	0.403335571	8	8	0.959991455	-0.556655884	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-01	3	0	0.099	8	8	0.272491455	-0.173491455	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-02	3	0	0.1	8	8	0.272491455	-0.172491455	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-03	3	1	0.096008301	8	8	0.272491455	-0.176483154	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-04	3	3	0.102661133	8	8	0.272491455	-0.169830322	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-05	3	0	0.099	8	8	0.272491455	-0.173491455	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-06	3	3	0.07699585	8	8	0.272491455	-0.195495605	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-07	3	3	0.099990845	8	8	0.272491455	-0.17250061	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-09	3	0	0.095	8	8	0.272491455	-0.177491455	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-10	3	1	0.059005737	8	8	0.272491455	-0.213485718	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-11	3	3	0.079666138	8	8	0.272491455	-0.192825317	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-12	3	3	0.070999146	8	8	0.272491455	-0.20149231	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-13	3	3	0.089660645	8	8	0.272491455	-0.182830811	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-14	3	3	0.076675415	8	8	0.272491455	-0.19581604	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-15	3	3	0.080337524	8	8	0.272491455	-0.192153931	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-16	3	3	0.058334351	8	8	0.272491455	-0.214157104	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-17	3	3	0.623336792	8	8	0.272491455	0.350845337	<0.05	Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-18	3	3	0.800003052	8	8	0.272491455	0.527511597	<0.05	Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-19	3	3	0.123336792	8	8	0.272491455	-0.149154663	1.00	Do Not Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-01	3	3	101.6666565	8	8	43.75	57.91665649	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-02	3	3	73.66667175	8	8	43.75	29.91667175	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-03	3	3	88.66665649	8	8	43.75	44.91665649	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-04	3	3	210	8	8	43.75	166.25	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-05	3	3	61.66667175	8	8	43.75	17.91667175	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-06	3	3	84.66667175	8	8	43.75	40.91667175	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-07	3	3	90.66667175	8	8	43.75	46.91667175	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-09	3	3	163.3333282	8	8	43.75	119.5833282	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-10	3	2	85.5	8	8	43.75	41.75	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-11	3	3	60.33332825	8	8	43.75	16.58332825	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-12	3	3	69.33334351	8	8	43.75	25.58334351	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-13	3	3	123.3333282	8	8	43.75	79.58332825	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-14	3	3	71.66665649	8	8	43.75	27.91665649	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-15	3	3	77.66665649	8	8	43.75	33.91665649	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-16	3	3	376.6666718	8	8	43.75	332.9166718	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-17	3	3	420	8	8	43.75	376.25	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-18	3	3	736.6666718	8	8	43.75	692.9166718	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-19	3	3	2300	8	8	43.75	2256.25	<0.05	Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-01	3	3	0.126663208	8	8	0.129241943	-0.002578735	0.52	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-02	3	3	0.130004883	8	8	0.129241943	0.000762939	0.50	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-03	3	3	0.133331299	8	8	0.129241943	0.004089355	0.45	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-04	3	3	0.183334351	8	8	0.129241943	0.054092407	0.06	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-05	3	3	0.10333252	8	8	0.129241943	-0.025909424	0.74	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-06	3	3	0.136657715	8	8	0.129241943	0.007415771	0.45	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-07	3	3	0.203338623	8	8	0.129241943	0.07409668	<0.05	Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-09	3	3	0.123336792	8	8	0.129241943	-0.005905151	0.62	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-10	3	3	0.149993896	8	8	0.129241943	0.020751953	0.29	Do Not Reject H0

Phase I Soil Background Comparison Permutation Tests

Matrix	Analyte Name	Analyte Code	CAS	Units	Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
					DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-11	3	3	0.210006714	8	8	0.129241943	0.080764771	<0.05	Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-12	3	3	0.14666748	8	8	0.129241943	0.017425537	0.30	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-13	3	3	0.166671753	8	8	0.129241943	0.03742981	0.17	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-14	3	3	0.120010376	8	8	0.129241943	-0.009231567	0.63	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-15	3	3	0.156661987	8	8	0.129241943	0.027420044	0.24	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-16	3	3	0.123336792	8	8	0.129241943	-0.005905151	0.57	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-17	3	3	0.123321533	8	8	0.129241943	-0.00592041	0.59	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-18	3	3	0.180007935	8	8	0.129241943	0.050765991	0.11	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-19	3	3	0.126663208	8	8	0.129241943	-0.002578735	0.61	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-01	3	3	22	8	8	32.375	-10.375	0.88	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-02	3	3	21.66667175	8	8	32.375	-10.70832825	0.89	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-03	3	3	24	8	8	32.375	-8.375	0.77	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-04	3	3	22	8	8	32.375	-10.375	0.86	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-05	3	3	19.66667175	8	8	32.375	-12.70832825	0.92	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-06	3	3	20.33334351	8	8	32.375	-12.04165649	0.86	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-07	3	3	20.33332825	8	8	32.375	-12.04167175	0.91	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-09	3	3	25	8	8	32.375	-7.375	0.80	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-10	3	3	22.66665649	8	8	32.375	-9.708343506	0.85	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-11	3	3	23	8	8	32.375	-9.375	0.84	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-12	3	3	27	8	8	32.375	-5.375	0.69	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-13	3	3	30.33332825	8	8	32.375	-2.041671753	0.61	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-14	3	3	20	8	8	32.375	-12.375	0.90	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-15	3	3	25.33332825	8	8	32.375	-7.041671753	0.73	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-16	3	3	29.33332825	8	8	32.375	-3.041671753	0.68	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-17	3	3	19	8	8	32.375	-13.375	0.93	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-18	3	3	27.33332825	8	8	32.375	-5.041671753	0.71	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-19	3	3	47.33332825	8	8	32.375	14.95832825	0.08	Do Not Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-01	3	3	78.33332825	8	8	42.375	35.95832825	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-02	3	3	75.33332825	8	8	42.375	32.95832825	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-03	3	3	109	8	8	42.375	66.625	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-04	3	3	206.6666718	8	8	42.375	164.2916718	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-05	3	3	75.66667175	8	8	42.375	33.29167175	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-06	3	3	67.66667175	8	8	42.375	25.29167175	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-07	3	3	206.6666718	8	8	42.375	164.2916718	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-09	3	3	68.66665649	8	8	42.375	26.29165649	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-10	3	3	58	8	8	42.375	15.625	0.12	Do Not Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-11	3	3	99	8	8	42.375	56.625	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-12	3	3	96	8	8	42.375	53.625	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-13	3	3	153.3333435	8	8	42.375	110.9583435	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-14	3	3	75.33332825	8	8	42.375	32.95832825	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-15	3	3	163.3333282	8	8	42.375	120.9583282	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-16	3	3	69	8	8	42.375	26.625	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-17	3	3	7033.333328	8	8	42.375	6990.958328	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-18	3	3	1161	8	8	42.375	1118.625	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-19	3	3	106.6666565	8	8	42.375	64.29165649	<0.05	Reject H0
SB	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-17	3	3	0.098342896	8	8	0.013412476	0.08493042	<0.05	Reject H0
SB	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-18	3	3	0.088668823	8	8	0.013412476	0.075256348	<0.05	Reject H0
SB	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-19	3	3	0.000976563	8	8	0.013412476	-0.012435913	1.00	Do Not Reject H0
SB	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-20	3	3	0.004928589	8	8	0.013412476	-0.008483887	0.96	Do Not Reject H0
SB	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-21	3	3	0.005599976	8	8	0.013412476	-0.0078125	0.97	Do Not Reject H0
SB	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-17	3	3	0.13999939	8	8	0.012390137	0.127609253	<0.05	Reject H0
SB	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-18	3	3	0.105010986	8	8	0.012390137	0.09262085	<0.05	Reject H0
SB	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-19	3	3	0.00151062	8	8	0.012390137	-0.010879517	1.00	Do Not Reject H0
SB	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-20	3	3	0.007553101	8	8	0.012390137	-0.004837036	0.94	Do Not Reject H0
SB	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-21	3	3	0.00793457	8	8	0.012390137	-0.004455566	0.90	Do Not Reject H0
SB	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-17	3	3	0.070999146	8	8	0.038757324	0.032241821	0.06	Do Not Reject H0
SB	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-18	3	3	0.196655273	8	8	0.038757324	0.157897949	<0.05	Reject H0
SB	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-19	3	3	0.001586914	8	8	0.038757324	-0.03717041	1.00	Do Not Reject H0
SB	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-20	3	3	0.006027222	8	8	0.038757324	-0.032730103	0.99	Do Not Reject H0
SB	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-21	3	3	0.004837036	8	8	0.038757324	-0.033920288	0.99	Do Not Reject H0
SB	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-17	3	3	0.036010742	8	8	0.033493042	0.0025177	0.38	Do Not Reject H0
SB	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-18	3	3	0.056655884	8	8	0.033493042	0.023162842	0.10	Do Not Reject H0
SB	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-19	3	3	0.005630493	8	8	0.033493042	-0.027862549	1.00	Do Not Reject H0
SB	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-20	3	3	0.021331787	8	8	0.033493042	-0.012161255	0.84	Do Not Reject H0
SB	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-21	3	3	0.011260986	8	8	0.033493042	-0.022232056	0.97	Do Not Reject H0
SB	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-17	3	3	6033.333328	8	8	12162.5	-6129.166672	1.00	Do Not Reject H0
SB	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-18	3	3	5000	8	8	12162.5	-7162.5	1.00	Do Not Reject H0
SB	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-19	3	3	22000	8	8	12162.5	9837.5	<0.05	Reject H0
SB	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-17	3	3	0.15032959	8	8	0.059188843	0.091140747	<0.05	Reject H0
SB	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-18	3	3	0.169998169	8	8	0.059188843	0.110809326	<0.05	Reject H0
SB	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-19	3	3	0.005432129	8	8	0.059188843	-0.053756714	1.00	Do Not Reject H0
SB	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-20	3	3	0.026000977	8	8	0.059188843	-0.033187866	0.89	Do Not Reject H0
SB	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-21	3	3	0.015670776	8	8	0.059188843	-0.043518066	0.96	Do Not Reject H0
SB	Antimony	SB	7440-36-0	mg/kg	IINY-DU-17	3	3	4.566665649	8	8	0.986236572	3.580429077	<0.05	Reject H0
SB	Antimony	SB	7440-36-0	mg/kg	IINY-DU-18	3	3	9.833343506	8	8	0.986236572	8.847106934	<0.05	Reject H0
SB	Antimony	SB	7440-36-0	mg/kg	IINY-DU-19	3	3	0.113327026	8	8	0.986236572	-0.872909546	1.00	Do Not Reject H0
SB	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-17	3	3	23.33334351	8	8	5.325012207	18.0083313	<0.05	Reject H0
SB	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-18	3	3	17.33334351	8	8	5.325012207	12.0083313	<0.05	Reject H0
SB	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-19	3	3	2.766662598	8	8	5.325012207	-2.558349609	0.97	Do Not Reject H0
SB	Barium	BA	7440-39-3	mg/kg	IINY-DU-17	3	3	356.6666565	8	8	33.375	323.2916565	<0.05	Reject H0
SB	Barium	BA	7440-39-3	mg/kg	IINY-DU-18	3	3	303.3333435	8	8	33.375	269.9583435	<0.05	Reject H0
SB	Barium	BA	7440-39-3	mg/kg	IINY-DU-19	3	3	35.33334351	8	8	33.375	1.958343506	0.44	Do Not Reject H0
SB	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-17	3	3	0.456665039	8	8	0.307479858	0.149185181	0.20	Do Not Reject H0
SB	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-18	3	3	0.503341675	8	8	0.307479858	0.195861816	0.15	Do Not Reject H0
SB	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-19	3	3	0.022003174	8	8	0.307479858	-0.285476685	1.00	Do Not Reject H0
SB	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-20	3	3	0.072998047	8	8	0.307479858	-0.234481812	0.91	Do Not Reject H0
SB	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-21	3	3	0.066665649	8	8	0.307479858	-0.240814209	0.95	Do Not Reject H0
SB	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-17	3	3	0.289993286	8	8	0.329742432	-0.039749146	0.58	Do Not Reject H0
SB	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-18	3	3	0.356658936	8	8	0.329742432	0.026916504	0.43	Do Not Reject H0
SB	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-19	3	3	0.025009155	8	8	0.329742432	-0.304733276	1.00	Do Not Reject H0
SB	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-20	3	3	0.074661255	8	8	0.329742432	-0.255081177	0.97	Do Not Reject H0
SB	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-21	3	3	0.067657471	8	8	0.329742432	-0.262084961	0.95	Do Not Reject H0
SB	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-17	3	3	0.653335571	8	8	0.523986816	0.129348755	0.35	Do Not Reject H0
SB	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-18	3	3	0.836669922	8	8	0.523986816	0.312683105	0.17	Do Not Reject H0
SB	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-19	3	3	0.038330078	8	8	0.523986816	-0.485656738	1.00	Do Not Reject H0
SB	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-20	3	3	0.113327026	8	8	0.523986816	-0.41065979	0.97	Do Not Reject H0
SB	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-21	3	3	0.123336792	8	8	0.523986816	-0.400650024	0.97	Do Not Reject H0
SB	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-17	3	3	0.246673584	8	8	0.261871338	-0.015197754	0.54	Do Not Reject H0

Phase I Soil Background Comparison Permutation Tests

Matrix	Analyte Name	Analyte Code	CAS	Units	Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
					DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SB	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-18	3	3	0.296661377	8	8	0.261871338	0.034790039	0.39	Do Not Reject H0
SB	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-19	3	3	0.022674561	8	8	0.261871338	-0.239196777	1.00	Do Not Reject H0
SB	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-20	3	3	0.045669556	8	8	0.261871338	-0.216201782	0.96	Do Not Reject H0
SB	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-21	3	3	0.040664673	8	8	0.261871338	-0.221206665	0.98	Do Not Reject H0
SB	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-17	3	3	0.15032959	8	8	0.191375732	-0.041046143	0.63	Do Not Reject H0
SB	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-18	3	3	0.164993286	8	8	0.191375732	-0.026382446	0.55	Do Not Reject H0
SB	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-19	3	3	0.011734009	8	8	0.191375732	-0.179641724	1.00	Do Not Reject H0
SB	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-20	3	3	0.033660889	8	8	0.191375732	-0.157714844	0.96	Do Not Reject H0
SB	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-21	3	3	0.038330078	8	8	0.191375732	-0.153045654	0.95	Do Not Reject H0
SB	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-17	3	3	1.333328247	8	8	0.43963623	0.893692017	<0.05	Reject H0
SB	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-18	3	3	0.653335571	8	8	0.43963623	0.213699341	0.13	Do Not Reject H0
SB	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-19	3	3	0.183334351	8	8	0.43963623	-0.25630188	0.91	Do Not Reject H0
SB	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-17	3	3	3.5	8	8	0.174987793	3.325012207	<0.05	Reject H0
SB	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-18	3	3	12.09999084	8	8	0.174987793	11.92500305	<0.05	Reject H0
SB	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-19	3	3	0.092330933	8	8	0.174987793	-0.08265686	1.00	Do Not Reject H0
SB	Calcium	CA	7440-70-2	mg/kg	IINY-DU-17	3	3	18333.33333	8	8	1222.5	17110.83333	<0.05	Reject H0
SB	Calcium	CA	7440-70-2	mg/kg	IINY-DU-18	3	3	32000	8	8	1222.5	30777.5	<0.05	Reject H0
SB	Calcium	CA	7440-70-2	mg/kg	IINY-DU-19	3	3	18000	8	8	1222.5	16777.5	<0.05	Reject H0
SB	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-17	3	3	12.66667175	8	8	14.6625061	-1.995834351	0.66	Do Not Reject H0
SB	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-18	3	3	31.33332825	8	8	14.6625061	16.67082214	<0.05	Reject H0
SB	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-19	3	3	7.766662598	8	8	14.6625061	-6.895843506	0.77	Do Not Reject H0
SB	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-17	3	3	0.759994507	8	8	0.424224854	0.335769653	0.09	Do Not Reject H0
SB	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-18	3	3	1.149993896	8	8	0.424224854	0.725769043	<0.05	Reject H0
SB	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-19	3	3	0.024658203	8	8	0.424224854	-0.39956665	1.00	Do Not Reject H0
SB	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-20	3	3	0.079330444	8	8	0.424224854	-0.344894409	0.97	Do Not Reject H0
SB	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-21	3	3	0.078674316	8	8	0.424224854	-0.345550537	0.97	Do Not Reject H0
SB	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-17	3	3	6.566665649	8	8	3.748733521	2.817932129	0.06	Do Not Reject H0
SB	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-18	3	3	6.333328247	8	8	3.748733521	2.584594727	0.08	Do Not Reject H0
SB	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-19	3	3	17	8	8	3.748733521	13.25126648	<0.05	Reject H0
SB	Copper	CU	7440-50-8	mg/kg	IINY-DU-17	3	3	146.6666718	8	8	14.92500305	131.7416687	<0.05	Reject H0
SB	Copper	CU	7440-50-8	mg/kg	IINY-DU-18	3	3	5400	8	8	14.92500305	5385.074997	<0.05	Reject H0
SB	Copper	CU	7440-50-8	mg/kg	IINY-DU-19	3	3	210	8	8	14.92500305	195.0749969	<0.05	Reject H0
SB	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-17	3	3	0.115997314	7	6	0.06703186	0.048965454	0.15	Do Not Reject H0
SB	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-18	3	3	0.121322632	7	6	0.06703186	0.054290771	0.13	Do Not Reject H0
SB	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-19	3	3	0.005569458	7	6	0.06703186	-0.061462402	0.98	Do Not Reject H0
SB	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-20	3	3	0.013671875	7	6	0.06703186	-0.053359985	0.93	Do Not Reject H0
SB	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-21	3	3	0.011993408	7	6	0.06703186	-0.055038452	0.97	Do Not Reject H0
SB	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-17	3	3	0.980010986	8	8	0.907501221	0.072509766	0.45	Do Not Reject H0
SB	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-18	3	3	1.016662598	8	8	0.907501221	0.109161377	0.37	Do Not Reject H0
SB	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-19	3	3	0.040664673	8	8	0.907501221	-0.866836548	1.00	Do Not Reject H0
SB	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-20	3	3	0.136672974	8	8	0.907501221	-0.770828247	0.98	Do Not Reject H0
SB	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-21	3	3	0.126663208	8	8	0.907501221	-0.780838013	1.00	Do Not Reject H0
SB	Fluorene	FL	86-73-7	mg/kg	IINY-DU-17	3	3	0.083343506	8	8	0.055587769	0.027755737	0.11	Do Not Reject H0
SB	Fluorene	FL	86-73-7	mg/kg	IINY-DU-18	3	3	0.150009155	8	8	0.055587769	0.094421387	<0.05	Reject H0
SB	Fluorene	FL	86-73-7	mg/kg	IINY-DU-19	3	3	0.002532959	8	8	0.055587769	-0.05305481	1.00	Do Not Reject H0
SB	Fluorene	FL	86-73-7	mg/kg	IINY-DU-20	3	3	0.008956909	8	8	0.055587769	-0.046630859	0.96	Do Not Reject H0
SB	Fluorene	FL	86-73-7	mg/kg	IINY-DU-21	3	3	0.005691528	8	8	0.055587769	-0.04989624	0.99	Do Not Reject H0
SB	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-17	3	3	4.684677124	8	8	4.054122925	0.630554199	0.35	Do Not Reject H0
SB	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-18	3	3	5.639663696	8	8	4.054122925	1.585540771	0.28	Do Not Reject H0
SB	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-19	3	3	0.253631592	8	8	4.054122925	-3.800491333	1.00	Do Not Reject H0
SB	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-20	3	3	0.759002686	8	8	4.054122925	-3.295120239	0.97	Do Not Reject H0
SB	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-21	3	3	0.728012085	8	8	4.054122925	-3.32611084	0.96	Do Not Reject H0
SB	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-17	3	3	0.208343506	8	8	0.287521362	-0.079177856	0.67	Do Not Reject H0
SB	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-18	3	3	0.256668091	8	8	0.287521362	-0.030853271	0.56	Do Not Reject H0
SB	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-19	3	3	0.023330688	8	8	0.287521362	-0.264190674	1.00	Do Not Reject H0
SB	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-20	3	3	0.048995972	8	8	0.287521362	-0.238525391	0.97	Do Not Reject H0
SB	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-21	3	3	0.047332764	8	8	0.287521362	-0.240188599	0.95	Do Not Reject H0
SB	Iron	FE	7439-89-6	mg/kg	IINY-DU-17	3	3	25666.66667	8	8	14200	11466.66667	<0.05	Reject H0
SB	Iron	FE	7439-89-6	mg/kg	IINY-DU-18	3	3	37333.33333	8	8	14200	23133.33333	<0.05	Reject H0
SB	Iron	FE	7439-89-6	mg/kg	IINY-DU-19	3	3	34666.66666	8	8	14200	20466.66666	<0.05	Reject H0
SB	Lead	PB	7439-92-1	mg/kg	IINY-DU-17	3	3	1573.333328	8	8	55	1518.333328	<0.05	Reject H0
SB	Lead	PB	7439-92-1	mg/kg	IINY-DU-18	3	3	2433.333344	8	8	55	2378.333344	<0.05	Reject H0
SB	Lead	PB	7439-92-1	mg/kg	IINY-DU-19	3	3	12.33334351	8	8	55	-42.66665649	1.00	Do Not Reject H0
SB	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-17	3	3	1.63899231	8	8	0.668014526	0.970977783	<0.05	Reject H0
SB	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-18	3	3	2.300323486	8	8	0.668014526	1.63230896	<0.05	Reject H0
SB	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-19	3	3	0.0377	8	8	0.668014526	-0.630310059	1.00	Do Not Reject H0
SB	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-20	3	3	0.151992798	8	8	0.668014526	-0.516021729	0.94	Do Not Reject H0
SB	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-21	3	3	0.115493774	8	8	0.668014526	-0.552520752	1.00	Do Not Reject H0
SB	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-17	3	3	8233.333328	8	8	1712.5	6520.833328	<0.05	Reject H0
SB	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-18	3	3	17333.33333	8	8	1712.5	15620.83333	<0.05	Reject H0
SB	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-19	3	3	7266.666656	8	8	1712.5	5554.166656	<0.05	Reject H0
SB	Manganese	MN	7439-96-5	mg/kg	IINY-DU-17	3	3	170	8	8	211.5	-41.5	0.74	Do Not Reject H0
SB	Manganese	MN	7439-96-5	mg/kg	IINY-DU-18	3	3	480	8	8	211.5	268.5	<0.05	Reject H0
SB	Manganese	MN	7439-96-5	mg/kg	IINY-DU-19	3	3	276.6666718	8	8	211.5	65.16667175	0.15	Do Not Reject H0
SB	Mercury	HG	7439-97-6	mg/kg	IINY-DU-17	3	3	0.82333374	8	8	0.227493286	0.595840454	<0.05	Reject H0
SB	Mercury	HG	7439-97-6	mg/kg	IINY-DU-18	3	3	1.173339844	8	8	0.227493286	0.945846558	<0.05	Reject H0
SB	Mercury	HG	7439-97-6	mg/kg	IINY-DU-19	3	3	0.206665039	8	8	0.227493286	-0.020828247	0.63	Do Not Reject H0
SB	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-17	3	3	0.240005493	8	8	0.017593384	0.222412109	<0.05	Reject H0
SB	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-18	3	3	0.559997559	8	8	0.017593384	0.542404175	<0.05	Reject H0
SB	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-19	3	2	0.001998901	8	8	0.017593384	-0.015594482	1.00	Do Not Reject H0
SB	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-20	3	3	0.007507324	8	8	0.017593384	-0.01008606	0.96	Do Not Reject H0
SB	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-21	3	3	0.007827759	8	8	0.017593384	-0.009765625	0.94	Do Not Reject H0
SB	Nickel	NI	7440-02-0	mg/kg	IINY-DU-17	3	3	19.66667175	8	8	13.02500916	6.641662598	0.23	Do Not Reject H0
SB	Nickel	NI	7440-02-0	mg/kg	IINY-DU-18	3	3	65	8	8	13.02500916	51.97499084	<0.05	Reject H0
SB	Nickel	NI	7440-02-0	mg/kg	IINY-DU-19	3	3	14	8	8	13.02500916	0.974990845	0.40	Do Not Reject H0
SB	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-17	3	3	0.820007324	8	8	0.43762207	0.382385254	0.09	Do Not Reject H0
SB	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-18	3	3	0.973327637	8	8	0.43762207	0.535705566	<0.05	Reject H0
SB	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-19	3	3	0.018035889	8	8	0.43762207	-0.419586182	1.00	Do Not Reject H0
SB	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-20	3	3	0.069656372	8	8	0.43762207	-0.367965698	0.99	Do Not Reject H0
SB	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-21	3	3	0.056655884	8	8	0.43762207	-0.380966187	1.00	Do Not Reject H0
SB	Potassium	K	2023695	mg/kg	IINY-DU-17	3	3	573.3333435	8	8	727.5	-154.1666565	1.00	Do Not Reject H0
SB	Potassium	K	2023695	mg/kg	IINY-DU-18	3	3	723.3333282	8	8	727.5	-4.166671753	0.47	Do Not Reject H0
SB	Potassium	K	2023695	mg/kg	IINY-DU-19	3	3	1133.333328	8	8	727.5	405.8333282	<0.05	Reject H0
SB	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-17	3	3	0.82333374	8	8	0.762481689	0.060852051	0.44	Do Not Reject H0
SB	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-18	3	3	0.936676025	8	8	0.762481689	0.174194336	0.31	Do Not Reject H0
SB	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-19	3	3	0.039672852	8	8	0.762481689	-0.722808838	1.00	Do Not Reject H0
SB	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-20	3	3	0.13999939	8	8	0.762481689	-0.6224823	0.96	Do Not Reject H0
SB	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-21	3	3	0.126663208	8	8	0.762481689	-0.635818481	0.99	Do Not Reject H0

Phase I Soil Background Comparison Permutation Tests

Matrix	Analyte Name	Analyte Code	CAS	Units	Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
					DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SB	Selenium	SE	7782-49-2	mg/kg	IINY-DU-17	3	3	1.333343506	8	8	0.959991455	0.373352051	<0.05	Reject H0
SB	Selenium	SE	7782-49-2	mg/kg	IINY-DU-18	3	3	0.866668701	8	8	0.959991455	-0.093322754	0.80	Do Not Reject H0
SB	Selenium	SE	7782-49-2	mg/kg	IINY-DU-19	3	3	0.229995728	8	8	0.959991455	-0.729995728	1.00	Do Not Reject H0
SB	Silver	AG	7440-22-4	mg/kg	IINY-DU-17	3	3	0.263336182	8	8	0.272491455	-0.009155273	0.56	Do Not Reject H0
SB	Silver	AG	7440-22-4	mg/kg	IINY-DU-18	3	3	1.476669312	8	8	0.272491455	1.204177856	<0.05	Reject H0
SB	Silver	AG	7440-22-4	mg/kg	IINY-DU-19	3	3	0.102325439	8	8	0.272491455	-0.170166016	1.00	Do Not Reject H0
SB	Sodium	NA	7440-23-5	mg/kg	IINY-DU-17	3	3	500	8	8	43.75	456.25	<0.05	Reject H0
SB	Sodium	NA	7440-23-5	mg/kg	IINY-DU-18	3	3	426.6666718	8	8	43.75	382.9166718	<0.05	Reject H0
SB	Sodium	NA	7440-23-5	mg/kg	IINY-DU-19	3	3	2733.333328	8	8	43.75	2689.583328	<0.05	Reject H0
SB	Thallium	TL	7440-28-0	mg/kg	IINY-DU-17	3	3	0.706680298	8	8	0.129241943	0.577438354	<0.05	Reject H0
SB	Thallium	TL	7440-28-0	mg/kg	IINY-DU-18	3	3	0.309997559	8	8	0.129241943	0.180755615	<0.05	Reject H0
SB	Thallium	TL	7440-28-0	mg/kg	IINY-DU-19	3	3	0.07232666	8	8	0.129241943	-0.056915283	0.93	Do Not Reject H0
SB	Vanadium	V	7440-62-2	mg/kg	IINY-DU-17	3	3	22.33334351	8	8	32.375	-10.04165649	0.84	Do Not Reject H0
SB	Vanadium	V	7440-62-2	mg/kg	IINY-DU-18	3	3	17.66667175	8	8	32.375	-14.70832825	0.94	Do Not Reject H0
SB	Vanadium	V	7440-62-2	mg/kg	IINY-DU-19	3	3	55.33332825	8	8	32.375	22.95832825	<0.05	Reject H0
SB	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-17	3	3	2133.333328	8	8	42.375	2090.958328	<0.05	Reject H0
SB	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-18	3	3	4566.666672	8	8	42.375	4524.291672	<0.05	Reject H0
SB	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-19	3	3	61	8	8	42.375	18.625	<0.05	Reject H0

1. For each test, 10,000 permutation resamples were used to yield a stable p-value. When the value shown in “Right Tailed Prob” is less than 0.05, the H0 is rejected. If the resulting value in the Conclusion column is Do Not Reject H0, then the H0 is true and site concentrations are less than or equal to background. If the result is Reject H0, then site concentrations are greater than background.

Appendix F2

Phase II Surface Water Background Comparison Permutation Tests

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Phase II Surface Water Background Comparison Permutation Tests

				Site Data				Background Data				Permutation Test (H0: Site <= Background)			
Analyte Name	Analyte Code	CAS	Units	Decision Unit	Number of Samples Collected	Number of Analyte Detections	Mean [1]	Decision Unit	Number of Samples Collected	Number of Analyte Detections	Mean [1]	Site Mean - Background Mean [2]	Right-Tailed Probability [3]	Adjusted Right-Tailed Probability [3]	Conclusion [4]
Aluminum	AL	7429-90-5	ug/L	DUMP	20	10	23.3	CHHRS	20	20	20.5	2.8	0.0499*	0.2495	Do Not Reject H0
Antimony	SB	7440-36-0	ug/L	DUMP	20	2	1.04	CHHRS	20	0	<1	[0.035, 1.04]	0.2196	0.2196	Do Not Reject H0
Arsenic	AS	7440-38-2	ug/L	DUMP	20	10	0.401	CHHRS	20	16	0.376	0.0248	0.1477	0.1477	Do Not Reject H0
Barium	BA	7440-39-3	ug/L	DUMP	20	20	12.7	CHHRS	20	20	12.4	0.35	0.1836	0.1836	Do Not Reject H0
Beryllium	BE	7440-41-7	ug/L	DUMP	20	2	0.0996	CHHRS	20	0	<0.3	[-0.2, 0.0996]	0.7425	0.7425	Do Not Reject H0
Cadmium	CD	7440-43-9	ug/L	DUMP	20	0	<0.75	CHHRS	20	0	<0.75	[-0.75, 0.75]	1.0000	1.0000	Do Not Reject H0
Calcium	CA	7440-70-2	ug/L	DUMP	20	20	17,400	CHHRS	20	20	22,200	-4800	1.0000	1.0000	Do Not Reject H0
Chromium	CR	7440-47-3	ug/L	DUMP	20	1	0.5	CHHRS	20	0	<1.8	[-1.3, 0.5]	1.0000	1.0000	Do Not Reject H0
Cobalt	CO	7440-48-4	ug/L	DUMP	20	4	0.145	CHHRS	20	1	0.093	0.052	0.0978	.0978	Do Not Reject H0
Copper	CU	7440-50-8	ug/L	DUMP	20	20	2.66	CHHRS	20	20	1.36	1.3	0.0020*	0.0025*	Reject H0
Iron	FE	7439-89-6	ug/L	DUMP	20	0	<96.7	CHHRS	20	19	65.6	[-65.6, 31.1]	0.0120*	0.0599	Do Not Reject H0
Lead	PB	7439-92-1	ug/L	DUMP	20	10	0.406	CHHRS	20	1	0.61	-0.204	0.9441	0.9441	Do Not Reject H0
Magnesium	MG	7439-95-4	ug/L	DUMP	20	20	5,790	CHHRS	20	20	3,820	1970	0.0020*	0.0050*	Reject H0
Manganese	MN	7439-96-5	ug/L	DUMP	20	20	6.73	CHHRS	20	20	12.7	-5.93	0.9242	0.9242	Do Not Reject H0
Mercury	HG	7439-97-6	ug/L	DUMP	40	0	<0.08	CHHRS	40	0	<0.08	[-0.08, 0.08]	1.0000	1.0000	Do Not Reject H0
Nickel	NI	7440-02-0	ug/L	DUMP	20	16	0.428	CHHRS	20	5	0.373	0.0551	0.1178	0.1178	Do Not Reject H0
Potassium	K	2023695	ug/L	DUMP	20	20	2,240	CHHRS	20	20	1,220	1020	0.0020*	0.0050*	Reject H0
Selenium	SE	7782-49-2	ug/L	DUMP	20	1	0.37	CHHRS	20	0	<1	[-0.63, 0.37]	1.0000	1.0000	Do Not Reject H0
Silver	AG	7440-22-4	ug/L	DUMP	20	0	<0.1	CHHRS	20	0	<0.1	[-0.1, 0.1]	1.0000	1.0000	Do Not Reject H0
Sodium	NA	7440-23-5	ug/L	DUMP	20	20	25,100	CHHRS	20	20	15,700	9400	0.0020*	0.0050*	Reject H0
Thallium	TL	7440-28-0	ug/L	DUMP	20	1	0.17	CHHRS	20	0	<0.2	[-0.03, 0.17]	1.0000	1.0000	Do Not Reject H0
Vanadium	V	7440-62-2	ug/L	DUMP	20	0	<3	CHHRS	20	0	<3	[-3, 3]	1.0000	1.0000	Do Not Reject H0
Zinc	ZN	7440-66-6	ug/L	DUMP	20	19	11.5	CHHRS	20	2	7.35	4.17	0.2635	0.2635	Do Not Reject H0
Aluminum	AL	7429-90-5	ug/L	DUMP	20	10	23.3	CHMS	20	18	58.9	-35.6	0.9900	0.9900	Do Not Reject H0
Antimony	SB	7440-36-0	ug/L	DUMP	20	2	1.04	CHMS	20	0	<1	[0.035, 1.04]	0.2315	0.2315	Do Not Reject H0
Arsenic	AS	7440-38-2	ug/L	DUMP	20	10	0.401	CHMS	20	19	0.711	-0.31	1.0000	1.0000	Do Not Reject H0
Barium	BA	7440-39-3	ug/L	DUMP	20	20	12.7	CHMS	20	20	13.1	-0.385	0.6627	0.6627	Do Not Reject H0
Beryllium	BE	7440-41-7	ug/L	DUMP	20	2	0.0996	CHMS	20	0	<0.3	[-0.2, 0.0996]	.7186	.7186	Do Not Reject H0
Cadmium	CD	7440-43-9	ug/L	DUMP	20	0	<0.75	CHMS	20	0	<0.75	[-0.75, 0.75]	1.0000	1.0000	Do Not Reject H0
Calcium	CA	7440-70-2	ug/L	DUMP	20	20	17,400	CHMS	20	20	20,300	-2920	0.9820	0.9820	Do Not Reject H0
Chromium	CR	7440-47-3	ug/L	DUMP	20	1	0.5	CHMS	20	12	0.555	-0.055	0.9860	0.9860	Do Not Reject H0
Cobalt	CO	7440-48-4	ug/L	DUMP	20	4	0.145	CHMS	20	12	0.132	0.0133	0.1776	0.1776	Do Not Reject H0
Copper	CU	7440-50-8	ug/L	DUMP	20	20	2.66	CHMS	20	20	0.896	1.76	0.0020*	0.0025*	Reject H0
Iron	FE	7439-89-6	ug/L	DUMP	20	0	<96.7	CHMS	20	12	170	[-170, -72.8]	0.9122	0.9122	Do Not Reject H0
Lead	PB	7439-92-1	ug/L	DUMP	20	10	0.406	CHMS	20	5	0.286	0.12	0.0459*	0.2295	Do Not Reject H0
Magnesium	MG	7439-95-4	ug/L	DUMP	20	20	5,790	CHMS	20	20	6,980	-1180	0.8942	0.8942	Do Not Reject H0
Manganese	MN	7439-96-5	ug/L	DUMP	20	20	6.73	CHMS	20	20	144	-137	1.0000	1.0000	Do Not Reject H0
Mercury	HG	7439-97-6	ug/L	DUMP	40	0	<0.08	CHMS	40	0	<0.08	[-0.08, 0.08]	1.0000	1.0000	Do Not Reject H0
Nickel	NI	7440-02-0	ug/L	DUMP	20	16	0.428	CHMS	20	17	0.436	-0.00833	0.6427	0.6427	Do Not Reject H0
Potassium	K	2023695	ug/L	DUMP	20	20	2,240	CHMS	20	20	2,060	185	0.1856	0.1856	Do Not Reject H0
Selenium	SE	7782-49-2	ug/L	DUMP	20	1	0.37	CHMS	20	0	<1	[-0.63, 0.37]	1.0000	1.0000	Do Not Reject H0
Silver	AG	7440-22-4	ug/L	DUMP	20	0	<0.1	CHMS	20	0	<0.1	[-0.1, 0.1]	1.0000	1.0000	Do Not Reject H0
Sodium	NA	7440-23-5	ug/L	DUMP	20	20	25,100	CHMS	20	20	52,200	-27200	1.0000	1.0000	Do Not Reject H0
Thallium	TL	7440-28-0	ug/L	DUMP	20	1	0.17	CHMS	20	0	<0.2	[-0.03, 0.17]	1.0000	1.0000	Do Not Reject H0
Vanadium	V	7440-62-2	ug/L	DUMP	20	0	<3	CHMS	20	0	<3	[-3, 3]	1.0000	1.0000	Do Not Reject H0
Zinc	ZN	7440-66-6	ug/L	DUMP	20	19	11.5	CHMS	20	10	3.08	8.44	0.0020*	0.0100*	Reject H0
Aluminum	AL	7429-90-5	ug/L	IHRS	20	6	21.8	CHHRS	20	20	20.5	1.33	0.1677	0.1677	Do Not Reject H0
Antimony	SB	7440-36-0	ug/L	IHRS	20	5	0.622	CHHRS	20	0	<1	[-0.378, 0.622]	0.9681	0.9681	Do Not Reject H0
Arsenic	AS	7440-38-2	ug/L	IHRS	20	20	0.491	CHHRS	20	16	0.376	0.115	0.0020*	0.0100*	Reject H0
Barium	BA	7440-39-3	ug/L	IHRS	20	20	16.4	CHHRS	20	20	12.4	4	0.0020*	0.0100*	Reject H0
Beryllium	BE	7440-41-7	ug/L	IHRS	20	0	<0.3	CHHRS	20	0	<0.3	[-0.3, 0.3]	1.0000	1.0000	Do Not Reject H0
Cadmium	CD	7440-43-9	ug/L	IHRS	20	0	<0.75	CHHRS	20	0	<0.75	[-0.75, 0.75]	1.0000	1.0000	Do Not Reject H0
Calcium	CA	7440-70-2	ug/L	IHRS	20	20	22,200	CHHRS	20	20	22,200	50	0.4711	0.4711	Do Not Reject H0
Chromium	CR	7440-47-3	ug/L	IHRS	20	1	0.56	CHHRS	20	0	<1.8	[-1.24, 0.56]	1.0000	1.0000	Do Not Reject H0
Cobalt	CO	7440-48-4	ug/L	IHRS	20	0	<0.35	CHHRS	20	1	0.093	[-0.093, 0.257]	0.5309	0.5309	Do Not Reject H0
Copper	CU	7440-50-8	ug/L	IHRS	20	20	5.93	CHHRS	20	20	1.36	4.57	0.0020*	0.0025*	Reject H0
Iron	FE	7439-89-6	ug/L	IHRS	20	1	37.8	CHHRS	20	19	65.6	-27.8	0.9800	0.9800	Do Not Reject H0
Lead	PB	7439-92-1	ug/L	IHRS	20	8	0.31	CHHRS	20	1	0.61	-0.3	1.0000	1.0000	Do Not Reject H0
Magnesium	MG	7439-95-4	ug/L	IHRS	20	20	4,450	CHHRS	20	20	3,820	630	0.0020*	0.0050*	Reject H0
Manganese	MN	7439-96-5	ug/L	IHRS	20	20	9.32	CHHRS	20	20	12.7	-3.34	0.7625	0.7625	Do Not Reject H0
Mercury	HG	7439-97-6	ug/L	IHRS	40	0	<0.08	CHHRS	40	0	<0.08	[-0.08, 0.08]	1.0000	1.0000	Do Not Reject H0
Nickel	NI	7440-02-0	ug/L	IHRS	20	18	0.432	CHHRS	20	5	0.373	0.0592	0.0998	0.0998	Do Not Reject H0
Potassium	K	2023695	ug/L	IHRS	20	20	1,730	CHHRS	20	20	1,220	510	0.0020*	0.0050*	Reject H0
Selenium	SE	7782-49-2	ug/L	IHRS	20	0	<1	CHHRS	20	0	<1	[-1, 1]	1.0000	1.0000	Do Not Reject H0
Silver	AG	7440-22-4	ug/L	IHRS	20	2	0.0667	CHHRS	20	0	<0.1	[-0.0333, 0.0667]	0.7545	0.7545	Do Not Reject H0
Sodium	NA	7440-23-5	ug/L	IHRS	20	20	20,400	CHHRS	20	20	15,700	4700	0.0020*	0.0050*	Reject H0
Thallium	TL	7440-28-0	ug/L	IHRS	20	0	<0.2	CHHRS	20	0	<0.2	[-0.2, 0.2]	1.0000	1.0000	Do Not Reject H0
Vanadium	V	7440-62-2	ug/L	IHRS	20	0	<3	CHHRS	20	0	<3	[-3, 3]	1.0000	1.0000	Do Not Reject H0
Zinc	ZN	7440-66-6	ug/L	IHRS	20	17	7.29	CHHRS	20	2	7.35	-0.06	0.4990	0.4990	Do Not Reject H0
Aluminum	AL	7429-90-5	ug/L	RRDS	10	8	20.9	CHMS	20	18	58.9	-38	1.0000	1.0000	Do Not Reject H0
Antimony	SB	7440-36-0	ug/L	RRDS	10	1	0.72	CHMS	20	0	<1	[-0.28, 0.72]	1.0000	1.0000	Do Not Reject H0
Arsenic	AS	7440-38-2	ug/L	RRDS	10	10	0.559	CHMS	20	19	0.711	-0.152	0.7705	0.7705	Do Not Reject H0
Barium	BA	7440-39-3	ug/L	RRDS	10	10	14.1	CHMS	20	20	13.1	1.02	0.2136	0.2136	Do Not Reject H0
Beryllium	BE	7440-41-7	ug/L	RRDS	10	0	<0.3	CHMS	20	0	<0.3	[-0.3, 0.3]	1.0000	1.0000	Do Not Reject H0
Cadmium	CD	7440-43-9	ug/L	RRDS	10	0	<0.75	CHMS	20	0	<0.75	[-0.75, 0.75]	1.0000	1.0000	Do Not Reject H0
Calcium	CA	7440-70-2	ug/L	RRDS	10	10	21,600	CHMS	20	20	20,300	1280	0.2675	0.2675	Do Not Reject H0
Chromium	CR	7440-47-3	ug/L	RRDS	10	0	<1.8	CHMS	20	12	0.555	[-0.555, 1.25]	0.0040*	0.0100*	Reject H0
Cobalt	CO	7440-48-4	ug/L	RRDS	10	2	0.0955	CHMS	20	12	0.132	-0.0362	1.0000	1.0000	Do Not Reject H0
Copper	CU	7440-50-8	ug/L	RRDS	10	10	1.28	CHMS	20	20	0.896	0.384	0.0020*	0.0025*	Reject H0
Iron	FE	7439-89-6	ug/L	RRDS	10	0	<100	CHMS	20	12	170	[-170, -69.5]	1.0000	1.0000	Do Not Reject H0
Lead	PB	7439-92-1	ug/L	RRDS	10	0	<0.7	CHMS	20	5	0.286	[-0.286, 0.414]	0.1118	0.1118	Do Not Reject H0
Magnesium	MG	7439-95-4	ug/L	RRDS	10	10	4,290	CHMS	20	20	6980	-2680	0.9780	0.9780	Do Not Reject H0
Manganese	MN	7439-96-5	ug/L	RRDS	10	10	30.7	CHMS	20	20	144	-113	0.9920	0.9920	Do Not Reject H0
Mercury	HG	7439-97-6	ug/L	RRDS	20	0	<0.08	CHMS	40	0	<0.08	[-0.08, 0.08]	1.0000	1.0000	Do Not Reject H0
Nickel	NI	7440-02-0	ug/L	RRDS	10	10	0.444	CHMS	20	17	0.436	0.00754	0.3992	0.3992	Do Not Reject H0
Potassium	K	2023695	ug/L	RRDS	10	10	1,580	CHMS	20	20	2,060	-475	0.9441	0.9441	Do Not Reject H0
Selenium	SE	7782-49-2	ug/L	RRDS	10	0	<1	CHMS	20	0	<1	[-1, 1]	1.0000	1.0000	Do Not Reject H0
Silver	AG	7440-22-4	ug/L	RRDS	10	0	<0.1	CHMS	20	0	<0.1	[-0.1, 0.1]	1.0000	1.0000	Do Not Reject H0
Sodium	NA	7440-23-5	ug/L	RRDS	10	10	20,200	CHMS	20	20	52,200	-32000	0.9900	0.9900	Do Not Reject H0
Thallium	TL	7440-28-0	ug/L	RRDS	10	0	<0.2	CHMS	20	0	<0.2	[-0.2, 0.2]	1.0000	1.0000	Do Not Reject H0
Vanadium	V	7440-62-2	ug/L	RRDS	10	1	1.2	CHMS	20	0	<3	[-1.8, 1.2]	1.0000	1.0000	Do Not Reject H0
Zinc	ZN	7440-66-6	ug/L	RRDS	10	0	<8	CHMS	20	10	3.08	[-3.08, 4.92]	0.0060*	0.0150*	Reject H0
Aluminum	AL	7429-90-5	ug/L	TWS	10	4	24.2	CHMS	20	18	58.9	-34.6	0.9381	.9381	Do Not Reject H0
Antimony	SB	7440-36-0	ug/L	TWS	10	7	0.558	CHMS	20	0	<1	[-0.442, 0.558]	1.0000	1.0000	Do Not Reject H0
Arsenic	AS	7440-38-2	ug/L	TWS	10	10	0.97	CHMS	20	19	0.711	0.259	0.0878	.0878	Do Not Reject H0
Barium	BA	7440-39-3	ug/L	TWS	10	10	13.7	CHMS	20	20	13.1	0.615	0.2814	.2814	Do Not Reject H0
Beryllium	BE	7440-41-7	ug/L	TWS	10	3	0.15	CHMS	20	0	<0.3	[-0.15, 0.15]	1.0000	1.0000	Do Not Reject H0
Cadmium	CD	7440-43-9	ug/L	TWS	10	0	<0.75	CHMS	20	0	<0.75	[-0.75, 0.75]	1.0000	1.0000	Do Not Reject H0

Phase II Surface Water Background Comparison Permutation Tests

				Site Data				Background Data				Permutation Test (H0: Site <= Background)			
Analyte Name	Analyte Code	CAS	Units	Decision Unit	Number of Samples Collected	Number of Analyte Detections	Mean [1]	Decision Unit	Number of Samples Collected	Number of Analyte Detections	Mean [1]	Site Mean - Background Mean [2]	Right-Tailed Probability [3]	Adjusted Right-Tailed Probability [3]	Conclusion [4]
Calcium	CA	7440-70-2	ug/L	TWS	10	10	22,500	CHMS	20	20	20,300	2180	0.1337	.1337	Do Not Reject H0
Chromium	CR	7440-47-3	ug/L	TWS	10	2	0.635	CHMS	20	12	0.555	0.08	0.0040*	.0100*	Reject H0
Cobalt	CO	7440-48-4	ug/L	TWS	10	4	0.111	CHMS	20	12	0.132	-0.0207	0.9681	.9681	Do Not Reject H0
Copper	CU	7440-50-8	ug/L	TWS	10	10	1.25	CHMS	20	20	0.896	0.354	0.0040*	.0040*	Reject H0
Iron	FE	7439-89-6	ug/L	TWS	10	0	<100	CHMS	20	12	170	[-170, -69.5]	1.0000	1.0000	Do Not Reject H0
Lead	PB	7439-92-1	ug/L	TWS	10	0	<0.7	CHMS	20	5	0.286	[-0.286, 0.414]	0.1517	0.1517	Do Not Reject H0
Magnesium	MG	7439-95-4	ug/L	TWS	10	10	6,640	CHMS	20	20	6,980	-335	0.6168	0.6168	Do Not Reject H0
Manganese	MN	7439-96-5	ug/L	TWS	10	10	58.1	CHMS	20	20	144	-85.6	0.9381	0.9381	Do Not Reject H0
Mercury	HG	7439-97-6	ug/L	TWS	20	0	<0.08	CHMS	40	0	<0.08	[-0.08, 0.08]	1.0000	1.0000	Do Not Reject H0
Nickel	NI	7440-02-0	ug/L	TWS	10	10	0.444	CHMS	20	17	0.436	0.00752	0.4311	0.4311	Do Not Reject H0
Potassium	K	2023695	ug/L	TWS	10	10	2,550	CHMS	20	20	2,060	495	0.0539	0.0539	Do Not Reject H0
Selenium	SE	7782-49-2	ug/L	TWS	10	0	<1	CHMS	20	0	<1	[-1, 1]	1.0000	1.0000	Do Not Reject H0
Silver	AG	7440-22-4	ug/L	TWS	10	0	<0.1	CHMS	20	0	<0.1	[-0.1, 0.1]	1.0000	1.0000	Do Not Reject H0
Sodium	NA	7440-23-5	ug/L	TWS	10	10	39,600	CHMS	20	20	52,200	-12600	0.8543	0.8543	Do Not Reject H0
Thallium	TL	7440-28-0	ug/L	TWS	10	1	0.11	CHMS	20	0	<0.2	[-0.09, 0.11]	1.0000	1.0000	Do Not Reject H0
Vanadium	V	7440-62-2	ug/L	TWS	10	0	<3	CHMS	20	0	<3	[-3, 3]	1.0000	1.0000	Do Not Reject H0
Zinc	ZN	7440-66-6	ug/L	TWS	10	1	3.9	CHMS	20	10	3.08	0.82	0.0639	0.0639	Do Not Reject H0

1. Kaplan-Meier estimator used for data sets with non-detect results.

2. Difference between site and background means reported as an interval if either site or background mean is a non-detect.

3. Right-tailed probability of permutation test of difference between site and background means. Adjusted p-values computed with Benjamini-Hochberg procedure for controlling false discovery rate (FDR). Asterisks indicate significance level (<0.05, <0.01, <0.001).

4. If the resulting value in the Conclusion column is Do Not Reject H0, then the H0 is true and site concentrations are less than or equal to background. If the result is Reject H0, then site concentrations are greater than background.

NOTES:

µg/L = micrograms per liter

CAS = Chemical Abstracts Service

DUMP = AOC #16 – Area D (former Dumping Area)

IHRS = Iona Hudson River Shoreline (along eastern boundary of AOC #16 – Area D)

RRDS = Riprap Filled Drainage Swale (Iona Marsh shoreline at outlet of riprap filled drainage swale)

TWS = Tidal Wetland Swale (Iona Marsh shoreline at outlet of tidal wetland swale)

CHHRS = Con Hook Hudson River Shoreline

CHMS = Con Hook Marsh Shoreline

Appendix F3

Phase II Sediment Background Comparison Permutation Tests

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Phase II Sediment Background Comparison Permutation Tests

			Site Data				Background Data				Permutation Test (H0: Site <= Background)				
Analyte Name	Analyte Code	CAS	Units	Decision Unit	Number of Samples Collected	Number of Analyte Detections	Mean [1]	Decision Unit	Number of Samples Collected	Number of Analyte Detections	Mean [1]	Site Mean - Background Mean [2]	Right-Tailed Probability [3]	Adjusted Right-Tailed Probability [3]	Conclusion [4]
Aluminum	AL	7429-90-5	mg/kg	IHRS	3	3	6,300	CHHRS	8	8	13,500	-7,200	1.0000	1.0000	Do Not Reject H0
Antimony	SB	7440-36-0	mg/kg	IHRS	3	3	103	CHHRS	8	8	0.48	103	0.0020*	0.0060*	Reject H0
Arsenic	AS	7440-38-2	mg/kg	IHRS	3	3	33.7	CHHRS	8	8	5.94	27.7	0.0040*	0.0060*	Reject H0
Barium	BA	7440-39-3	mg/kg	IHRS	3	3	450	CHHRS	8	8	85.6	364	0.0120*	0.0120*	Reject H0
Beryllium	BE	7440-41-7	mg/kg	IHRS	3	3	0.863	CHHRS	8	8	0.889	-0.0254	0.5210	0.5210	Do Not Reject H0
Cadmium	CD	7440-43-9	mg/kg	IHRS	3	3	9.27	CHHRS	8	8	0.711	8.56	0.0080*	0.0140*	Reject H0
Chromium	CR	7440-47-3	mg/kg	IHRS	3	3	133	CHHRS	8	8	32.9	100	0.0080*	0.0080*	Reject H0
Cobalt	CO	7440-48-4	mg/kg	IHRS	3	3	13.3	CHHRS	8	8	10.5	2.8	0.2495	0.2495	Do Not Reject H0
Copper	CU	7440-50-8	mg/kg	IHRS	3	3	6,230	CHHRS	8	8	35.8	6200	0.0120*	0.0120*	Reject H0
Iron	FE	7439-89-6	mg/kg	IHRS	3	3	157,000	CHHRS	8	8	23,800	133,000	0.0080*	0.0120*	Reject H0
Lead	PB	7439-92-1	mg/kg	IHRS	3	3	9,900	CHHRS	8	8	49.1	9,850	0.0080*	0.0120*	Reject H0
Manganese	MN	7439-96-5	mg/kg	IHRS	3	3	1,200	CHHRS	8	8	1,020	182	0.2894	0.2894	Do Not Reject H0
Mercury	HG	7439-97-6	mg/kg	IHRS	6	6	0.072	CHHRS	16	16	0.19	-0.118	0.9960	0.9960	Do Not Reject H0
Nickel	NI	7440-02-0	mg/kg	IHRS	3	3	85.3	CHHRS	8	8	22.9	62.4	0.0060*	0.0120*	Reject H0
Selenium	SE	7782-49-2	mg/kg	IHRS	3	0	<0.63	CHHRS	8	8	0.436	[-0.436, 0.194]	0.0379*	0.1138	Do Not Reject H0
Silver	AG	7440-22-4	mg/kg	IHRS	3	3	1.47	CHHRS	8	8	0.253	1.21	0.0060*	0.0180*	Reject H0
Thallium	TL	7440-28-0	mg/kg	IHRS	3	3	0.0667	CHHRS	8	8	0.149	-0.0822	1.0000	1.0000	Do Not Reject H0
Vanadium	V	7440-62-2	mg/kg	IHRS	3	3	33	CHHRS	8	8	21.8	11.2	0.0100*	0.0150*	Reject H0
Zinc	ZN	7440-66-6	mg/kg	IHRS	3	3	3,730	CHHRS	8	8	109	3,620	0.0040*	0.0080*	Reject H0
Aluminum	AL	7429-90-5	mg/kg	RRDS	3	3	18,000	CHMS	8	8	15,400	2620	0.0659	0.0659	Do Not Reject H0
Antimony	SB	7440-36-0	mg/kg	RRDS	3	3	0.743	CHMS	8	8	0.94	-0.197	0.9820	0.9820	Do Not Reject H0
Arsenic	AS	7440-38-2	mg/kg	RRDS	3	3	9.57	CHMS	8	8	5.69	3.88	0.0040*	0.0060*	Reject H0
Barium	BA	7440-39-3	mg/kg	RRDS	3	3	107	CHMS	8	8	62.4	44.3	0.0060*	0.0120*	Reject H0
Beryllium	BE	7440-41-7	mg/kg	RRDS	3	3	0.927	CHMS	8	8	1.12	-0.191	0.7764	0.7764	Do Not Reject H0
Cadmium	CD	7440-43-9	mg/kg	RRDS	3	3	0.937	CHMS	8	8	0.726	0.21	0.0120*	0.0140*	Reject H0
Chromium	CR	7440-47-3	mg/kg	RRDS	3	3	41	CHMS	8	8	24.4	16.6	0.0080*	0.0080*	Reject H0
Cobalt	CO	7440-48-4	mg/kg	RRDS	3	3	14.7	CHMS	8	8	8.22	6.44	0.0060*	0.0090*	Reject H0
Copper	CU	7440-50-8	mg/kg	RRDS	3	3	54	CHMS	8	8	26.2	27.8	0.0060*	0.0120*	Reject H0
Iron	FE	7439-89-6	mg/kg	RRDS	3	3	35,700	CHMS	8	8	17,400	18,300	0.0140*	0.0140*	Reject H0
Lead	PB	7439-92-1	mg/kg	RRDS	3	3	61	CHMS	8	8	53.2	7.75	0.0439*	0.0439*	Reject H0
Manganese	MN	7439-96-5	mg/kg	RRDS	3	3	2,700	CHMS	8	8	488	2,210	0.0080*	0.0120*	Reject H0
Mercury	HG	7439-97-6	mg/kg	RRDS	6	6	0.187	CHMS	16	16	0.25	-0.0633	0.9940	0.9940	Do Not Reject H0
Nickel	NI	7440-02-0	mg/kg	RRDS	3	3	34	CHMS	8	8	21.4	12.6	0.0080*	0.0120*	Reject H0
Selenium	SE	7782-49-2	mg/kg	RRDS	3	3	0.763	CHMS	8	8	0.781	-0.0179	0.6287	0.6287	Do Not Reject H0
Silver	AG	7440-22-4	mg/kg	RRDS	3	3	0.317	CHMS	8	8	0.316	0.000443	0.4291	0.4291	Do Not Reject H0
Thallium	TL	7440-28-0	mg/kg	RRDS	3	3	0.19	CHMS	8	8	0.175	0.015	0.2735	0.2735	Do Not Reject H0
Vanadium	V	7440-62-2	mg/kg	RRDS	3	3	29.7	CHMS	8	8	24.2	5.42	0.0699	0.0699	Do Not Reject H0
Zinc	ZN	7440-66-6	mg/kg	RRDS	3	3	193	CHMS	8	8	116	77.8	0.0080*	0.0080*	Reject H0
Aluminum	AL	7429-90-5	mg/kg	TWS	3	3	15700	CHMS	8	8	15,400	292	0.5090	0.5090	Do Not Reject H0
Antimony	SB	7440-36-0	mg/kg	TWS	3	3	0.84	CHMS	8	8	0.94	-0.1	0.7904	0.7904	Do Not Reject H0
Arsenic	AS	7440-38-2	mg/kg	TWS	3	3	8.57	CHMS	8	8	5.69	2.88	0.0080*	0.0080*	Reject H0
Barium	BA	7440-39-3	mg/kg	TWS	3	3	94	CHMS	8	8	62.4	31.6	0.0120*	0.0120*	Reject H0
Beryllium	BE	7440-41-7	mg/kg	TWS	3	3	0.927	CHMS	8	8	1.12	-0.191	0.7904	0.7904	Do Not Reject H0
Cadmium	CD	7440-43-9	mg/kg	TWS	3	3	1.41	CHMS	8	8	0.726	0.687	0.0140*	0.0140*	Reject H0
Chromium	CR	7440-47-3	mg/kg	TWS	3	3	42.3	CHMS	8	8	24.4	18	0.0060*	0.0080*	Reject H0
Cobalt	CO	7440-48-4	mg/kg	TWS	3	3	13.3	CHMS	8	8	8.22	5.11	0.0040*	0.0090*	Reject H0
Copper	CU	7440-50-8	mg/kg	TWS	3	3	62	CHMS	8	8	26.2	35.8	0.0100*	0.0120*	Reject H0
Iron	FE	7439-89-6	mg/kg	TWS	3	3	31,300	CHMS	8	8	17,400	14,000	0.0060*	0.0120*	Reject H0
Lead	PB	7439-92-1	mg/kg	TWS	3	3	80.3	CHMS	8	8	53.2	27.1	0.0080*	0.0120*	Reject H0
Manganese	MN	7439-96-5	mg/kg	TWS	3	3	1,100	CHMS	8	8	488	612	0.0060*	0.0120*	Reject H0
Mercury	HG	7439-97-6	mg/kg	TWS	6	6	0.193	CHMS	16	16	0.25	-0.0567	0.9940	0.9940	Do Not Reject H0
Nickel	NI	7440-02-0	mg/kg	TWS	3	3	33	CHMS	8	8	21.4	11.6	0.0140*	0.0140*	Reject H0
Selenium	SE	7782-49-2	mg/kg	TWS	3	3	0.66	CHMS	8	8	0.781	-0.121	0.9481	0.9481	Do Not Reject H0
Silver	AG	7440-22-4	mg/kg	TWS	3	3	0.323	CHMS	8	8	0.316	0.00711	0.3892	0.3892	Do Not Reject H0
Thallium	TL	7440-28-0	mg/kg	TWS	3	3	0.18	CHMS	8	8	0.175	0.005	0.4830	0.4830	Do Not Reject H0
Vanadium	V	7440-62-2	mg/kg	TWS	3	3	34.3	CHMS	8	8	24.2	10.1	0.0060*	0.0150*	Reject H0
Zinc	ZN	7440-66-6	mg/kg	TWS	3	3	527	CHMS	8	8	116	411	0.0080*	0.0080*	Reject H0

1. Kaplan-Meier estimator used for data sets with non-detect results.

2. Difference between site and background means reported as an interval if either site or background mean is a non-detect.

3. Right-tailed probability of permutation test of difference between site and background means. Adjusted p-values computed with Benjamini-Hochberg procedure for controlling false discovery rate (FDR). Asterisks indicate significance level (<0.05, <0.01, <0.001).

4. If the resulting value in the Conclusion column is Do Not Reject H0, then the H0 is true and site concentrations are less than or equal to background. If the result is Reject H0, then site concentrations are greater than background.

NOTES:

CAS = Chemical Abstracts Service

mg/kg = milligrams per kilogram

DUMP = AOC #16 – Area D (former Dumping Area)

IHRS = Iona Hudson River Shoreline (along eastern boundary of AOC #16 – Area D)

RRDS = Riprap Filled Drainage Swale (Iona Marsh shoreline at outlet of riprap filled drainage swale)

TWS = Tidal Wetland Swale (Iona Marsh shoreline at outlet of tidal wetland swale)

CHHRS = Con Hook Hudson River Shoreline

CHMS = Con Hook Marsh Shoreline

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Appendix G

Human Health Risk Assessment

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Final Human Health Risk Assessment
Iona Island Naval Ammunition Depot
Formerly Used Defense Site
Stony Point, Rockland County, New York

Contract No. 912DR-15-D-0014
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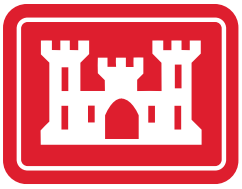

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LIST OF ACRONYMS AND ABBREVIATIONS

95UCL	95 percent upper confidence limit
µg/dl	Microgram(s) lead per deciliter
µg/L	Microgram(s) per liter
µg/m^3	Microgram(s) per cubic meter
µg/mg	Microgram(s) per milligram
ABS	Absorption factor
ADAF	Age-dependent adjustment factor
AF	Adherence factor
ALM	Adult lead model
AOC	Area of concern
AST	Aboveground storage tank
AT	Averaging time
ATSDR	Agency for Toxic Substances and Disease Registry
BADU	Background and Decision Unit
bgs	Below ground surface
BW	Body weight
CalEPA	California EPA
CDC	Centers for Disease Control and Prevention
CF	Conversion factor
CHHRS	Con Hook Hudson River shoreline
CHMS	Con Hook Marsh shoreline
cm^2	Square centimeter(s)
COPC	Contaminant of potential concern
CSM	Conceptual site model
CV	Coefficient of variation
DAF	Dosimetric adjustment factor
DoD	Department of Defense
DU	Decision unit
DUMP	Dump Area
EA	EA Engineering, P.C. and its affiliate EA Science and Technology
EC	Exposure concentration
ED	Exposure duration
EF	Exposure frequency
EFH	Exposure Factors Handbook
ELCR	Excess lifetime cancer risk
EPA	U.S. Environmental Protection Agency
EPC	Exposure point concentration
ET	Exposure time

ft	Foot (feet)
FUDS	Formerly Used Defense Site
GI ABS	Gastrointestinal dermal absorption factor
GSA	General Services Administration
GSD	Geometric standard deviation
HEC	Human equivalent concentration
HHRA	Human Health Risk Assessment
HI	Hazard index
HQ	Hazard quotient
HTRW	Hazardous Toxic and Radioactive Waste
IEUBK	Integrated Exposure Uptake Biokinetic
IHRS	Iona Hudson River shoreline
in.	Inch(es)
IR	Ingestion rate
IRHS	Hudson River Shoreline
IRIS	Integrated Risk Information System
ISM	Incremental sampling methodology
ITRC	Interstate Technology Regulatory Council
IUR	Inhalation unit risk
kg	Kilogram(s)
kg/mg	Kilogram(s) per milligram(s)
LADI	Lifetime average daily intake
LOAEL	Lowest-observed-adverse-effect-level
LOD	Limit of detection
LOQ	Limit of quantitation
m^3/kg	Cubic meter(s) per kilogram
mg/cm^2	Milligram(s) per square centimeters
mg/m^3	Milligram(s0 per cubic meter
mg/day	Milligram(s) per day
mg/kg	Milligram(s) per kilogram(s)
mg/kg-bw/day	kilogram of body weight per day
NHANES	National Health and Nutrition Examination Survey
No.	Number
NOAEL	No-observed-adverse-effect-level
NRC	National Research Council
NYSDEC	New York State Department of Environmental Conservation

OSWER	Office of Solid Waste and Emergency Response
PAH	Polycyclic aromatic hydrocarbon
PbB_0	Baseline blood-lead level
PCB	Polychlorinated biphenyl
PEF	Particulate emission factor
PIPC	Palisades Interstate Park Commission
QA	Quality assurance
QAPP	Quality Assurance Project Plan
QC	Quality control
RAGS	Risk Assessment Guidance for Superfund
RfC	Reference concentration
RfD	Reference dose
RI	Remedial Investigation
RRDS	Rip Rap Drainage Swale
RSL	Regional screening level
SA	Surface area
SF	Slope factor
SU	Sampling unit
TAL	Target Analyte List
TRW	Technical Review Workgroup
TWS	Tidal Wetland Swale
UCL	Upper confidence limit
UF	Uncertainty factor
UFP	Uniform Federal Policy
USACE	U.S. Army Corps of Engineers
USAGC	U.S. Army Geospatial Center
WOE	Weight-of-evidence

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1. INTRODUCTION

The Hazardous Toxic and Radioactive Waste (HTRW) Remedial Investigation (RI) has been conducted at the Iona Island Naval Ammunition Depot Formerly Used Defense Site (FUDS), (FUDS Project Number [No.] C02NY074402), located in Stony Point, Rockland County, New York (Figure 1). The RI has been conducted to characterize the nature and extent of hazardous substances in environmental media at the Iona Island Naval Ammunition Depot FUDS attributable to historical Department of Defense (DoD) operations and evaluate potential risk to human health and ecological receptors. This Human Health Risk Assessment (HHRA) for the Iona Island Naval Ammunition Depot FUDS has been prepared on behalf of the U.S. Army Corps of Engineers (USACE) to evaluate the potential for adverse effects to human health from exposure to FUDs eligible site-related contaminants of potential concern (COPCs) detected in media affected by past DoD site use.

The Navy used the site as an Ammunition Depot from 1900 to 1947, with the major effort consisting of assembling naval ammunition for World War II. Although no ammunition was manufactured at Iona, various types of explosives were assembled on site. Activities included preparing, assembling, maintaining, inspecting, and testing ammunition; storing bulk explosives, ammunition, and ordnance material; and issuing ammunition to the fleet, shore establishments, armed merchantmen, transport, and district forces (U.S. Army Geospatial Center [USAGC] 2018). The former depot was excessed by the Navy in 1957 and transferred to the General Services Administration (GSA). GSA conveyed the FUDS property to the Palisades Interstate Park Commission (PIPC) in 1965. The majority of buildings and structures, including building foundations, were demolished and removed by PIPC between November 1965 and December 1973 (USAGC 2018).

Investigations have been ongoing at the Iona Island Naval Ammunition Depot FUDS since 1992. Two previous investigations (the 1996 Data Collection Activities [Greeley-Polhemus Group, Inc. 1997] and 2007 Site Inspection [Alion Science and Technology Corporation 2008]) reported widespread detections of metals and polycyclic aromatic hydrocarbons (PAHs) in surface soil and/or subsurface soil.

Existing data from previous investigations were insufficient to evaluate nature and extent of contaminants in environmental media attributable to historical DoD operations and to evaluate whether concentrations of contaminants pose an unacceptable risk to human health and/or ecological receptors. The HTRW RI was proposed to address these insufficiencies and is the first comprehensive investigation of the Iona Island Naval Ammunition Depot FUDS.

1.1 OBJECTIVES OF THE HUMAN HEALTH RISK ASSESSMENT

An HHRA is a qualitative and quantitative process that characterizes site conditions and determines applicable risk to human health based on potential exposure scenarios. This HHRA is being conducted in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by Title 42 of the U.S. Code Sections 9601 through 9675. Specifically, the objectives of the HHRA include the following:

- Outline the regulatory basis and guidance for conducting the HHRA
- Outline the methods for determining COPCs in site media
- Present the exposure setting that details land use, nearby human populations, and potential site activities
- Develop a conceptual site model (CSM) that characterizes relevant complete contaminant exposure pathways and receptors of concern
- Calculate potential carcinogenic and non-carcinogenic risk to receptors of concern (e.g., any human contact at the site under current or future scenarios)
- Identify areas that pose no unacceptable risks to human health and require no further action
- Determine contaminants of concern in site media that contribute significantly to potential risk concerns, which will be used to evaluate risk management decisions.

1.2 GENERAL APPROACH

The HHRA follows procedures and methodologies set forth by the U.S. Environmental Protection Agency (EPA) and USACE. Specific guidance documents used to evaluate potential risks to human health include the following:

- Risk Assessment Guidance for Superfund (RAGS), *Volume 1: Human Health Evaluation Manual (Part A) (Interim Final)*, EPA/540/1-89/002). December 1989.
- RAGS, *Volume 1: Human Health Evaluation Manual Supplemental Guidance – "Standard Default Exposure Factors" (Interim Final)*, Publication 9285.6-03. 25 March 1991a.
- RAGS, *Volume I – Human Health Evaluation Manual (Part B – Development of Risk-based Preliminary Remediation Goals)*. EPA/540/R-92/003. December 1991b.
- *Guidelines for Data Usability in Risk Assessment (Part A)*. Office of Solid Waste and Emergency Response (OSWER), Publication OSWER 9285.7-09A. December 1992.
- RAGS, *Volume I: Human Health Evaluation Manual (Part D, Standardized Planning, Reporting and Review of Superfund Risk Assessments)*. Office of Emergency and Remedial Response. December 2001.
- *Human Health Toxicity Values in Superfund Risk Assessments*. OSWER 9285.7-53. Office of Emergency and Remedial Response. December 2003a.

- RAGS, *Volume I: Human Health Evaluation Manual (Part E: Supplemental Guidance for Dermal Risk Assessment)* Final, EPA/540/R/99/005, OSWER 9285.7-02EP, Office of Superfund Remediation and Technology Innovation. July 2004.

- *Guidelines for Carcinogen Risk Assessment*. Risk Assessment Forum. EPA/630/P-03/001F. March 2005a.

- *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens*. Risk Assessment Forum, EPA/630/R-03/003F. March 2005b.

- *Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part F: Supplemental Guidance for Inhalation Risk Assessment) Final*. Office of Superfund Remediation and Technology Innovation, EPA-540-R-070-002. January 2009a.

- *Exposure Factors Handbook, 2011 Edition*. EPA/600/R-090/052F. September 2011.

- *Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Exposure Factors*, OSWER Directive 9200.1-120-Update. 6 February 2014.

- *Risk Assessment Handbook Volume I: Human Health Evaluation*. USACE Engineering Manual 200-1-4. 31 January 1999.

- *Standard Scopes of Work for Environmental Risk Assessments*. USACE Engineer Pamphlet 200-1-15. 30 June 2016.

- *Environmental Quality – Formerly Used Defense Sites (FUDS) Program Policy*. USACE Engineer Regulation 200-3-1. 10 May 2004.

- *Tri-Service Position Paper on Background Levels in Risk Assessment*. USACE, Environmental and Munitions Center of Expertise, Omaha, NE. October.

1.3 REPORT ORGANIZATION

The HHRA consists of the following Sections:

- ***Section 1***—Introduction
- ***Section 2***—Data Handling and Evaluation
- ***Section 3***—Identification of COPCs
- ***Section 4***—Exposure Assessment
- ***Section 5***—Toxicity Assessment
- ***Section 6***—Risk Characterization
- ***Section 7***—Risk Assessment Uncertainties
- ***Section 8***—Conclusions
- ***Section 9***—References

1.4 SITE HISTORY AND BACKGROUND

The Iona Island Naval Ammunition Depot FUDS property consists of approximately 124 acres of land and inland water located on Iona Island and Round Island along the west side of the Hudson River, in the Town of Stony Point, Rockland County, New York (Figure 1). Iona Island is located within the Lower Hudson River Valley region, which includes all of Putnam, Rockland, and Westchester counties and is considered part of the downstate New York region due to its geographical and cultural proximity to New York City.

Prior to use by the military, Iona Island was utilized as a resort hotel during the Civil War. There was no documented evidence available of past use of ordnance-related items on Iona island prior to use by the military. The Navy acquired Iona Island from the L.H. Mace Brokerage Company of New York City in 1899 for construction of the Iona Island Naval Ammunition Depot (USACE 1998). In 1942, an additional approximately 13 acres of marshland, Round Island, was purchased and used for ammunition storage (USACE 1998).

During World War I, almost all the depth bombs and ammunition used in the Atlantic area passed through Iona. All submarines were sent to Iona Island to be filled with explosives, in addition to the regular work conducted. In 1915, over 2 million pounds of powder were made up in charges, about 327 carloads of material were handled during the year, and large shipments were made by transport, tug, and barge. A 1919 annual report to the Secretary of the Navy states that most of the 14-inch (in.) ammunition for the Army and Navy Railroad battery was prepared at Iona Island.

After World War I, although Iona Island was one of two of the Navy's main depots on the east coast, a program of reducing personnel and material and keeping active work to a minimum was followed under the United States' general program of limitation of arms treaty. In the 1930s, Iona Island supplied ammunition of various calibers to the fleet for service allowances, target practice, and reserve war requirements.

Between 1941 and 1945, the major activity conducted on Iona Island was assembling naval ammunition for World War II. More than 2,300 Navy ships and 2,300 merchant ships received their ammunition from Iona Island during World War II. In addition, 77 bases, 500 shore stations and 700 foreign naval ships were serviced with ammunition.

After World War II, use of Iona island as an ammunition depot became obsolete because of lack of expansion room to accommodate new types of ammunition. In 1947, the Department of the Navy decided to deactivate the Iona Island Naval Ammunition Depot and made the property available for restricted lease. The FUDS was re-designated as an Annex to the United States Naval Ammunition Depot, Earle, New Jersey, and in 1957, declared the Annex excess. In 1955 and 1960, the GSA utilized the Iona Island Naval Ammunition Depot FUDS through a permit for stockpile materials such as rubber and copper. In 1960, the GSA received official jurisdiction of the property, and other agencies under GSA control utilized the property for record storage during the 1960s. These agencies included the following: Maritime Administration, Atomic Energy Commission, Civil Service Commission, USACE, and the Navy's Bureau of Ships. The Maritime Administration also conducted occasional trans-shipments of heavy freight at the main wharf on

an occasional basis. On 30 March 1965, Iona Island was deemed evacuated after the last load of stockpiled materials left the property. In 1965, PIPC acquired both Iona and Round islands (USACE 1998).

In 1924, a total of 106 buildings including two water storage tanks and one standpipe were present on Iona Island (USACE 1998). In the late 1920s through the 1930s, various programs of maintenance and remodeling were carried out by the Bureau of Yards and Docks in addition to several other buildings being built. For example, ten magazine buildings were remodeled for fireproofing; three black-powder magazines and a railroad track to serve them were ordered; and two water tanks were provided, the water system enlarged, and two engine-driven generators installed. In addition, a 0.85-acre Dump Area is first identified between Round Island and Iona Island on a 1930-dated U.S. Navy layout plan (USAGC 2018).

Round Island, the southernmost portion of the depot, was utilized by the Navy for ammunition storage. The Navy filled in the area between Iona Island and Round Island to provide a connection between the two islands. Subsurface magazines were quarried out of rock on Round Island, and the rock removed was used to create a blast barrier between the magazine storage and the depot activities on Iona Island (Bluestone Environmental Group, Inc. 2018).

In 1951 when the depot was deactivated, there were 146 buildings on Iona Island (USAGC 2018). A 22 June 1965 letter presented in the Archive Search Report provides information on the site layout at the time of DoD transfer to PIPC. Roads on Iona Island were in poor condition, with many of the buildings not served by roads. Buildings were served by railroad with spurs from the West Shore Railroad that led to each warehouse and to the pier. Most buildings had been built between 1914 and 1918 and were made of brick while additional buildings constructed in 1941 were made of concrete-faced cinder block. Most buildings had no natural or artificial lighting, heating, or other utilities; they were large, open warehouses with high ceilings and no partitions or separation of floors. Several homes were also present on Iona Island, and previously served as residences for naval officers. Redevelopment for industrial or warehousing use would have required extensive renovation of buildings, clearance of structures, and construction of roads, parking lots, and new sewer system and utility lines; therefore, use of Iona Island was discontinued (USACE 1998).

Most buildings and structures were demolished and removed between November 1965 and December 1973 (USAGC 2018). It is possible that fill material was used during regrading following demolition and excavation/removal of foundations, and that surface and subsurface soil was significantly reworked/mixed across much of the former operations area. The FUDS has remained undeveloped since its transfer from DoD ownership to PIPC in 1965. PIPC developed demolition plans for the remaining buildings and for construction of a recreational park; however, the plans to develop Iona Island into a recreational park were not executed. The only construction that occurred on Iona Island was the parking lot located directly west of Iona Island and outside of the FUDS boundary. The contract plans illustrate the locations of the former buildings, which PIPC removed except for a few buildings which currently remain onsite. The plans also illustrate a fill area (believed to be building demolition debris) that currently provides access between Iona Island and Round Island (Alion Science and Technology Corporation 2008).

Original structures still standing include Building 201 (Empty Projectile Magazine); Building 212 (former Marine Barracks); Building 217 (Fire Station and Labor Office), Building 222 (Miscellaneous Storage Building), Building 508 (Bag Charge Magazine); and Building 603 (Pyrotechnic Magazine) (Bluestone Environmental Group, Inc. 2018). Figure 2 details the location of the remaining buildings. Building 222 (Store House) is utilized by Bear Mountain State Park for shipping and receiving. Building 212 is in disrepair but has not been demolished due to concerns with asbestos. The old roads in the main part of the former depot (near former Buildings 123 and 410) are still accessible by vehicle. The fill area between Round Island and Iona Island is vegetated, and solid ground allows the area to be traversable by foot.

2. DATA HANDLING AND EVALUATION

The RI was conducted to characterize the nature and extent of impacts to environmental media associated with 19 areas of concern (AOCs) identified as being eligible for further investigation under the FUDS HTRW project, and to assess potential exposure pathways and risk to human receptors and/or ecological receptors. HTRW RI field activities were conducted in accordance with the Uniform Federal Policy (UFP)-Quality Assurance Project Plan (QAPP) (EA Engineering, P.C. and its affiliate EA Science and Technology [EA] 2020) and the UFP-QAPP Addendum (EA 2022a). A two-phased approach (Phase I and Phase II) was employed to facilitate data collection, evaluation, and discussion.

2.1 PHASE I REMEDIAL INVESTIGATION SAMPLING

Phase I field activities were completed in March–April 2020. The Phase I investigation area at Iona Island covered the majority of the former operational area, the eastern (Hudson River) and western (Iona Marsh) shorelines of Iona Island, and the eastern and western sides of the active River Subdivision (CSX Transportation) railroad tracks. Field activities consisted of onsite and background soil sampling and a shoreline reconnaissance along Iona Island. Onsite field activities completed during Phase I included the following:

- Surface and subsurface soil sampling using incremental sampling methodology (ISM).
  - Establishment of 32 onsite decision units (DUs) to address HTRW AOCs, locations where elevated concentrations of Target Analyte List (TAL) metals and/or PAHs were detected during previous investigations, and former explosive storage and filling operations buildings identified as having potential for exposure risk to human and ecological receptors from remaining explosives residues in environmental media (DU-1 through DU-25 and EXDU-1 through EXDU-7) (Figure 3).
  - Surface soil sampling (0-6 in. below ground surface [bgs]) within a total of 30 onsite DUs (DU-1 though DU-7, DU-9 through DU-23, DU-25, and EXDU-1 through EXDU-7) with triplicate samples collected at each DU. Samples were analyzed for TAL metals, PAHs, polychlorinated biphenyls (PCBs), and/or explosives.
    - DU-8 was not sampled due to the presence of non-DoD-related 55-gallon drums and other debris within the DU.
    - DU-24 was not sampled as the majority of the DU consists of exposed bedrock with little, thin soil cover.
  - Shallow subsurface soil sampling (6 to maximum of 36 in. bgs) within 5 DUs (DU-17 through DU-21), with triplicate samples at each DU. Samples were analyzed for TAL metals, PAHs, PCBs, explosives, and/or benzene, toluene, ethylbenzene, and xylene. Subsurface soil at the remaining DUs was not sampled due to shallow depth to refusal (less than 12 in. bgs) at each DU.

- Completion of a shoreline reconnaissance survey to identify potential pathways that lead to the shoreline environment, evaluate whether there are barriers to overland transport from Iona Island to the shoreline, and conduct a receptor and resource inventory evaluation.

- A background soil investigation was conducted to establish regional background metal and PAH concentration ranges in surface and subsurface soil. Background soil sampling was conducted using ISM and included the following investigation field activities:

  — Establishment of 8 background DUs in Bear Mountain State Park outside the influence of the Iona Island Naval Ammunition Depot FUDS (Background and Decision Unit [BADU]-1 through BADU-8) (Figure 4).

  — Background surface soil sampling (0-6 in. bgs) within each of the background DUs. Samples were analyzed for TAL metals and PAHs.

  — Subsurface soil was not sampled at background DUs due to shallow depth to refusal (less than 12 in. bgs) at each DU.

Detailed sample collection information is presented in Section 2 of the RI Report (EA 2022b).

2.2 PHASE II REMEDIAL INVESTIGATION SAMPLING

Elevated metals concentrations were detected within AOC #16 – Area D (former Dumping Area) Phase I soil samples. As a result, Phase II was conducted to close data gaps identified in complete migration pathways from AOC#16 after completion of Phase I and support decision making. Defined surface water migration pathways were identified during Phase I leading from AOC #16 – Area D (former Dumping Area) to the Hudson River and Iona Marsh shorelines. These pathways include overland flow with tidal water and stormwater runoff to the Hudson River, a tidal wetland swale that appears to convey flow to the west toward Iona Marsh, and a riprap-filled drainage swale that directs flow south towards Iona Marsh.

Based upon potential migration pathways, it was determined there is potential for chemicals within soil at AOC #16 – Area D (former Dumping Area) to be mobilized during tidal inundation and transported via surface water to the Hudson River shoreline. In addition, the tidal wetland swale and riprap-filled drainage swale leading to Iona Marsh during the shoreline reconnaissance may convey water and associated contaminants during storm events.

Phase II field activities were completed in April 2022. The Phase II investigation area at Iona Island included the Hudson River shoreline along the eastern boundary of AOC #16 – Area D (former Dumping Area), and the outlets of two surface water migration pathways leading from AOC #16 – Area D (former Dumping Area) to Iona Marsh (including a riprap-filled drainage swale and tidal wetland swale). Onsite field activities completed during Phase II included the following:

- Surface water samples were collected using discrete sampling methods, with a total of 60 discrete surface water samples collected for analysis of dissolved (field filtered)

TAL metals, hardness, and water quality parameter data (temperature, pH, specific conductivity, dissolved oxygen, oxidation-reduction potential, turbidity, and salinity) (Figure 5)

— 20 samples within AOC #16 – Area D (former Dumping Area) during tidal inundation (DUMP-SW-01 to DUMP-SW-20) to evaluate whether contaminants are being mobilized from soil within the source area to tidal water.

— 20 samples along the Hudson River shoreline along the eastern boundary of AOC #16 – Area D (former Dumping Area) (IHRS-SW-01 to IHRS-SW-20) to evaluate the potential for migration of metals from AOC #16 – Area D (former Dumping Area) to the river shoreline.

— 20 samples along the Iona Marsh shoreline at the outlets of drainages identified during Phase I, including the riprap-filled drainage swale (RRDS-SW-01 to RRDS-SW-10) and tidal wetland swale (TWS-SW-01 to TWS-SW-10) to further evaluate these swales as contaminant migration pathways.

- Sediment sampling was conducted using ISM and included the following:

— Establishment of 3 sediment DUs at the ends of preferential flow pathways from AOC #16 – Area D (former Dumping Area) to the Hudson River and Iona Marsh shorelines, with one DU established along the Hudson River shoreline (IHRS-DU-01) and two DUs established along the Iona Marsh shoreline (RRDS-DU-01, and TWS-DU-01) (Figure 6).

— Sediment sampling within each onsite sediment DU, with a total of 9 ISM sediment samples (3 per DU) collected for analysis of TAL metals and physical parameter data (grain size, total organic carbon, pH, and oxidation-reduction potential)

Additionally, background surface water and sediment samples were collected to determine whether COCs in shoreline sediments on Iona Island are consistent with or exceed background. Background field activities completed during Phase II are presented in the bulleted list below. Con Hook, located approximately 3 miles upstream of Iona Island on the western side of the Hudson River, was selected to represent background surface water and sediment concentrations. Con Hook has similar depositional environments to Iona Island, with approximately 7 acres of upland habitat and another 12 acres of a Phragmites-dominated tidal marsh (Con Hook Marsh) (Figure 7). The Active River Subdivision (CSX Transportation) railroad tracks parallels the western boundary of Con Hook Marsh. Similar to Iona Marsh, Con Hook Marsh adjoining the railroad right-of-way may be impacted by contaminants associated with normal operation of the rail line.

- Background surface water sampling using discrete sampling methods at Con Hook for analysis of dissolved (field filtered) TAL metals, hardness, and water quality parameter data (temperature, pH, specific conductivity, dissolved oxygen, oxidation-reduction potential, turbidity, and salinity). A total of 40 surface water samples were collected, with

samples split between the Con Hook Hudson River shoreline and Con Hook Marsh shoreline to serve as background samples for the Iona Island Hudson River and marsh shoreline depositional environments (Figure 7).

— 20 discrete background surface water samples along the Con Hook Hudson River shoreline (CHHRS-SW-01 through CHHRS-SW-20).

— 20 discrete background surface water samples along the Con Hook Marsh shoreline, (CHMS-SW-01 through CHMS-SW-20).

- Background sediment sampling using ISM for analysis of TAL metals and physical parameter data (grain size, TOC, pH, and oxidation-reduction potential).

— Establishment of 2 DUs at Con Hook (upstream island within the Hudson River with similar depositional environments to Iona Island), with 1 DU on the Con Hook Hudson River shoreline and 1 DU on the Con Hook Marsh shoreline to serve as background areas for the Iona Island Hudson River and marsh shoreline depositional environments. Each DU was comprised of 8 non-contiguous sampling units (SUs) (CHHRS-SU-01 through CHHRS-SU-08 and CHMS-SU-01 through CHMS-SU-08) (Figure 7).

— Background sediment sampling within each background sediment SU, with a total of 16 ISM sediment samples collected for analysis, including 8 ISM sediment samples along the Con Hook Hudson River shoreline (CHHRS-SU-01 through CHHRS-SU-08) and 8 ISM sediment samples along the Con Hook Marsh shoreline (CHMS-SU-08 through CHMS-SU-08).

2.3 DATA EVALUATION AND USABILITY ASSESSMENT

Analytical data packages were reviewed to ensure that required laboratory components were included, quality assurance (QA)/quality control (QC) requirements were performed, and data use restrictions were well defined. The analytical data were qualified and appropriately flagged during data validation, and a data usability assessment was conducted to review the analytical results and data qualifiers. The data usability assessments for Phase I and Phase II analytical results are presented in Appendix D of the RI Report (EA 2022b). The following qualifiers were applied to the reported data:

- No qualifier: The analyte was positively identified at the associated numerical value, which is the concentration of the analyte in the sample.

- J: The analyte was positively identified, and the associated numerical value is the approximate concentration of the analyte in the sample.

- J-: The result is an estimated quantity, but the result may be biased low.

- J+: The result is an estimated quantity, but the result may be biased high.

- U: The analyte was not detected at a level greater than or equal to the associated numerical value (limit of detection [LOD] or limit of quantitation [LOQ]).

- UJ: The analyte was not detected; however, the associated numerical value (LOD or LOQ) is approximate and may be inaccurate or imprecise.

- R: The data are unusable. The sample results are rejected due to serious deficiencies in meeting the QC criteria. The analyte may or may not be present in the sample.

Various data were qualified as estimated (J or UJ) during data validation due to QC issues as discussed in the data usability assessments, Appendix D of the RI Report. Overall, the data generated for the Phase I and Phase II investigation meet the data quality objectives specified in the UFP-QAPP and UFP-QAPP Addendum (EA 2020, 2022a) and are considered sufficiently accurate to meet the project objectives. The potential impact of the estimated values is addressed in Section 7 of this HHRA. With the exception of the 1 rejected result (dibenz[a,h]anthracene at BADU-4), the results are deemed of sufficient quality for use in the HHRA.

2.4 DATA EVALUATED IN THE HUMAN HEALTH RISK ASSESSMENT

Data that had no qualifier was used as reported. For data with analytical qualifiers, the inclusion or exclusion of data was based upon EPA (1992) and USACE (2004) guidance. The following procedures were followed for sample results identified with data qualifiers:

- Analytical results bearing the U and UJ qualifiers (indicating that the analyte is not detected at the given LOD) were retained in the data set and considered non-detects. Each non-detected COPC was assigned a numerical value equal to its LOD.

- Analytical results bearing the J, J+, J- qualifiers (indicating that the reported value is estimated because the analyte is detected at a concentration below the LOQ or for other reasons), was retained at the reported concentration.

- Analytical results bearing the R qualifier (indicating that the data was rejected) were not evaluated in the HHRA.

Analytical results for all samples (including background results) are presented in Tables A-1 through A-13, **Attachment 1.**

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3. IDENTIFICATION OF CONTAMINANTS OF POTENTIAL CONCERN

Identifying COPCs is a critical step in the risk assessment process. Screening criteria serve to focus the HHRA on COPCs that have the potential to significantly contribute to potential human health risks. Constituents that cannot be eliminated by screening are identified as COPCs and are then quantitatively evaluated in the HHRA. This section describes the risk-based screening as well as the background evaluation conducted to identify COPCs at the site.

3.1 RISK-BASED SCREENING

Risk-based screening identifies analytes that warrant further evaluation in the HHRA. When an analyte is detected at a concentration less than its respective risk-based criteria, exposure is not expected to result in health effects or concerns, and the analyte is not considered further in the HHRA. Analytes detected at concentrations that exceed their respective risk-based screening criteria do not necessarily represent a health concern. Instead, the results of the screening identify those analytes that warrant a more detailed, site-specific evaluation to determine whether health effects may occur. Risk-based screening was conducted by comparing detected analyte concentrations within each DU to risk-based screening concentrations. Any analyte in any medium for which the measured concentration exceeded the risk-based screening concentration was retained as an initial COPC.

EPA's regional screening levels (RSLs) were used for risk-based screening purposes in the HHRA (EPA 2022a). The EPA RSLs combine human health toxicity values with default exposure scenarios to estimate analyte concentrations in environmental media that are considered by EPA to be protective of human exposures (including sensitive populations) over a lifetime. For instance, a residential scenario assumes a default exposure of 350 days per year over a 26-year duration. EPA residential soil RSLs were used to screen the soil data. A restrictive clause is in place for Iona island that it shall be used for recreational purposes only; therefore, residential development is unlikely to occur at the site (USACE 1995). However, EPA residential soil RSLs are included to evaluate potential child receptors at the site.

The RSLs are based on specific, conservative, fixed levels of risk. For carcinogens, this is 10^{-6}, which is the lower bound for excess lifetime potential carcinogenic risk as defined by the National Contingency Plan (EPA 1990). For non-carcinogens, the RSLs are based on a hazard quotient (HQ) of 0.1, to account for potential cumulative effects of multiple contaminants affecting the same target organ. The EPA RSL table identifies some carcinogenic contaminants where the carcinogenic RSL is greater than one-tenth the non-carcinogenic RSL (identified in the EPA RSL tables as "c**"). In these instances, the more conservative one-tenth the non-carcinogenic RSL was used.

For soil and sediment ISM results, the 95 percent upper confidence limit (95UCL) on the mean for each DU was compared to screening criteria. For the ISM samples, triplicate samples were collected for each DU. A 95UCL was calculated from the triplicate results to represent the DU chemical concentration. For the Phase I soil ISM results, the 95UCL was calculated using the Interstate Technology Regulatory Council (ITRC) (2012) calculator as discussed in Section 2.5 of the Phase I RI Data Summary Report (EA 2021). The ITRC calculator uses two candidate upper

confidence limit (UCL) equations that can accommodate ISM datasets: the Student's-t and Chebyshev. The Chebyshev UCL is generally considered to be a conservative estimate of the 95UCL because it generally achieves or exceeds the desired coverage rates, even for non-normal distribution (ITRC 2012). Therefore, the Chebyshev UCL was selected as the 95UCL for use for Phase I results. For the Phase II sediment DUs, the updated ITRC Calculator was used to determine the 95UCL (ITRC 2020). The ITRC Calculator recommends the 95UCL from either the Student's-t or Chebyshev method based upon coefficient of variation (CV). The calculator recommends the Student's-t 95UCL for data sets where the CV of increments is low (defined as CV < 1.5), and the Chebyshev 95UCL for data sets where the CV is medium (defined as 1.5 < CV < 3) or high (defined as CV > 3) (ITRC 2021). The CV of increments is estimated based on summary statistics of the replicates. Therefore, the 95UCL was selected as either the Students-t or Chebyshev 95UCL based upon the recommendation from the ITRC calculator.

For the discrete surface water results, the maximum detected concentration is compared to the screening criteria. Soil and sediment analytical results were compared to the EPA residential soil RSLs. Surface water results were compared to the EPA tap water RSL and the EPA maximum contaminant level. Risk-based screening criteria are presented in Tables A-1 through A-13, **Attachment 1**.

3.2 COMPARISON TO BACKGROUND

3.2.1 Soil and Sediment COPC Background Comparison

Permutation test of means (Student t-Test with adjusted p-value) at the 95 percent confidence level was used to evaluate whether soil metals and PAH concentrations and sediment metals concentrations exceeded regional background concentration ranges.

Permutation tests are a subset of nonparametric statistics. The two-sample permutation test of means evaluates the difference between two group means, and the permutation test does not require that the data from each group follow a normal distribution or that the two groups have the same variance. For this reason, the permutation test is suitable for evaluating both small datasets and non-normal data distributions. Also, this permutation test does not require that the distribution of the two data groups have the same shape in order to be a central value test.

The permutation test assumes only that the data from the two are "exchangeable" when H_0 is true. For a two-sample permutation test of means, the test statistic is the observed difference in the two group means (i.e., site versus background). If the H_0 is true, the group assignment is arbitrary, as there is no difference in the means and the data in essence come from the same population. Therefore, the data are randomly rearranged regardless of group assignment to produce a different set of group means in each rearrangement. The difference in group means is computed and stored after each rearrangement, and this process is repeated for either all possible rearrangements (if possible) or several thousand permutations for larger data sets. The proportion of differences from the rearrangements that equal or exceed the one observed difference from the original data is the permutation p-value of the test (Helsel et al. 2020).

Concentrations for constituents within each DU for soil and sediment were compared to background concentrations using a two-sample hypothesis test with the following H_0.

$$H_0: \text{Site} \leq = \text{Background}$$
$$H_a: \text{Site} > \text{Background}$$

For each test, 10,000 permutation resamples were used to yield a stable p-value. Results of the permutation tests are presented in **Attachment 2**.

3.2.2 Surface Water COPC Background Comparison

A quantitative statistical approach (statistical hypothesis tests) using the two-sample hypothesis test described in Section 3.2.1 was used to compare onsite and background surface water metals concentrations. Mean concentrations from each onsite surface water area [Former Dump Area, Iona Hudson River shoreline, riprap drainage swale, and tidal wetland swale] were compared to mean concentrations from the applicable background depositional environment [Con Hook Hudson River shoreline and Con Hook Marsh shoreline]. The comparisons were made between similar environments. Mean concentrations in the Former Dump Area were compared to both the Con Hook Hudson River shoreline and Con Hook Marsh shoreline. Mean concentrations within the Hudson River shoreline were compared to only the Con Hook Hudson River shoreline. Mean concentrations within the riprap drainage swale, and tidal wetland swale were compared to the Con Hook Marsh shoreline. Results of the permutation tests are presented in **Attachment 2**.

3.3 SELECTION OF CONTAMINANTS OF POTENTIAL CONCERN

COPCs were identified as those analytes exceeding both EPA RSLs and background concentrations. Tables 1a through 1c present a summary of the COPCs identified within soil, sediment, and surface water, respectively. COPCs are presented in Tables 1a through 1c if they exceed risk-based concentrations as presented on Tables A-1 through A-13, **Attachment 1**.

For surface water, arsenic exceeds the EPA tap water RSL (0.052 microgram per liter [µg/L]) within the Former Dump Area (DUMP DU), Iona Hudson River Shoreline (IHRS DU), Tidal Wetland Swale (TWS DU), and Rip Rap Drainage Swale (RRDS DU). However, arsenic surface water detections do not exceed the arsenic maximum contaminant level of 10 µg/L. The following presents a comparison to background surface water results:

Insert #1. Arsenic Surface Water Descriptive Statistics

Decision Unit	Frequency of Detection	Mean Concentration (µg/L)
Dump	10/20	0.401
IHRS	20/20	0.491
RRDS	10/10	0.559
TWS	10/10	0.97
CHHRS	16/20	0.376
CHMS	19/20	0.711

Hypothesis tests for centrality comparing site DUs to background (**Attachment 2**) demonstrate that only IHRS DU has surface water arsenic concentrations exceeding background at the 95% confidence level. The arsenic surface water detections within the Former Dump Area (DUMP DU), the suspected source area for contaminants in IHRS DU, do not exceed background locations (Con Hook Hudson River shoreline and Con Hook Marsh shoreline) at the 95% confidence level. Therefore, the arsenic surface water concentrations within the IHRS DU are considered background levels and are not an indication of release to surface water. As a result, arsenic is not considered a COPC within surface water.

4. EXPOSURE ASSESSMENT

The exposure assessment is conducted to identify the persons or receptors that are or may be exposed to the site, the pathways through which they are potentially exposed, and the magnitude of these potential exposures. To quantify the magnitude of exposure, required information must include the COPC concentrations in various exposure media to which receptors are exposed (exposure point concentrations [EPCs]) and receptor-specific exposure or intake factors that determine the amount of chemical that enters the body (either orally, absorbed through the skin, or inhaled).

The exposure assessment includes several steps:

- Evaluating the exposure setting, which includes a description of the land use and the potentially exposed human populations.

- Developing the CSM, identifying the source of contamination, the contamination transport and release mechanisms, the exposure media, the exposure routes, and the potentially exposed populations.

- Calculating EPCs for each COPC for each of the complete exposure pathways identified in the CSM.

- Identifying the exposure models and parameters with which to calculate the exposure intakes.

- Calculating exposure intakes.

Based upon the site history and current and anticipated site use, a CSM was used to identify complete, potentially complete, or incomplete exposure pathways. Figure 8 presents the CSM. An exposure pathway is the course a chemical or physical agent takes from a source to a receptor. The CSM evaluates the potential sources of contamination, routes of migration, and potential receptors. Exposure pathways begin from potential source areas and progress through the environment via various fate and transport processes to potential human receptors. The exposure pathways may also include a release mechanism and a transport medium if the point of exposure is not at the same location as the source. A completed exposure pathway requires the following four components:

- A source and mechanism of chemical release to the environment
- An environmental transport medium for the released chemical
- A point of potential human contact with the contaminated medium
- A human exposure route at the point of exposure

All four components must exist for an exposure pathway to be complete and for exposure to occur. Incomplete exposure pathways do not result in actual human exposure and are not included in the

exposure assessment and resulting risk characterization. The HHRA exposure pathways are receptor-specific and address all potential human receptors of concern.

4.1 EXPOSURE SETTING

The Iona Island Naval Ammunition Depot FUDS property is located on Iona Island and Round Island along the west side of the Hudson River, in the Town of Stony Point, Rockland County, New York, (Figure 1). The approximately 124.2-acre site is connected to the mainland by a narrow two-lane road. A gate is present along this road; however, access to Iona island is still possible on foot. A busy freight rail line is located immediately east of Iona Island along the point of access.

Iona Island is part of the Hudson River National Estuarine Research Reserve and is under the administration of PIPC who operates the adjacent Bear Mountain State Park property. GSA conveyed the property to PIPC under a "restrictive clause" (recreational purposes only) (USACE 1995). The Hudson River National Estuarine Research Reserve is managed under New York's Coastal Management Program. For the portions of Bear Mountain State Park that are open to the public, recreational opportunities include hiking, boating, and bird watching. There is a parking lot and scenic overlook located directly west of Iona Island, outside of the FUDS boundary.

The majority of Iona Island consists of open space. The site is closed to the public seasonally from December through March when bald eagles are common. Park staff primarily use the existing buildings on Iona Island for storage. The shoreline along the Hudson River areas consists primarily of riprap, gravel, cobbles, boulders, and exposed bedrock. A limited area of exposed sand and gravel shoreline area is present along the shoreline of AOC #16. This area of shoreline is a likely area for boaters or kayakers to access the site. This shoreline area changes to cobbles and boulders (riprap) extending southward along Round Island and a retaining wall spanning the shoreline north of this area is present, with large boulders in the river. The wall is not present along the shoreline in the area of the northern dock. Due to these physical constraints, access to Iona island from the Hudson River is not likely in AOC #16 areas between AOC #16 and the northern dock area or south of AOC #16 towards Round Island.,

The section of the Hudson River at Iona Island is very narrow and deep, with strong currents that scour the shoreline leaving a rocky bottom substrate. The Hudson River in this area has a depth of approximately 165 ft. Tidal influence at Iona Island is approximately 3.5 ft, consequently, the shorelines may not be accessible during high tide conditions (Alion 2008). In addition, a shallow bedrock shelf is present along the Hudson River shoreline. The shelf extends eastward into the river channel, with depths ranging from 0 to approximately -10 ft shoreline below the river surface. The shelf along the shoreline of AOC #16 – Area D (former Dumping Area) extends 250 to 350 ft into the Hudson River channel before sloping steeply downward to a depth of approximately -95 ft below the river surface. Northwest of AOC #16 – Area D (former Dumping Area) the shelf narrows to less than 100 ft along the majority of the eastern shoreline of Iona Island.

Groundwater and surface water at Iona Island are not used as potable water. In the 1990s, the water supply line that supplied Iona Island ruptured on the causeway (near NYS Route 9W). Bear

Mountain State Park did not repair the waterline break and a bedrock well was installed (March 1997) behind the existing storehouse (Building 222). Per Charlie Tonneson, Bear Mountain Park Engineering Department, this new well is not treated and is used for non-potable purposes only (bottled water is brought onto Iona Island for drinking purposes).

Due to the Iona Island restrictive clause that it shall be used for recreational/park purposes only, residential development is not a possible future use (USACE 1995). Recreational use at the site is limited to educational outings and history tours (6–8 times per year with approximately 50 people). Additionally, Iona Island has been used for camping, notably by the Boy Scouts of America (Boy Scouts), who have used the site for activities within the past 5 years (EA 2020). In addition, researchers are presently working in the marshes. Potential trespassers are a possibility because the shoreline is not fenced and residents who live nearby may access the site during boating season from the Hudson River or walk along the access road. Local residents have been observed walking dogs and fishing along the Hudson River shoreline of the site.

Canoers can also access Iona Island, but canoeing is by permit only. There is no intent to put in a trail system associated with the state park. There were plans in the 1970s to develop part of Iona Island as a retreat/nature center, and a sewer system was installed in the early 1970s but was never used. There is no plan for utility work and construction work activities are limited. There are no anticipated construction plans beyond potentially converting existing buildings for other use or constructing a new storehouse. However, if parts of the site were developed for recreational use, construction workers could be potential future receptors.

4.2 SOURCE AREAS

Source areas at the Iona Island FUDS include the 19 AOCs identified as being eligible for further inclusion in the HTRW project and locations where filling or possible spilling of explosive-containing materials could have occurred. The AOCs include the locations/footprints of 16 former buildings, 4 former aboveground storage tanks (ASTs), a former dumping area, 2 former coal storage areas, and 3 former transformers where contaminants related to the facilities or from historic processes during the site's commission as an ammunition depot may be present. In addition, 7 former explosive storage and filling operations buildings were identified as potential source areas. Figure 2 presents the locations of the AOCs and other source areas.

4.3 RELEASE MECHANISMS

Release mechanisms include those physical processes that contribute to the introduction and distribution of a contaminant in the environment. The primary release mechanisms for site contaminants from former buildings/structures at the Iona Island FUDS during operational use included spills, direct releases to the ground, and improper disposal including dumping. These primary release mechanisms may have resulted in contamination of soil at and/or beneath former buildings/structures.

Contaminants in surface and shallow subsurface soil may have been transported to a range of exposure media (including air, subsurface soil, surface water, and sediment) through secondary

and tertiary release mechanisms. Secondary release mechanisms from surface and shallow subsurface soil to other media include the following:

- Soil removal/reworking
- Leaching and infiltration into the subsurface via gravity and/or percolation of precipitation/surface water
- Overland runoff and erosion to surface water bodies or drainage swales
- Wind erosion

The majority of buildings and structures, including building foundations, were demolished and removed by PIPC between November 1965 and December 1973, and imported fill may have been placed over much of the former operational areas (USAGC 2018). Contaminants in surface and subsurface soil were likely mobilized beyond the footprint of the AOCs during demolition of former buildings/structures and reworking of surface and subsurface soil.

Potential contaminants may also have leached/infiltrated into the subsurface through gravity and/or percolation of precipitation/surface water, thus migrating to the subsurface soil. Leaching/infiltration may be ongoing if a soil source is present at Iona Island, particularly at AOC #16 – Area D (Dumping Area). In addition, contaminants may have been transported along the surface via overland runoff and erosion and ultimately deposited in shoreline environments.

4.4 MEDIA OF CONCERN

Soil is the primary medium of concern. Surface soil samples were collected at each DU at 0 to 6 in. bgs. Subsurface soil samples were collected from 6 to 36 in. bgs at select DUs where subsurface soil was encountered. Samples were collected within a wet area, DU-17 through DU-19, which is identified as AOC #16 – Area D (former Dumping Area). Samples collected from DU-17 through DU-19 were considered soil samples for this HHRA.

Groundwater was not encountered during sampling within any of the DUs evaluated. Surface water and sediment samples were collected in select area based upon an evaluation of Phase I soil analytical results that revealed potential concern for the migration of chemicals from AOC#16 – Area D (former Dumping Area) to surface water and sediment. Migration pathways include tidal flow to the Hudson River shoreline and defined surface water channels leading to Iona Marsh (riprap-filled drainage swale and tidal wetland swale). No COPCs were determined for surface water (see Section 3.3). Therefore, only soil and sediment are considered a potential media of concern.

4.5 RECEPTORS OF CONCERN

Within the exposure assessment, EPA guidance (1989, 1991a, 1991b) requires that plausible exposure under both current and future land use be evaluated in the HHRA. Accordingly, potential

receptors were identified for both current and future use scenarios. Potential receptors identified include park personnel, researcher, construction worker, adult recreator, adolescent recreator, child recreator, adolescent trespasser, and camper.

Park Personnel

Park personnel are assumed to be adults who work for PIPC. Park personnel may perform maintenance activities such as grass mowing, site inspections, and general maintenance of the buildings. The Park Personnel are expected to contact the entire site, including the shoreline portions. The park personnel are not expected to dig at depths greater than 6 inches or perform other excavation activities. Therefore, contact is limited to surface soil. These workers may also perform maintenance or similar activities to the swales (RRDS and TWS) and within the IHRS. Therefore, there is a potential for contact to sediment within these areas. The following exposure pathways were considered complete or potentially complete for the park personnel:

- Incidental ingestion of soil and sediment
- Dermal contact with soil and sediment
- Inhalation of windblown particulates from soil

The particulate pathway assumes COPCs are attached to soil particles and become airborne through wind action. Sediments were assumed to remain inundated with water and not expected to produce particulates through wind action.

Researcher

The researcher was also assumed to be an adult and work at the site on a limited or part-time basis. They are not full-time employees with PIPC. The researcher was assumed to work or plant within the marshes so contact with soils within the marsh is expected. Sediment within the marshes was assumed as a contact similar to soil. Plantings within the marsh are assumed within the top 6 inches of soil/sediment. Researchers may also contact other areas of the site. Additionally, the researchers are not expected to perform other subsurface activities. Therefore, contact is limited to surface soil. Researchers are not anticipated to contact sediment collected within the drainage swales (RRDS and TWS) or along the Hudson River (IHRS). The following exposure pathways were considered complete for the researcher:

- Incidental ingestion of soil
- Dermal contact with soil
- Inhalation of windblown particulates from soil

The particulate pathway assumes COPCs are attached to soil particles and become airborne through wind action. Sediments were assumed to remain inundated with water and not expected to produce particulates through wind action.

Construction Worker

The construction worker was also assumed to be an adult and work at the site during short-term construction projects (i.e., 1 year or less). They are expected to dig and perform other subsurface activities, including installation of utilities. Therefore, they may contact all soil depths. Construction worker contact with the Site is expected to be variable. They may contact just one DU during specific construction activities, such as re-development, or move around the Site and contact many DUs during multiple construction activities. The following exposure pathways were considered complete or potentially complete for the construction worker:

- Incidental ingestion of soil
- Dermal contact with soil
- Inhalation of windblown particulates from soil

Recreational Users

The recreational user represents a multiple age-range family that may visit the site from canoeing or access from the road that connects to Iona Island. The adult recreational user was assumed at over 18 years of age. The adolescent recreational user was assumed from 6 to 16 years. The child recreational user was assumed from 2 to 6 years. Recreational users younger than 2 years of age are not anticipated due to site access and site conditions that are not conducive to playgrounds or other play areas. The recreational user is not expected to dig or perform other subsurface activities and is representative of other low frequency receptors that may visit the site during tours or other group events. Additionally, recreational users may contact sediment along the Hudson River shoreline (IHRS). Risk results for the recreational user are protective of other low frequency visitors. The following exposure pathways are considered complete for the recreational user:

- Incidental ingestion of soil and sediment
- Dermal contact with soil and sediment
- Inhalation of windblown particulates from soil

Sediments were assumed to remain inundated with water and not expected to produce particulates through wind action.

Trespasser

The trespasser represents a receptor who may visit the site while boating along the eastern shoreline (Hudson River), boating along the western shoreline, or hiking in the state park. An adult or an adolescent trespasser are expected; however, only an adolescent was evaluated to provide a protective evaluation. The adolescent trespasser was assumed to be 12 to 18 years of age and represents a slightly older adolescent trespasser who may be alone or in the presence of similarly aged individuals. A trespasser is not expected to dig or perform other subsurface activities. The following exposure pathways are considered complete or potentially complete for the trespasser:

- Incidental ingestion of soil and sediment

- Dermal contact with soil and sediment
- Inhalation of windblown particulates from soil

Sediments were assumed to remain inundated with water and not expected to produce particulates through wind action.

Boy Scouts/Camper

The Boy Scouts were assumed at an age from 5 to 18 years who would visit the site to camp and may perform other activities, such as planting or clean-up. The Boy Scouts/Camper may dig or perform other subsurface activities, so they were expected to contact deeper soils. The Boy Scouts may also contact sediment along the IRHS. The following exposure pathways were considered complete or potentially complete for the Boy Scouts/camper:

- Incidental ingestion of soil and sediment
- Dermal contact with soil and sediment
- Inhalation of windblown particulates from soil

4.6 DETERMINATION OF EXPOSURE AREAS

The initial evaluation of DU analytical results was performed on a DU-basis to inform potential decisions that relate to the DU. However, it is acknowledged that all potential site receptors may not remain within one DU because none of the DUs present an attractive area for any of the receptors to spend a majority of time while onsite. Therefore, all receptors may visit various areas of Iona Island during their visit.

However, DU-17 through DU-19 within AOC #16 – Area D (former Dumping Area) are different from the remainder of the Iona Island DUs. The former Dumping Area is a marshy area that is covered with vegetation and subject to tidal influence from the Hudson River that makes access difficult. The Former Dump Area is also identified as a future nature preserve/wetland area. No construction or other activities are expected in this area and actual contact with this area is likely minimal due to vegetation and tidal influences. Additionally, DU-17 through DU-19 were the only DUs with COPCs within the deeper soil samples of 6 to 36 in. bgs. As a result of the site layout and DU locations, two separate exposure areas were identified in the HHRA, in addition to each individual DU.

The first exposure area was identified as the Iona Island Exposure Area. The Iona Island Exposure Area is an upland area exposure to site soils and includes all DUs, except DU-17 through DU-19 within AOC #16 – Area D (Former Dumping Area). The second exposure area, identified as the Former Dump Area Exposure Area, includes only DUs 17 through 19. All receptors identified for Iona Island were evaluated for contact with each exposure area.

The sediment DUs, IHRS, RRDS, and TWS, were not evaluated within an exposure area. The physical condition and location of these DUs are very different than the exposure areas. The IHRS DU consists of exposed sand and gravel shoreline area that is very different than the uplands Island

Exposure Area and the Former Dump Area Exposure Area (DU-17 through DU-19). The drainage swales, RRDS and TWS, represent small areas that lead to the Iona Tidal Marsh. Due to the fact they are drainage swales and are physically separate from other areas, these DUs are evaluated as separate DUs.

4.7 EXPOSURE POINT CONCENTRATIONS

To determine potential doses, EPCs were derived to quantify COPC concentrations within onsite soil. The EPC represents the concentration of COPC in media of concern that a potential receptor is expected to contact over a designated exposure period. Site receptors move randomly across areas of the site over an exposure time, so the EPC was represented by a conservative estimate of the average concentration of the area of exposure.

For ISM samples, triplicate samples were collected for each DU. A 95UCL was calculated from the triplicate results to represent the DU chemical concentration. For the Phase I soil ISM results, the 95UCL was calculated using the Interstate Technology Regulatory Council (ITRC) (2012) calculator. The ITRC calculator uses two candidate upper confidence limit (UCL) equations that can accommodate ISM datasets: the Student's-t and Chebyshev. The Chebyshev UCL is generally considered to be a conservative estimate of the 95UCL because it generally achieves or exceeds the desired coverage rates, even for non-normal distribution (ITRC 2012). Therefore, the Chebyshev UCL was selected as the 95UCL for use for Phase I soil results. Tables A-1 through A-6, **Attachment 1**, present the 95UCL for each soil DU.

For each soil exposure area, which represents combined DUs as discussed in Section 4.4, the EPC was represented by the 95UCL of all the DUs within the respective exposure area combined. The 95UCL for each exposure area was calculated using the ITRC (2020) area weighted calculator. For the exposure areas, all COPCs identified for the individual DUs were evaluated in the exposure area evaluation. **Attachment 3** presents the 95UCL for each exposure area.

For the sediment ISM results, the updated ITRC Calculator was used to determine the 95UCL (ITRC 2020). The ITRC Calculator recommends the 95UCL from either the Student's-t or Chebyshev method based upon coefficient of variation (CV). The calculator recommends the Student's-t 95UCL for data sets where the CV of increments is low (defined as $CV < 1.5$), and the Chebyshev 95UCL for data sets where the CV is medium (defined as $1.5 < CV < 3$) or high (defined as $CV > 3$) (ITRC 2021). The CV of increments was estimated based on summary statistics of replicates. For the Phase II sediment DUs, the 95UCL was selected as either the Students-t or Chebyshev 95UCL based upon the recommendation from the ITRC calculator. Tables A-12 and A-13, **Attachment 1**, present the 95UCL for each sediment DU.

4.8 QUANTIFICATION OF DOSE FROM CHEMICAL EXPOSURES

To determine potential concerns for human health, an estimate of chemical dose was calculated. Two different measures were evaluated, depending on the nature of the effect. When evaluating longer-term (i.e., chronic) exposures to chemicals that produce adverse non-carcinogenic effects, intakes are averaged over the period of exposure (i.e., the averaging time [AT]) (EPA 1989). This measure of intake is referred to as the average daily intake and is a less than lifetime exposure. For

chemicals that produce carcinogenic effects, intakes are averaged over an entire lifetime and are referred to as the lifetime average daily intake (LADI) (EPA 1989).

Detailed equations for determining intake are described below.

Intake Equations for Soil and Sediment

Intake for the incidental ingestion of soil or sediment was estimated using the following equation:

$$(L)ADI = \frac{EPC \; x \; IR \; x \; EF \; x \; ED \; x \; CF}{BW \; x \; AT}$$

where:

(L)ADI = (Lifetime) Average daily intake (milligram per kilogram [mg/kg]-day)
EPC = Concentration of COPC in soil or sediment (mg/kg)
IR = Ingestion rate (milligram(s) per day [mg/day])
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
CF = Conversion factor (10^{-6} kilogram per milligram [kg/mg])
BW = Body weight (kilogram [kg])
AT = Averaging time (days)
For non-carcinogens, AT = ED x 365 days/year
For carcinogens, AT = 70 years x 365 days/year

Exposure associated with dermal contact of soil or sediment was estimated based upon the following equation:

$$(L)ADI = \frac{EPC \; x \; SA \; x \; AF \; xA \; BS \; x \; EF \; x \; ED \; x \; CF}{BW \; x \; AT}$$

where:

(L)ADI = (Lifetime) Average daily intake (mg/kg-day)
EPC = Concentration of a COPC in a soil or sediment (mg/kg)
SA = Surface area for Contact (square centimeters [cm^2])
AF = Skin adherence factor (milligrams per square centimeter [mg/cm^2-event])
ABS = Absorption factor (dimensionless)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
CF = Conversion factor (10^{-6} kg/mg)
BW = Body weight (kg)
AT = Averaging time (days)
For non-carcinogens, AT = ED x 365 days/year
For carcinogens, AT = 70 years x 365 days/year

The inhalation of particulates from soil was calculated using the following equation (EPA 2009a):

$$EC = \frac{EPC_{air} \; x \; ET \; x \; EF \; x \; ED \; x \; CF_1}{AT \; x \; CF_2}$$

where:

EC = Exposure concentration (microgram(s) per cubic meter [µg/m^3])
EPC$_{air}$ = Concentration of COPC in air (milligrams per cubic meter [mg/m^3])
ET = Exposure time (hours)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
CF$_1$ = Conversion factor (1,000 micrograms per milligram [µg/mg])
CF$_2$ = Conversion factor (24 hours/day)
AT = Averaging time (days)
For non-carcinogens, AT = ED x 365 days/year x 24 hours/day
For carcinogens, AT = 70 years x 365 days/year x 24 hours/day

The concentration of COPCs in air resulting from particulate emissions from soil was developed following procedures presented in EPA's Soil Screening Guidance (EPA 2002). The COPC concentration in air was calculated from:

$$EPC_{air} = EPC_{soil} \; x \left[\frac{1}{PEF}\right]$$

where:

EPC$_{air}$ = Concentration of COPC in air (mg/m^3)
EPC$_{soil}$ = COPC concentration in soil (mg/kg)
PEF = Particulate emission factor (cubic meters per kilogram [m^3/kg])

The PEF relates the concentration of a COPC in soil with the concentration of dust particles in air. For all receptors, except the construction worker, a PEF value of 1.21×10^9 m^3/kg is used.

The PEF for the construction worker considers particulate matter emissions from wind erosion, excavation soil dumping, dozing, grading, and tiling. The EPA RSL calculator (EPA 2022b) was used to determine the PEF for the construction worker. The PEF is based upon potential construction that may occur at the site assuming excavation, grading, and tilling at the site, which results in a PEF from other than vehicle traffic assuming 1 acre is disturbed during construction. Outputs from the calculator are provided in **Attachment 4**.

4.9 EXPOSURE PARAMETERS

The second step in quantifying chemical intakes requires the identification of exposure parameters. Exposure parameters include rates of contact (e.g., ingestion rates, skin surface areas), exposure

frequency and duration, BW, and averaging time. The contact rate reflects the amount of contaminated media contacted per unit time or event. Exposure frequency and duration are used to estimate the total time of exposure to COPC in media of concern. The BW represents the average BW over an exposure period (EPA 1989). Specific exposure parameters for each receptor are selected based on EPA guidance (EPA 1989, 1991a, 1991b, 2002, 2004, 2011, and 2014) and professional judgment. The receptor-specific exposure parameters used in the HHRA are shown in **Table 2**.

For all adult receptors (i.e., park personnel, researcher, adult recreational user, and construction worker), the BW was assumed at 80 kg (EPA 2014). For the child recreational user, the BW was assumed at 16 kg. This is based on values in Table 8-1 of EPA's Exposure Factors Handbook (EFH) (EPA 2011) and is the average BW for the age ranges of 2 to less than 3 years (13.8 kg) and 3 to less than 6 years (18.6 kg). For the adolescent recreational user, the Boy Scouts/camper, and the adolescent trespasser, the BW was based on the average of the age range evaluated in EPA's EFH Table 8-1.

The ED for each receptor was based upon EPA guidance (2011, 2014), professional judgement, and the age range evaluated. Park personnel are assumed to be long-term, career park employees working at the site for 25 years (EPA 2011, 2014). The researcher was assumed to be a short-term, part-time park employee. Table 16-105 of EPA EFH presents the occupational tenure of employed individuals by employment status. The median duration for a part-time employee is 3.1 years (EPA 2011). Construction workers were assumed to be at the site for a 1-year duration (EPA 2014). For all other receptors, the exposure duration was based upon the age-range evaluated.

4.9.1 Soil Exposure Parameters

For each receptor, the EF, incidental ingestion rates, and skin surface areas available for contact were assumed to be the same for both surface soil and subsurface soil. The soil skin adherence factor and dermal absorption factor were expected to differ for each receptor between surface soil and subsurface soil.

The EF for the park personnel and construction worker were based on EPA (2011, 2014) guidance. Park personnel are similar to the default composite worker (both indoor and outdoor exposure) listed in EPA guidance (1991a, 2014). EF for the researcher, trespasser, and Boy Scouts/camper were based upon professional judgement. The EF for the recreational user was based on professional judgement.

The construction worker was assumed to contact soil for 250 days per year, which is 5 days per week for 50 weeks (EPA 2014). Park personnel were assumed to contact soil for 5 days per week for 32 weeks (approximately 6 months) or 160 days per year. The recreational user was assumed to visit the site 1 day per week during the warmer months, or approximately 31 weeks, this results in an exposure frequency of 31 days/year. This was assumed to occur over a 10-year exposure duration based upon the age range of 6 to 16 years for the adolescent recreational user, 4-year duration for the child, and a 20-year duration for the adult. The camper EF was estimated based upon a typical number of days Boy Scouts spend camping. A merit badge requirement for camping

within the Boy Scouts is for 20 nights per year (Boy Scouts of America 2023). While this requirement is more likely for an older age range than the age range evaluated in this HHRA, the estimate of 20 nights per year was selected. The ED for the camper was based upon the age range evaluated. The EF for the trespasser assumes a visit 1 day per week, twice per month from April to November, which equals 16 days per year. The 1 day per week visit was typical for all users at New York State Parks (New York State Office of Parks, Recreation & Historic Preservation 2016) and is site-specific. This EF for the trespasser was expected to occur over a 6-year ED based upon the age range evaluated for the trespasser. The researcher was assumed to visit the site 2 days per week, 6 months per year (primarily in growing season to maintain marsh or other areas) for a total of 52 days per year.

The ingestion rate for the construction worker was obtained from guidance for the calculation of the EPA RSLs and Supplemental Guidance for Developing Soil Screening Levels (EPA 2002, 2022a). A construction worker soil ingestion rate of 330 mg/day was assumed. For the park personnel and researcher, a soil ingestion rate of 100 mg/day was assumed to account for primarily outdoor activities (EPA 2011, 2014, 2022a). For the adult, adolescent, and child recreational user, soil ingestion rates of 100 mg/day, 200 mg/day, and 200 mg/day were assumed, respectively, which are equal to typical ingestion rates used for the resident adult and child (EPA 2011, 2014, 2022a). For the Boy Scouts/campers, a soil ingestion rate equal to the resident child, 200 mg/day, was assumed to account for expected high-contact rate with soil. The adolescent trespasser has a lower contact rate with soil; therefore, a soil ingestion rate of 100 mg/day was assumed.

Dermal exposure to soil was assumed for exposed body surface areas only. The SA available for contact generally assumes hands, forearms, head, lower legs, and feet for the resident. The construction worker and park personnel were only assumed to contact soil with hands, forearms, and head with a mean SA of 3,527 cm^2 (EPA 2014). The adult recreational user SA available for contact was set to the SA for the adult resident of 6,032 cm^2 (EPA 2014, 2022a). For the adolescent recreational user, child recreational user, adolescent trespasser, and camper the mean SA was determined for the head, hands, forearms, and lower legs from Table 7-2 of the EPA EFH (EPA 2011). To account for the forearm and lower leg only, these body parts were assumed at 45 percent of the full arm and leg mean surface areas. For the child recreational user, the mean SA for the head, hands, forearms, and lower legs for the age groups of 2 to less than 3 years and 3 to less than 6 years was determined to be 2,107 cm^2 (EPA 2011). For the adolescent recreational user and trespasser, the mean SA for the head, hands, forearms, and lower legs for the age groups of 11 to less than 16 years was determined to be 4,645 cm^2 (EPA 2011). For the Boy Scouts/camper, the mean SA for the head, hands, forearms, and lower legs for the age groups of 6 to less than 11 years and 11 to less than 16 years was determined to be 3,947 cm^2 (EPA 2011).

Adherence factors for surface soil were obtained from EPA guidance for workers and residents (EPA 2011, 2014, 2022a). The researcher and construction worker were expected to have higher contact with surface soil, so the skin adherence factor was set to the EPA default for a construction worker of 0.3 mg/cm^2. Additionally, the adherence factor for the adolescent and child recreational user, trespasser, and Boy Scouts were set to the EPA default of 0.2 mg/cm^2 for a recreator (EPA 2022a). The adherence factor for the park personnel was set to the EPA default for a composite worker (0.12 mg/cm^2) to account for indoor and outdoor work (EPA 2022a).

Adherence factors for subsurface soil were based upon the expected activities for the construction worker and Boy Scouts since they are the only receptors expected to contact the subsurface. Exhibit 3-3 of RAGS E (EPA 2004) presents soil adherence factors based upon activities. For the construction worker, the 95th percentile adherence factor for a utility worker of 0.9 mg/cm^2 was selected (EPA 2004a). For the Boy Scouts, the adherence factor for children playing in wet soil (3.3 mg/cm^2) was selected (EPA 2004).

The inhalation of soil particulates assumed a 24-hour exposure period for the Boy Scouts/camper and an 8-hour workday for the researcher and park personnel. For the construction worker, the workday was determined from Table 16-20 of EPA EFH (EPA 2011), which presents the time spent in select outdoor locations and outdoor at construction sites. The 90th percentile time spent at a construction site for 18 to 64 years of age is 687 minutes per day. The 90th percentile time spent at a construction site for the Northeast Region is 695 minutes per day. Both of these times are similar and are approximately 11.5 hours per day. The recreational user and trespasser were assumed to only be present at the site for 4 hours per day. This is based upon a comparison of outdoor recreation times for doers only from Tables 16–25 and 16–26 of EPA EFH (EPA 2011). The 50 percentile and 90 percentile times for both the 11 to 16 age range (Table 16-25) and the 50 percentile and 90 percentile times for the Northeast Region ranged from 2 to 6 hours. Therefore, a value of 4 hours was selected. The PEF for all receptors, except the construction worker, was set to 1.21×10^9 m^3/kg. This PEF is specific to New York State and averages meteorological data for four cities (Cleveland, Ohio; Harrisburg, Pennsylvania; Hartford, Connecticut; and Philadelphia, Pennsylvania) based upon the two climatic zones for New York State (zones #7 and #8) [New York State Department of Environmental Conservation (NYSDEC) 2006]. A review of this PEF confirms it is appropriate for site-specific use for the site exposure. The PEF for the construction worker was determined using the EPA RSL calculator and is provided in **Attachment 4**.

4.9.2 Sediment Exposure Parameters

Exposure frequencies for contact with sediment were assumed equal to those for soil due to the low number of days per year the recreational user and Boy Scouts contact the site. It is reasonable that they may contact sediment for these same number of days. However, park personnel were assumed to be at the site for 160 days per year. This receptor contact with sediment was assumed at half of the days they are estimated to be onsite. Incidental ingestion rates for sediment are not available, so soil incidental ingestion rates are usually used as a surrogate. However, the soil ingestion rates account for ingestion of dust (EPA 2011). To determine the sediment ingestion rate for all receptors, only the soil ingestion rates (i.e., no dust ingestion), 50 mg/day, were used from Table 5-1 of the EPA 2011 EFH (EPA 2011). For dermal contact, the skin surface area available for contact used for surface soil was assumed to be similar because this accounts for exposed skin surfaces of the receptor, so these areas will also be available for sediment contact. The adherence factor used for subsurface soil for similar aged receptors were assumed similar since they take into account a wetter soil with a higher adherence factor.

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5. TOXICITY ASSESSMENT

The toxicity assessment considers the types of potential adverse health effects associated with exposures to COPCs in onsite soil, the relationship between the magnitude of exposure and potential adverse effects, and the related uncertainties, such as the weight of evidence of a particular COPCs carcinogenicity in humans.

5.1 HEALTH EFFECTS CLASSIFICATION AND CRITERIA

EPA (1989) specifies that the assessment be accomplished in two steps: hazard identification and dose-response assessment. Hazard identification is the process of determining whether studies demonstrate that exposure to a COPC may cause the incidence of an adverse effect. EPA specifies the dose-response assessment, which involves: (1) quantitative evaluation of the existing toxicity information, and (2) characterization of the relationship between the dose of the COPC administered or received, and the incidence of potentially adverse health effects in the exposed population. From this quantitative dose-response relationship, specific toxicity values are derived that can be used to estimate the incidence of potentially adverse effects occurring in humans at different exposure levels (EPA 1989).

Toxicity values will be selected according to EPA (2003a) and USACE (2016) guidance. The following hierarchy for human toxicity values will be used in the HHRA:

- **Tier 1 values** – EPA's Integrated Risk Information System (IRIS) (EPA 2022c)
- **Tier 2 values** – EPA's Provisional Peer Reviewed Toxicity Values
- **Tier 3 values** – Toxicity values from other sources. Priority will be given to sources of information that use sound science and are the most current, peer-reviewed, transparent, and publicly available.

The primary source of toxicity information is IRIS (EPA 2022c). When toxicity information and factors are not available in IRIS, a secondary value is sought. Tier 2 values, EPA's Provisional Peer Reviewed Toxicity Values, are developed by the Office of Research and Development, the National Center for Environmental Assessment, and the Superfund Health Risk Technical Support Center on a chemical-specific basis when requested by the Superfund program. Tier 3, other toxicity values, are considered when Tier 1 or Tier 2 toxicity values are not available. These toxicity values are taken from additional EPA and non-EPA sources and are chosen based on the most current and best peer-reviewed source available. The California EPA (CalEPA) Office of Environmental Health Hazard Assessment Toxicity Criteria Database (CalEPA 2022), the CalEPA Cancer Potency Values (CalEPA 2009), the Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (ATSDR 2022), and the Health Effects Assessment Summary Tables (EPA 1997) are potential Tier 3 sources for this HHRA.

For this HHRA, two toxicological endpoints are considered: carcinogenic and non-carcinogenic. The following sections detail how each endpoint is determined.

Toxicity Assessment for Non-Carcinogens

The methodology used by EPA for deriving non-cancer reference values for non-carcinogens, and site-specific considerations for modifying or using these concentrations are discussed in detail in Barnes and Dourson (1988) and EPA guidance (EPA 2022c). Non-carcinogens are typically judged to have a threshold daily dose below which deleterious or harmful effects are unlikely to occur. This concentration is called the no-observed-adverse-effect-level (NOAEL), and may be derived from either animal laboratory experiments or human epidemiology investigations (usually workplace studies). In developing a toxicity value or human NOAEL for non-carcinogens (i.e., a reference dose [RfD]), the regulatory approach is to (1) identify the critical toxic effect associated with chemical exposure (i.e., the most sensitive adverse effect); (2) identify the threshold dose in either an animal or human study; and (3) modify this dose to account for interspecies variability (where appropriate), differences in individual sensitivity (within-species variability), and other uncertainty and modifying factors. For the reference concentration (RfC), experimental exposures are extrapolated to a human equivalent concentration (HEC). The HEC is determined through a two-step process that begins with a point-of-departure, which is adjusted (multiplied) by a dosimetric adjustment factor (DAF) (EPA 2009a). The point-of-departure can represent a NOAEL, lowest-observed-adverse-effect-level (LOAEL), benchmark concentration, lower confidence limit, and the lower limit on an effective concentration using a 10 percent response level (LEC_{10}). The DAF is for the specific site of the chemical's effects (e.g., respiratory tract). The DAF is dependent upon the nature of the contaminant and the target site of the toxic effect.

Uncertainty factors (UFs) are intended to account for specific types of uncertainty inherent in extrapolation from the available data. The UFs are generally 10-fold, default factors used in operationally deriving the RfD and RfC from experimental data. UFs less than 10 can be used. A UF of 3 can be used in place of one-half power ($10^{0.5}$), when appropriate. The UFs are intended to account for (1) variation in susceptibility among the members of the human population (i.e., inter-individual or intraspecies variability); (2) uncertainty in extrapolating animal data to humans (i.e., interspecies uncertainty); (3) uncertainty in extrapolating from data obtained in a study with less-than-lifetime exposure (i.e., extrapolating from subchronic to chronic exposure); (4) uncertainty in extrapolating from a LOAEL rather than from a NOAEL; and (5) uncertainty associated with extrapolation when the database is incomplete. The maximum UF for the derivation of the RfCs used in this HHRA is 1,000. The maximum UF for the derivation of the RfDs used in this HHRA is 3,000. To calculate the RfD, the appropriate NOAEL is divided by the product of all the applicable UFs. This is expressed as:

$$RfD = NOAEL / (UF_1 \times UF_2 \times UF_3 \times UF_4)$$

The resulting RfD is expressed in units of milligrams of chemical per kilogram of body weight per day (mg/kg-bw/day). To calculate the RfC, the HEC is divided by UFs and is expressed in units of mg/m^3. Tables 3 and 4 present the non-carcinogenic toxicity values used in this HHRA.

Toxicity Assessment for Carcinogenicity

Unlike non-carcinogens, carcinogens are generally assumed to have no threshold. There is presumed to be no level of exposure below which carcinogenic effects will not manifest

themselves. This "non-threshold" concept supports the idea that there are small, finite probabilities of inducing a carcinogenic response associated with every level of exposure to a potential carcinogen. EPA uses a two-part evaluation for carcinogenic effects. This evaluation includes the assignment of a weight-of-evidence (WOE) classification and the quantification of a cancer toxic potency concentration.

EPA has established five recommended standard hazard descriptors: "*Carcinogenic to Humans*," "*Likely to Be Carcinogenic to Humans*," "*Suggestive Evidence of Carcinogenic Potential*," "*Inadequate Information to Assess Carcinogenic Potential*," and "*Not Likely to Be Carcinogenic to Humans*" (EPA 2005a). The WOE classification is based on a thorough scientific examination of the body of available data. Only compounds that have a WOE classification of B2 or above are considered to have carcinogenic potential in this risk assessment. Compounds with a WOE classification of C will be discussed in the uncertainty section.

Since the revised cancer guidelines (EPA 2005a) are not yet incorporated into many of the IRIS chemical profiles, the WOE classifications defined by EPA (EPA 1989) and shown in the toxicity profiles on the IRIS system will still be used when interpreting carcinogenic toxicity of COPCs. The WOE classification system assigns a letter or alphanumeric (A through E) to each potential carcinogen that reflects an assessment of its potential to be a human carcinogen. This WOE classification that will be used in the HHRA is defined as follows:

- ***Group A*** – Known human carcinogen
- ***Group B –*** Probable human carcinogen
- ***Group B1 –*** Limited evidence of carcinogenicity in humans
- ***Group B2 –*** Sufficient evidence in animals, but inadequate evidence in humans
- ***Group C –*** Possible human carcinogen (limited evidence of carcinogenicity in animals in the absence of human data)
- ***Group D –*** Human carcinogenicity not classifiable because of lack of data
- ***Group E*** – Evidence of non-carcinogenicity in humans (no evidence in at least two adequate animal tests in different species or in both epidemiological and animal studies)

Quantification is expressed as a slope factor (SF) for oral and dermal exposures and an inhalation unit risk (IUR) for inhalation exposures, which reflects the dose-response data for the carcinogenic endpoint(s) (EPA 1989, 2009a). The SF and the IUR are the upper 95^{th} percentile confidence limit of the probability of response per unit daily intake of a chemical over a lifetime. The SF is expressed in units of proportion (of a population) affected per mg/kg-day. The IUR is expressed in $\mu g/m^3$. Typically, the SF and the IUR are used to estimate the upper-bound lifetime probability of a person developing cancer from exposure to a given concentration of a carcinogen. SFs and IURs are generally based on experimental animal data unless suitable epidemiological studies are

available. Due to the difficulty in detecting and measuring carcinogenic endpoints at low exposure concentrations, SFs and IURs are typically developed by using a model to fit the available high-dose, experimental animal data, and then extrapolating downward to the low-dose range to which humans are typically exposed. EPA recommends the linear multistage model to derive an SF and IUR. The model is conservative and provides an upper bound estimate of excess lifetime cancer risk. These methods and approaches are discussed in greater detail within the EPA *Cancer Guidelines* (EPA 2005a). Tables 5 and 6 present the carcinogenic toxicity values used in this HHRA.

Carcinogenic compounds were assessed for mutagenic modes of action. COPCs identified as mutagenic have sensitivity pertaining to cancer risks associated with early-life exposures. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene are the COPCs with a mutagenic mode of action. Tables 5 and 6 present the COPCs with a mutagenic mode of action. The mutagenic mode of action is assessed with a linear approach (EPA 2005b). To account for the early-life exposure and the mutagenic mode of action, the cancer potency estimates will be adjusted by an age-dependent adjustment factor (ADAF). EPA recommends, for mutagenic chemicals, when no chemical-specific data exist, a default approach using estimates from chronic studies (i.e., cancer slope factors) with appropriate modifications to address the potential for differential risk of early life stage exposure (EPA 2005a, 2005b). An ADAF modification for early life stage exposure to mutagenic COPCs is required because available studies indicate higher cancer risks resulting from a given exposure occurring early in life when compared with the same amount of exposure during adulthood (EPA 2005b). The intakes for COPCs identified with a mutagenic mode of action will be modified by an ADAF for the following exposures (EPA 2005b):

- For exposures before 2 years of age (i.e., spanning a 2-year time interval from the first day of birth up until a child's second birthday), a 10-fold adjustment

- For exposures between 2 and less than 16 years of age (i.e., spanning a 14-year time interval from a child's second birthday up until their sixteenth birthday), a 3-fold adjustment

- For exposures after turning 16 years of age, no adjustment

For this HHRA, the adolescent recreational user, child recreational user, and adolescent trespasser are within the age range that requires adjustment for a mutagenic mode of action.

5.2 ADJUSTMENT FOR DERMAL ABSORPTION

Toxicity values specific to dermal exposures are not available and require adjustment of the oral toxicity values (oral RfDs or SFs). This adjustment accounts for the difference between the daily intake dose through dermal contact as opposed to ingestion. Most toxicity values are based on the actual administered dose and must be corrected for the percent of chemical-specific absorption that occurs across the gastrointestinal tract prior to use in dermal contact risk assessment (EPA 1989, 2004). EPA recommends utilizing oral absorption efficiency factors in converting oral toxicity values to dermal toxicity values (EPA 2004). This adjustment accounts for the absorption

efficiency in the "critical study," which is utilized in determining the RfD and SF. Where oral absorption in the critical study is essentially complete (i.e., 100 percent), the absorbed dose is equivalent to the administered dose, and no adjustment of oral toxicity values is necessary when evaluating dermal exposures. When gastrointestinal absorption of a chemical in the critical study is poor (e.g., 1 percent), the absorbed dose is much smaller than the administered dose, and toxicity values for dermal exposure are adjusted to account for the difference in the absorbed dose relative to the administered dose. To account for the differences between the administered (oral) and the absorbed (dermal) dose, RfDs and SFs are modified by the gastrointestinal dermal absorption factor (GI ABS).

In addition to the GI ABS modification of the toxicity values for dermal contact, dermal contact rates are also evaluated based upon a chemical's ability to be absorbed through the skin surface. This absorption rate is dependent upon the medium evaluated. For soil, EPA has identified a dermal ABS that is chemical-specific. The ABS value reflects the desorption of a chemical from soil and the absorption of the chemical across the skin and into the blood stream. Recommended values are presented that consider ranges of values that result from different soil types, loading rates, chemical concentrations, and other conditions. ABSs specific to sediment have not been set forth, so soil ABSs are used as surrogates for sediment. Chemical-specific adjustment for dermal absorption is presented on Table 7.

5.3 SPECIAL CHEMICAL: LEAD

Lead is classified as a B2-probable human carcinogen. However, EPA has not published an SF or IUR for quantifying carcinogenic risks. Lead is not regulated as a carcinogen because it appears to be more potent as a toxicant to the hemopoietic system by inhibiting heme synthesis. Much of the toxicological data collected on the effects of lead in humans relates to exposure and effect in terms of the amount of lead in blood associated with an observed effect, expressed as micrograms of lead per deciliter of blood (µg lead/dL blood). EPA and the Centers for Disease Control and Prevention (CDC) have determined that there is no safe level of lead in children (CDC 2012). CDC recommended a reference value based on the 97.5^{th} percentile of the National Health and Nutrition Examination Survey (NHANES)-generated blood-lead level in children 1–5 years old (CDC 2012). The 97.5^{th} percentile blood-level level was identified as 5 µg/dL. Therefore, blood lead levels are the indicator of excess lead exposure in humans.

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6. RISK CHARACTERIZATION

The characterization of human health risk involves combining information from the exposure assessment with that from the toxicity assessment. Chemical intakes for each receptor and each exposure pathway are combined with toxicity information to derive cumulative excess lifetime cancer risks (ELCRs) and cumulative non-cancer hazard indexes (HIs). The ELCRs and HIs are presented in EPA RAGS D format (EPA 2001). These tables also present cumulative cancer risks or HIs for COPCs, pathways, and receptors.

The methodologies used to estimate carcinogenic risks and chronic and subchronic risks for non-carcinogens are described further in the sections below.

6.1 HAZARD INDEX FOR NON-CARCINOGENIC EFFECTS

Potential human health risks associated with exposures to non-carcinogenic COPCs are calculated by comparing the intake or the EC with the chemical-specific RfD or RfC, as per EPA Guidance (EPA 1989, 2009a). An HQ is derived for each COPC, as shown in the equation below:

$$HQ = \frac{Intake}{RfD} \qquad \text{or} \qquad HQ = \frac{EC}{RfC \times (1{,}000 \mu g/mg)}$$

where:

HQ	=	Hazard quotient (unitless)
Intake	=	Calculated non-carcinogenic average daily intake (mg/kg-day)
EC	=	Exposure concentration (µg/m^3)
RfD	=	Reference dose (mg/kg-day)
RfC	=	Reference concentration (mg/m^3)

If the average daily dose (intake) exceeds the RfD or RfC, the HQ will exceed a ratio of one (1.0) and there may be concern that potential adverse systemic health effects will be observed in the exposed populations. If the average daily dose (intake) does not exceed the RfD or the RfC, the HQ will not exceed 1.0 and there will be no concern that potential adverse systemic health effects will be observed in the exposed populations. In general, the greater the value of the HQ is above 1.0, the greater the level of concern. However, the HQ does not represent a statistical probability that an adverse health effect will occur. To evaluate the potential for exposure to multiple chemicals for each exposure pathway, an HI is calculated.

This approach assumes that the exposure to more than one chemical is additive; and therefore, sums the HQs of all the COPCs:

$$HI = \Sigma HQ_n$$

In this aspect, synergistic and antagonistic interactions are not considered. Similar to the HQs, if the HI exceeds 1.0, the potential for non-carcinogenic adverse effects may exist. The overall receptor-specific HI is the sum of the HIs for all exposure pathways. If the HI is less than 1.0, then

no adverse health effects are likely to be associated with exposures at the site. However, if the total HI is greater than 1.0, separate endpoint-specific HIs may be calculated based on toxic endpoint of concern or target organ (e.g., HQs for neurotoxins are summed separately from HQs for renal toxins). Only if an endpoint-specific HI is greater than 1.0 is there reason for concern about potential health effects for that endpoint.

6.2 CARCINOGENIC RISK

Carcinogenic risk is calculated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen. The numerical estimate of ELCR is calculated by multiplying the lifetime cancer average daily intake (LADI) by the risk per unit dose (the SF) or multiplying the EC by the IUR.

This is shown in the following equation:

$$ELCR_n = LADI \times SF$$
$$ELCR_n = EC \times IUR$$

where:

$ELCR_n$ = chemical-specific excess lifetime cancer risk for chemical "n"
$LADI$ = Lifetime average daily intake (mg/kg-day)
EC = Exposure concentration ($\mu g/m^3$)
SF = Cancer slope factor $(mg/kg\text{-}day)^{-1}$
IUR = Inhalation unit risk $(\mu g/m^3)^{-1}$

Since the SF and the IUR are the statistical 95th percent upper-bound confidence limit on the dose-response slope, this method provides a conservative, upper-bound estimate of risk. It should be noted that the interpretation of the significance of the cancer risk estimate is based on the appropriate public policy. EPA in the National Contingency Plan (40 CFR Part 300) (EPA 1990) states that:

> *"...For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6}."*

To evaluate the potential for exposure to multiple chemicals for each exposure pathway, risks resulting from exposure to multiple carcinogens are assumed to be additive. Therefore, the pathway-specific ELCR is estimated by summing the risks estimated for each COPC in each environmental media and for each pathway:

$$ELCR_{total} = \Sigma ELCR_n$$

where:

$ELCR_{total}$ = total lifetime cancer risk across all exposure pathways
$ELCR_n$ = chemical-specific excess lifetime cancer risk for chemical "n"
n = various individual carcinogenic COPCs

The overall receptor-specific $ELCR_{total}$ is the sum of the risk for all exposure pathways. This risk is presented as one significant figure (EPA 1989).

6.3 LEAD RISKS

For lead in soil, lead risks were modeled using *Recommendations of the Technical Review Workgroup for Lead, An Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil* (EPA 2003b, 2009b, 2017). The adult lead model (ALM) is developed to model the most sensitive receptor which is the fetus of a worker who develops a body burden as a result of non-residential exposure to lead. The model assumes levels of lead that are protective of a fetus will also afford protection for male or female adult workers. To achieve a specific level of protectiveness, EPA has established a limit to exposure to soil lead levels such that a typical (or hypothetical) child would have an estimated risk of no more than 5 percent exceeding the reference blood-lead level.

For the adult receptors, the baseline blood-lead level (PbB_0) and geometric standard deviation of the blood-lead level (GSDi) based upon the NHANES 2009–2014 data were used (EPA 2017).

The ALM is recommended for use to evaluate potential concerns for exposure to lead for adolescents, which includes the site receptors adolescent recreational users and trespassers EPA 2022d). EPA notes, "The adolescent population may be considered sensitive since exposures during these years may result in a body burden of lead that is available to transfer to the fetus later in life. Given the limitations of currently available modeling tools, it is reasonable to apply the ALM to adolescent receptors…" (EPA 2022d). To evaluate adolescents, specific model parameters in the ALM are changed to better model the adolescent population; these parameters include the exposure frequency, exposure duration, baseline blood lead (PbB_0), and absorption fraction.

EPA notes that potential lead absorption is higher in adolescents than in adults. A range from 12 to 30 percent absorption is identified. However, an absorption fraction of 12 percent is selected for all receptors based upon the expected activities that will occur at the site and the infrequent exposures. The baseline blood lead level for the adolescent was taken from the CDC report *National Report on Human Exposure to Environmental Chemicals* (CDC 2022). The report using individual and pooled blood or urine samples tested by Centers for Disease Control and Prevention from people who took part in CDC's NHANES. The report determined a geometric mean of blood lead levels for adolescents (age 12 to 19 years) from years 2017 and 2018 as 0.411 µg/dL (CDC 2022). The CDC report does not specify a GSD_i for this blood-lead level. Therefore, ALM default GSD_i was used.

For the soil ingestion rate, EPA notes, "a soil ingestion rate of 50 mg/day is recommended as a plausible central tendency value for non-contact-intensive activities. Either commercial or

industrial workers may work primarily indoors, so that exposure to soil occurs primarily via indoor dust. Workers' limited and occasional contact with outdoor soils (e.g., picnicking, walking to parking lots, standing on a loading dock) should be adequately accounted for via the 50 mg/day incidental soil ingestion. If an individual is performing a contact-intensive activity with soil, then a soil ingestion rate greater than 50 mg/day would be expected (EPA 2022c)." For all receptors, except the construction worker, contact with the site was assumed to consist of only non-contact-intensive activities; therefore, a soil ingestion rate of 50 mg/day was assumed. The construction worker exposure to soil is expected to be contact intensive. For this type of exposure, EPA notes, "Because central tendency values are recommended inputs for both the IEUBK [Integrated Exposure Uptake Biokinetic] model and the ALM, a more plausible range for a soil lead ingestion rate is 50 mg/day to 200 mg/day for adult contact-intense soil exposures. Thus, there is reasonable support for use of 100 mg/day as a soil ingestion rate for the contact-intense worker scenario in the ALM (EPA 2022d)."

EPA also notes for the ALM, "If exposures are expected to occur over a shorter time interval, then EF should not be prorated over the entire year (EPA 2022d)." For recreational user receptors, contact with the site is not expected to occur over the entire year (i.e., 12 months) but rather during warmer months (e.g., 6 months). As a result, the averaging time used in the ALM reflects the shorter time period these receptors are present at the site (EPA 2003b).

The following is a summary of some default parameters and site-specific parameters used in the ALM:

- Lead concentration in soil = mean concentration (DU specific)
- Mother's Blood Lead Concentration at Childbirth = 0.6 µg of lead/dL
- GSD_i of lead in blood = 1.8 (EPA 2017)
- Soil ingestion rate = 100 mg/day (construction worker); 50 mg/day (worker and recreational user)
- Absorption fraction = 0.12 (default)
- Exposure frequency = Receptor specific (Table 2)
- Baseline blood lead (PbB_0) = 0.411 µg/dL (adolescent), 0.6 µg/dL (adults)

6.4 RISK ASSESSMENT RESULTS

Calculations are presented for each individual DU and for the two exposure areas. The Iona Island Exposure Area includes DU-1 through DU-07 and DU-09 through DU-22, which encompass

15 AOCs (locations/footprints of 16 former buildings, 4 former ASTs[1], 2 former coal storage areas, and 3 former transformer locations). The Former Dump Area Exposure Area is the second exposure area and includes DU-17 through DU-19, which includes AOC #16 – Area D (Former Dumping Area).

The following sections and tables present the non-carcinogenic hazards and carcinogenic risks. No receptor exposures exceeded the acceptable cancer risk range of 10^{-4} to 10^{-6}. Additionally, all receptors exposure were below the non-cancer hazard index of 1.0 for exposure to DUs-13 through -18, except for the construction worker. However, a breakdown by target organ did not reveal any target organ HIs greater than 1.0. Potential risk concerns were determined for lead; these are discussed in Section 6.4.25.

6.4.1 DU-1 Risk Assessment Results

Calculations for receptors evaluated for DU-1 are presented in Tables 8 through 15. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 16 through 23. The following table presents a summary of the results:

Insert #2. DU-1 Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	3E-06	0.04
Researcher	2E-07	0.01
Construction Worker	7E-07	0.4
Adult Recreator	5E-07	0.007
Adolescent Recreator	7E-07	0.03
Child Recreator	9E-07	0.07
Adolescent Trespasser	1E-07	0.006
Camper	7E-07	0.02

[1] The ASTs themselves are not the AOCs. The FUDS-eligible AOCs are the former AST locations/footprints. The ASTs were removed but the sites were not formally closed and were not included in the Containerized HTRW project.

6.4.2 DU-2 Risk Assessment Results

Calculations for receptors evaluated for DU-2 are presented in Tables 24 through 31. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 32 through 39. The following table presents a summary of the results:

Insert #3. DU-2 Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	5E-06	0.05
Researcher	3E-07	0.02
Construction Worker	1E-06	0.6
Adult Recreator	8E-07	0.01
Adolescent Recreator	2E-06	0.04
Child Recreator	2E-06	0.09
Adolescent Trespasser	4E-07	0.008
Camper	2E-06	0.02

6.4.3 DU-3 Risk Assessment Results

Calculations for receptors evaluated for DU-3 are presented in Tables 40 through 47. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 48 through 55. The following table presents a summary of the results:

Insert #4. DU-3 Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	4E-06	0.04
Researcher	2E-07	0.02
Construction Worker	8E-07	0.5
Adult Recreator	6E-07	0.008
Adolescent Recreator	8E-07	0.04
Child Recreator	1E-06	0.08
Adolescent Trespasser	1E-07	0.007
Camper	8E-07	0.02

6.4.4 DU-4 Risk Assessment Results

Calculations for receptors evaluated for DU-4 are presented in Tables 56 through 63. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 64 through 71. The following table presents a summary of the results:

Insert #5. DU-4 Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	1E-05	0.1
Researcher	6E-07	0.04
Construction Worker	3E-06	0.8
Adult Recreator	2E-06	0.02
Adolescent Recreator	3E-06	0.09
Child Recreator	4E-06	0.2
Adolescent Trespasser	6E-07	0.02
Camper	3E-06	0.04

6.4.5 DU-5 Risk Assessment Results

Calculations for receptors evaluated for DU-5 are presented in Tables 72 through 79. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 80 through 87. The following table presents a summary of the results:

Insert #6. DU-5 Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	3E-06	0.04
Researcher	1E-07	0.01
Construction Worker	6E-07	0.5
Adult Recreator	4E-07	0.007
Adolescent Recreator	6E-07	0.03
Child Recreator	8E-07	0.07
Adolescent Trespasser	1E-07	0.006
Camper	6E-07	0.02

6.4.6 DU-6 Risk Assessment Results

Calculations for receptors evaluated for DU-6 are presented in Tables 88 through 95. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 96 through 103. The following table presents a summary of the results:

Insert #7. DU-6 Risk Assessment Results

DU-6 Risk Assessment Results		
Receptors	**HHRA Results**	
	Carcinogenic Risk	**Non-carcinogenic Hazards**
Park Personnel	3E-06	0.04
Researcher	1E-07	0.02
Construction Worker	7E-07	0.7
Adult Recreator	4E-07	0.008
Adolescent Recreator	6E-07	0.04
Child Recreator	8E-07	0.07
Adolescent Trespasser	1E-07	0.006
Camper	7E-07	0.02

6.4.7 DU-7 Risk Assessment Results

Calculations for receptors evaluated for DU-7 are presented in Tables 104 through 111. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 112 through 119. The following table presents a summary of the results:

Insert #8. DU-7 Risk Assessment Results

Receptors	**HHRA Results**	
	Carcinogenic Risk	**Non-carcinogenic Hazards**
Park Personnel	4E-06	0.04
Researcher	2E-07	0.02
Construction Worker	9E-07	0.5
Adult Recreator	6E-07	0.008
Adolescent Recreator	9E-07	0.04
Child Recreator	1E-06	0.07
Adolescent Trespasser	2E-07	0.007
Camper	9E-07	0.02

6.4.8 DU-9 Risk Assessment Results

Calculations for receptors evaluated for DU-9 are presented in Tables 120 through 127. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 128 through 135. The following table presents a summary of the results:

Insert #9. DU-9 Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	3E-09	0.02
Researcher	1E-10	0.006
Construction Worker	2E-08	0.3
Adult Recreator	2E-10	0.003
Adolescent Recreator	1E-10	0.02
Child Recreator	5E-11	0.03
Adolescent Trespasser	4E-11	0.002
Camper	6E-10	0.008

6.4.9 DU-10 Risk Assessment Results

Calculations for receptors evaluated for DU-10 are presented in Tables 136 through 143. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 144 through 151. The following table presents a summary of the results:

Insert #10. DU-10 Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	3E-09	0.02
Researcher	1E-10	0.006
Construction Worker	2E-08	0.3
Adult Recreator	3E-10	0.004
Adolescent Recreator	1E-10	0.02
Child Recreator	5E-11	0.03
Adolescent Trespasser	4E-11	0.003
Camper	6E-10	0.009

6.4.10 DU-11 Risk Assessment Results

Calculations for receptors evaluated for DU-11 are presented in Tables 152 through 159. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 160 through 167. The following table presents a summary of the results:

Insert #11. DU-11 Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	1E-05	0.1
Researcher	5E-07	0.04
Construction Worker	2E-06	0.8
Adult Recreator	2E-06	0.02
Adolescent Recreator	3E-06	0.09
Child Recreator	3E-06	0.2
Adolescent Trespasser	5E-07	0.02
Camper	3E-06	0.04

6.4.11 DU-12 Risk Assessment Results

Calculations for receptors evaluated for DU-12 are presented in Tables 168 through 175. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 176 through 183. The following table presents a summary of the results:

Insert #12. DU-12 Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	4E-06	0.05
Researcher	2E-07	0.02
Construction Worker	1E-06	0.7
Adult Recreator	7E-07	0.01
Adolescent Recreator	2E-06	0.04
Child Recreator	2E-06	0.08
Adolescent Trespasser	3E-07	0.008
Camper	2E-06	0.02

6.4.12 DU-13 Risk Assessment Results

Calculations for receptors evaluated for DU-13 are presented in Tables 184 through 191. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 192 through 199. The following table presents a summary of the results:

Insert #13. DU-13 Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	1E-05	0.1
Researcher	6E-07	0.05
Construction Worker	2E-06	1.3
Adult Recreator	2E-06	0.02
Adolescent Recreator	6E-06	0.1
Child Recreator	7E-06	0.2
Adolescent Trespasser	1E-06	0.02
Camper	6E-06	0.06

For the construction worker, a breakdown by target organ does not reveal any target organs above 1.0 (Table 194).

6.4.13 DU-14 Risk Assessment Results

Calculations for receptors evaluated for DU-14 are presented in Tables 200 through 207. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 208 through 215. The following table presents a summary of the results:

Insert #14. DU-14 Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	4E-06	0.05
Researcher	2E-07	0.02
Construction Worker	9E-07	0.5
Adult Recreator	6E-07	0.009
Adolescent Recreator	9E-07	0.04
Child Recreator	1E-06	0.08
Adolescent Trespasser	2E-07	0.007
Camper	1E-06	0.02

6.4.14 DU-15 Risk Assessment Results

Calculations for receptors evaluated for DU-15 are presented in Tables 216 through 223. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 224 through 231. The following table presents a summary of the results:

Insert #15. DU-15 Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	3E-09	0.02
Researcher	1E-10	0.005
Construction Worker	2E-08	0.3
Adult Recreator	2E-10	0.003
Adolescent Recreator	1E-10	0.01
Child Recreator	4E-11	0.03
Adolescent Trespasser	3E-11	0.002
Camper	5E-10	0.007

6.4.15 DU-16 Risk Assessment Results

Calculations for receptors evaluated for DU-16 are presented in Tables 232 through 239. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 240 through 247. The following table presents a summary of the results:

Insert #16. DU-16 Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	3E-09	0.04
Researcher	1E-10	0.01
Construction Worker	2E-08	0.4
Adult Recreator	3E-10	0.007
Adolescent Recreator	1E-10	0.03
Child Recreator	5E-11	0.07
Adolescent Trespasser	4E-11	0.005
Camper	7E-10	0.02

6.4.16 DU-17 Risk Assessment Results

Calculations for receptors evaluated for DU-17 are presented in Tables 248 through 255. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 256 through 263. The following table presents a summary of the results:

Insert #17. DU-17 Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	4E-06	0.1
Researcher	2E-07	0.04
Construction Worker	9E-07	0.7
Adult Recreator	6E-07	0.02
Adolescent Recreator	9E-07	0.1
Child Recreator	1E-06	0.2
Adolescent Trespasser	2E-07	0.02
Camper	1E-06	0.05

6.4.17 DU-18 Risk Assessment Results

Calculations for receptors evaluated for DU-18 are presented in Tables 264 through 271. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 272 through 279. The following table presents a summary of the results:

Insert #18. DU-18 Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	5E-06	0.2
Researcher	3E-07	0.07
Construction Worker	1E-06	1.2
Adult Recreator	8E-07	0.04
Adolescent Recreator	1E-06	0.2
Child Recreator	2E-06	0.4
Adolescent Trespasser	2E-07	0.03
Camper	1E-06	0.09

For the construction worker, a breakdown by target organ did not reveal any target organs above an acceptable level of 1.0 (Table 274).

6.4.18 DU-19 Risk Assessment Results

Calculations for receptors evaluated for DU-19 are presented in Tables 280 through 287. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 288 through 295. The following table presents a summary of the results:

Insert #19. DU-19 Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	3E-06	0.1
Researcher	1E-07	0.04
Construction Worker	6E-07	0.9
Adult Recreator	4E-07	0.02
Adolescent Recreator	9E-07	0.1
Child Recreator	1E-06	0.2
Adolescent Trespasser	2E-07	0.02
Camper	9E-07	0.05

6.4.19 DU-22 Risk Assessment Results

Calculations for receptors evaluated for DU-22 are presented in Tables 296 through 303. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 304 through 311. The following table presents a summary of the results:

Insert #20. DU-22 Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	1E-06	0.01
Researcher	7E-08	0.004
Construction Worker	2E-07	0.1
Adult Recreator	2E-07	0.001
Adolescent Recreator	8E-07	0.007
Child Recreator	9E-07	0.01
Adolescent Trespasser	2E-07	0.001
Camper	8E-07	0.003

6.4.20 Former Dump Exposure Area Risk Assessment Results

Receptors were evaluated for potential ingestion of, dermal contact with, and inhalation of particulates from soil in the Former Dumping Area (DU-17, DU-18, and DU-19). Calculations for receptors evaluated for the Former Dump Area Exposure Area are presented in Tables 312 through 319. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 320 through 327. The following table presents a summary of the results:

Insert #21. Former Dump Exposure Area (DU-17 through DU-19) Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	4E-06	0.2
Researcher	2E-07	0.08
Construction Worker	8E-07	1.3
Adult Recreator	6E-07	0.04
Adolescent Recreator	1E-06	0.2
Child Recreator	1E-06	0.4
Adolescent Trespasser	2E-07	0.03
Camper	1E-06	0.09

For the construction worker, a breakdown by target organ did not reveal any target organs above an acceptable level of 1.0 (Table 322).

6.4.21 Island Exposure Area Risk Assessment Results

Receptors were evaluated for potential ingestion of, dermal contact with, and inhalation of particulates from soil from the Iona Island Exposure Area (DU-1 through DU-7 and DU-09 through DU-22). Calculations for receptors evaluated for the Iona Island Exposure Area are presented in Tables 328 through 335. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 336 through 343. The following table presents a summary of the results:

Insert #22. Iona Island Exposure Area (DU-17 through DU-19) Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	4E-06	0.07
Researcher	2E-07	0.03
Construction Worker	9E-07	0.6
Adult Recreator	7E-07	0.01
Adolescent Recreator	1E-06	0.06
Child Recreator	2E-06	0.1
Adolescent Trespasser	3E-07	0.01
Camper	1E-06	0.03

6.4.22 Hudson River Shoreline Risk Assessment Results

Calculations for receptors evaluated for IHRS DU sediment are presented in Tables 344 through 349. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 350 through 355. The following table presents a summary of the results:

Insert #23. IHRS DU Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	1E-05	0.4
Adult Recreator	3E-06	0.1
Adolescent Recreator	6E-06	0.2
Child Recreator	4E-06	0.5
Adolescent Trespasser	2E-06	0.1
Camper	5E-06	0.2

6.4.23 Rip Rap Drainage Swale Risk Assessment Results

Calculations for receptors evaluated for RRDS DU sediment are presented in Tables 356 through 361. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 362 through 367. The following table presents a summary of the results:

Insert #24. RRDS DU Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	4E-06	0.04
Adult Recreator	9E-07	0.01
Adolescent Recreator	2E-06	0.03
Child Recreator	1E-06	0.06
Adolescent Trespasser	5E-07	0.02
Camper	1E-06	0.02

6.4.24 Tidal Wetland Swale

Calculations for receptors evaluated for TWS DU sediment are presented in Tables 368 through 373. Estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 374 through 379. The following table presents a summary of the results:

Insert #25. TWS DU Risk Assessment Results

Receptors	HHRA Results	
	Carcinogenic Risk	Non-carcinogenic Hazards
Park Personnel	4E-06	0.08
Adult Recreator	9E-07	0.02
Adolescent Recreator	2E-06	0.06
Child Recreator	1E-06	0.1
Adolescent Trespasser	5E-07	0.03
Camper	1E-06	0.05

6.4.25 Lead

Lead was identified as a COPC based upon a comparison to the EPA residential soil RSL (400 mg/kg) (Table 1a). Lead was identified as a COPC for the individual DU-7, DU-17 (surface and subsurface soil), DU-18 (surface and subsurface soil), and IHRS DU. Since these individual DUs had maximum detected concentrations of lead above the residential soil RSL, lead was identified as a COPC within the combined exposure areas, Iona Island Exposure Area (including DU-1 through DU-7, DU-9 through DU-15) and Former Dump Exposure Area (DU-17 through DU-19). Potential concerns for workers, recreational adults and adolescents exposure to lead in soil were evaluated using the EPA ALM. The ALM evaluates the percentage of a target population that will have blood-lead levels above a reference concentration of 5 µg/dL. Outputs of the ALM are presented in **Attachment 5**.

Insert #26. Results of ALM

Receptor	% Exceeding	95th percentile Fetal Blood Lead Level (µg/dL)
DU-7 – surface soil		
Park Personnel	2.4	4.1
Construction Worker	**24.9**	**8.8**
Adult Recreational	0.22	2.5
Adolescent Recreational	0.07	2.0
DU-17 – surface soil		
Park Personnel	**9.4**	**6.1**
Construction Worker	**54.9**	**14.1**
Adult Recreational	0.84	3.2
Adolescent Recreational	0.4	2.8
DU-17 – subsurface soil		
Park Personnel	**6.3**	**5.3**
Construction Worker	**44.6**	**12.1**
DU-18 – surface soil		
Park Personnel	5.0	5.0
Construction Worker	**39.2**	**11.2**
Adult Recreational	0.43	2.8
Adolescent Recreational	0.2	2.4
DU-18 – subsurface soil		
Park Personnel	**16.9**	**7.5**
Construction Worker	**70.4**	**18.0**
Former Dump Area Exposure Area		
Park Personnel	**8.9**	**6.0**
Construction Worker	**53.6**	**13.9**
Adult Recreational	0.8	3.2
Adolescent Recreational	0.4	2.7
Island Exposure Area		
Park Personnel	0.1	2.2
Construction Worker	1.2	3.5
Adult Recreational	0.03	1.7
Adolescent Recreational	0.003	1.3
IHRS DU – sediment		
Park Personnel	**87.8**	**26.1**
Adult Recreational	**38.1**	**11.0**
Adolescent Recreational	**35.4**	**10.6**

The models indicate mean blood-lead levels exceed a level of concern for a construction worker at all areas evaluated. Mean blood-lead levels exceeded a level of concern for the park personnel at DU-17 surface and subsurface soil, DU-18 subsurface soil, the Former Dump Area and IHRS DU. For the recreational user, only the IHRS (Hudson River Shoreline) DU exceeded the

acceptable mean blood-lead level. It is noted that the Former Dump Area Exposure Area, which includes DU-17 and DU-18, is a marshy area that is covered with vegetation and subject to tidal influence that makes access difficult. The Former Dump Area is also identified as a future nature preserve/wetland area. No construction or other activities are expected in this area and actual contact with this area is minimal and unlikely to result in human health concerns.

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7. RISK ASSESSMENT UNCERTAINTIES

There are numerous uncertainties inherent in the HHRA process. Risk assessment methods as specified by guidance (EPA 1989) are precautionary; as such, they are protective but may over-estimate risks to assure protectiveness of public health. Where uncertainties exist, conservative parameters were used in the HHRA process to ensure that the resulting risk characterization represents an "overestimate" of potential human health concerns. This ensures adequate protection of human health so that risks are not underestimated.

7.1 SAMPLING AND ANALYSIS UNCERTAINTIES

Of the potential uncertainties associated with environmental sampling, the sample design is likely to have the greatest impact on the evaluation of risks to receptors. The soil sampling design was developed based on the available historical information regarding the activities that occurred at the site. Focusing the study design to provide analyses for certain chemicals specific to suspected source areas is a valid and accepted means of maintaining a practical and efficient limit on the field effort. However, there is always a possibility that the study design could miss sampling where these chemicals are present or miss other types of chemicals in a specific sample.

The ISM sampling design was used to prevent missing areas where site-related chemicals are present. However, only 1-acre grids were sampled across the site in areas of suspected historical activities. The areas where no grids were sampled present an uncertainty in that, over time, as the soils have been reworked and spread across the site, these areas that were not sampled may contain chemicals. However, ISM sampling design better predicts the average concentration across an area than discrete samples.

In an effort to address the uncertainties just discussed, and in accordance with the conservative nature of HHRAs, the 1-acre and smaller DUs established in areas most likely to contain the highest levels of contamination. However, each DU was sampled randomly. Therefore, the sample design is likely to overestimate potential long-term human health risk concerns for exposure to the Site.

The 95UCL was used as an upper estimate of mean exposures for all Phase I ISM results. In almost all cases, both the Student's-t and Chebychev calculated 95UCL from the triplicate samples produced results that were higher than any of the detected replicate concentrations. Due to the distribution of the data, variability in the results, and the apparent heterogeneity of site soil, the Chebychev value was recommended over the Student's-t value, which was generally a lower number. There were no cases where the Chebychev value resulted in an HQ greater than 1 where the Student's-t would not. However, both values are typically higher than the triplicate sample results, are conservative, and may overestimate risks. However, these uncertainties would not change the overall results of the HHRA because no risk concerns were determined for any receptor exposure to the site.

As discussed in Section 3.2 of the Phase I RI Data Summary Report (EA 2021), approximately 20 percent of the sample results were J-flagged for minor laboratory interferences including matrix interference, trace contamination in blank samples, and/or exceeding holding times. J qualifiers

indicate estimated values. In some cases, the J qualifier is biased low, indicating the reported result may be lower than the actual concentration. In these cases, risks may be underestimated. For instance, due to the potential low bias in the PAH concentrations at DU-13 as a result of holding time exceedances during laboratory preparation, concentrations of PAHs could be higher than those reported. As such, potential risks at DU-13 could also be higher. In the cases where the J qualifier is biased high, then the potential risks associated with these data may be overestimated because the reported result is potentially higher than the actual concentration. This occurs for several metals and PAHs in DUs 9, 11, 14, 19, and 20. However, these uncertainties would not change the overall results of the HHRA. For the biased high PAH results, potential risk concerns were not identified for any receptors' exposure to PAHs at the site. For the biased low PAH results, risk results for all receptors' exposure to PAHs were at least an order of magnitude below levels considered unacceptable.

Section 3.3.2 of the Phase II RI Data Summary Report (EA 2023) notes some metals were reported with LOQs greater than the project action limits. This occurred only within the surface water analytical results. The metals that had LOQs greater than the project action limits are shaded gray in Tables A-7 through A-11 in Attachment 1. The metals that exceeded were antimony, arsenic, mercury, and thallium. The following table compares the LOQs and the project action levels:

Insert #27. LOQs and Project Action Levels

Chemical	LOQ (µg/L)	Project Action Level (µg/L)
Antimony	1.0	0.78
Arsenic	1.0	0.052
Mercury	0.08	0.063
Thallium	0.2	0.02

The project action levels for these chemicals are based upon an HQ=0.1, except for arsenic. Arsenic is based upon a cancer risk level of $1x10^{-6}$. The LOQs for antimony, mercury, and thallium are within or less than an order of magnitude (i.e., 10 times) of the project action levels. This reveals that the LOQs would not result a non-cancer hazards above a level of 1. For arsenic, the LOQ represents an approximate cancer risk level of $2x10^{-5}$, which is within the acceptable cancer risk range of $1x10^{-6}$ to $1x10^{-4}$. Additionally, detected concentrations of antimony, arsenic, mercury, and thallium were reported as estimated (i.e., "J" flagged) concentrations below the LOQs. Therefore, the LOQs above the project action levels would not result in potential risk concerns and would not affect the overall conclusions of the HHRA.

7.2 EXPOSURE ASSESSMENT UNCERTAINTIES

Potential receptor exposure to environmental media at Iona Island does not adhere to "typical" default exposure scenarios that are modeled for a recreational area. The site is remote, and use of the site is intermittent. While the site is used by PIPC and there is evidence of local residents visiting the site, the actual exposure and contact with the site media is difficult to quantify. A majority of the exposure parameters determined for each receptor are based upon professional judgement and EPA guidance. The exposure parameter that presents the most uncertainty is the

exposure frequency (EF), or number of days a receptor visits/contacts the site. Conservative EFs were determined for each receptor to provide a protective evaluation. The EFs are likely overestimated, especially when evaluating a long-term exposure to the site.

The HHRA did not reveal any risk concerns for receptor exposure to any of the DUs evaluated, except potential concerns for lead in soil and sediment within DUs 7, 17, 18, the Former Dump Area Exposure Area, and IHRS DU. DU-7 only revealed potential concerns for a construction worker exposure. DUs 17 and 18 revealed potential concerns for the park personnel, and IHRS DU revealed potential concerns for all receptors (park personnel, adult/adolescent recreational users). While it is likely that site receptors would visit random areas of the site and not one specific DU, it is reasonable that a construction worker may perform construction activities within the one-acre DU area, or a recreational user would specifically spend time within the IHRS DU due to its accessibility from the Hudson River. However, the park personnel is more likely to visit the entire area of Iona island to perform maintenance activities such as grass mowing, site inspections, and general maintenance. As a result, the concentration of lead would not be specific to a DU for the park personnel but better represented as a mean concentration across the DUs. The mean lead concentration across all DUs is 667 mg/kg. This mean lead concentration includes the sediment DUs (i.e., IHRS, RRDS, and TWS). It is noted that determining a mean concentration using just the DU lead concentrations likely results in a overestimate of the mean lead concentration across the entire Iona Island. The DUs only represent approximately 25 acres out of the 124 acres of the Iona Island Naval Ammunition Depot FUDS. The determination of the lead DU mean concentration is similar to method used to determine EPCs for the combined exposure areas (i.e., the Former Dump Exposure Area and the Iona Island Exposure Area). However, this provides a protective evaluation of potential contact.

The DU mean lead concentration was evaluated using the ALM. Attachment 6 contains the outputs for the determination of the mean concentration and the ALM model. The following table presents the results of the ALM model:

Insert #28. Results of ALM for All DUs

Receptor	% Exceeding	95th percentile Fetal Blood Lead Level (µg/dL)
Entire Site		
Park Personnel	0.7	3.1

The results of the ALM modeling for the entire site reveal there are no potential concerns for park personnel exposure to lead in soil. This reveals that potential risk concerns determined for the park personnel exposure to lead within a specific DU is likely overestimated and expected park personnel exposures across Iona island would be much lower and are not expected to be a concern.

Additionally, the HHRA evaluated the potential relative bioavailability (RBA) of lead within soil and sediment using the default value of 60% in both the IEUBK and ALM models. Both models use the RBA of lead in soil/sediment and the absorption of soluble lead (20% in the ALM and 50% in the IEUBK) to determine absolute gastrointestinal absorption factor (AF_{Pb}) for lead in soil and

sediment. The AF_{Pb} is a significant variable in the determination of resulting blood-lead levels. However, the lead concentrations within the areas of concern, especially the IHRS, were high enough that the RBA of lead in soil and sediment would have to be around 20% (as opposed to the default 60%) to result in blood-lead levels that are below a level of concern.

7.3 TOXICITY ASSESSMENT UNCERTAINTIES

There are numerous uncertainties associated with the toxicity assessment. These are generally due to the unavailability of data to thoroughly calculate the toxicity of COPCs. These uncertainties are described in more detail in the following sections.

7.3.1 Uncertainties Associated with Non-Carcinogenic Effects Interspecies Extrapolation

Most toxicological information is developed through experiments with laboratory animals. Regulatory agencies rely on experimental animal data to assess the hazards of chemical exposures to humans. Interspecies differences in chemical absorption, metabolism, excretion, and toxic response are not well understood; therefore, conservative assumptions are applied to animal data when extrapolating to humans. These assumptions probably result in an overestimation of toxicity.

7.3.2 Intraspecies Extrapolation

Differences in individual human susceptibilities to the effects of chemical exposures may be caused by such variables as genetic factors (e.g., glucose-6-phosphate dehydrogenase deficiency), lifestyle (e.g., cigarette smoking and alcohol consumption), age, hormonal status (e.g., pregnancy), and disease. Considering the diversity of human populations and their differing susceptibilities to chemically induced injury or disease, a safety factor is used. EPA uses a factor between 1 and 10. This uncertainty may lead to overestimates or underestimates of human health effects at given doses.

7.3.3 Uncertainties Associated with Carcinogenic Effects Interspecies Extrapolation

Most toxicological information for carcinogenic assessments is derived from experiments with laboratory animals. There is uncertainty about whether animal carcinogens are also carcinogenic in humans. While many chemical substances are carcinogenic in one or more animal species, only a very small number of chemical substances are known to be human carcinogens. The fact that some chemicals are carcinogenic in some animal species but not in others raises the possibility that not all animal carcinogens are human carcinogens. Regulatory agencies assume that humans are as sensitive to carcinogens as the most sensitive animal species. This policy decision, designed to prevent underestimation of risk, introduces the potential to overestimate carcinogenic risk.

7.3.4 High-Dose to Low-Dose Extrapolation

Typical cancer bioassays provide limited low-dose data on responses in experimental animals for chemicals being assessed for carcinogenic or chronic effects. The usual dose regime involves three dose groups per assay. The first dose group is given the highest dose that can be tolerated, the second is exposed to one-half that dose, and the third group is unexposed (control group) (National

Research Council [NRC] 1983). Since this dosing method does not reflect how animals would react to much lower doses of a chemical, a dose-response assessment requires extrapolation from high to low doses using mathematical modeling that incorporates, to varying degrees, information about physiologic processes in the body (NRC 1983).

A central problem with the low-dose extrapolation models is that they often fit the range of data from animal bioassays equally well, and it is not possible to determine their validity based on goodness of fit. Several models may fit experimental data equally well, but all may not be equally plausible biologically. The dose-response curves derived from different models diverge substantially in the dose range of interest (NRC 1983). Therefore, low-dose extrapolation is more than a curve-fitting process, and considerations of biological plausibility of the models must be considered before choosing the best model for a particular set of data.

7.3.5 Modification for Mutagenic Compounds

Carcinogenic slope factors for compounds identified with a mutagenic mode of action for early-life exposure (i.e., PAHs) are modified by a default adjustment factor. The default adjustment factors are used because chemical-specific data are not available to directly assess cancer susceptibility from early-life exposure to a carcinogen acting through a mutagenic mode of action. The default adjustment factors are derived from a weighted geometric mean tumor incidence ratio. Therefore, the use of the default adjustment factors may both over-estimate and under-estimate the potential potency for early-life exposure for chemicals with a mutagenic mode of action for carcinogenesis (EPA 2005b). However, the analysis of potential exposure over a lifetime reduces the effects and uncertainty of the mutagenic adjustments on estimated lifetime cancer risk. Carcinogenic risks for receptors identified within the early-life exposure age range are determined based upon a lifetime exposure. The resulting uncertainty in the use of the mutagenic default adjustment factors is reduced but some uncertainty still remains in the use of default factors over a specified age range rather than chemical-specific data. This uncertainty is evident in the carcinogenic risk calculations for benzo(a)pyrene. The use of the mutagenic adjustment factor for benzo(a)pyrene results in significantly higher carcinogenic risks for all receptors younger than 16 years (e.g., child resident and adolescent recreational user). Benzo(a)pyrene has shown sufficient evidence in animals for a mutagenic mode of action; however, the adjustment factors used in this HHRA are standard values that are not specific to benzo(a)pyrene. This results in additional uncertainties and potential overestimate of carcinogenic risks for benzo(a)pyrene, and other PAHs.

7.4 RISK CHARACTERIZATION UNCERTAINTIES

Uncertainties in the risk characterization can stem from the inherent uncertainties in the data evaluation, the exposure assessment process, including any modeling of EPCs in secondary media from primary media, and the toxicity assessment process. The individual uncertainties in these respective processes were addressed in the previous sections.

7.5 UNCERTAINTY CONCLUSIONS

For each step of the risk assessment process, conservative assumptions were made that are intended to be protective of human health and to ensure that risks are not underestimated. All uncertainties discussed in this section revealed that the risk results in the HHRA are likely overestimated. The overestimation of potential risks from exposure to the site would not change the overall conclusions of the HHRA, except for lead. For all chemicals, except lead, the HHRA revealed no potential risk concerns for any receptors' exposure to the site. The following table presents an updated table of the lead model results based upon the exposure discussion for the park personnel presented in Section 7.2:

Insert #29. Revised Results of ALM for Entire Site

Receptor	% Exceeding	95th percentile Fetal Blood Lead Level (µg/dL)
DU-7 – surface soil		
Construction Worker	**24.9**	**8.8**
Adult Recreational	0.22	2.5
Adolescent Recreational	0.07	2.0
DU-17 – surface soil		
Construction Worker	**54.9**	**14.1**
Adult Recreational	0.84	3.2
Adolescent Recreational	0.4	2.8
DU-17 – subsurface soil		
Construction Worker	**44.6**	**12.1**
DU-18 – surface soil		
Construction Worker	**39.2**	**11.2**
Adult Recreational	0.43	2.8
Adolescent Recreational	0.2	2.4
DU-18 – subsurface soil		
Construction Worker	**70.4**	**18.0**
Former Dump Area Exposure Area		
Construction Worker	**53.6**	**13.9**
Adult Recreational	0.8	3.2
Adolescent Recreational	0.4	2.7
Island Exposure Area		
Construction Worker	1.2	3.5
Adult Recreational	0.03	1.7
Adolescent Recreational	0.003	1.3
IHRS DU – sediment		
Adult Recreational	**38.1**	**11.0**
Adolescent Recreational	**35.4**	**10.6**
Entire Site		
Park Personnel	0.7	3.1

8. CONCLUSIONS

Potential receptors evaluated in the HHRA included park personnel, researcher, construction workers, recreational users (adult, adolescent, and child), adolescent trespasser, and camper/Boy Scout. The HHRA quantitatively evaluated all receptor's exposure to each DU at the site that revealed potential COPCs in onsite soil and sediment. The evaluation of DU analytical results was performed on a DU-basis to inform potential decisions that relate to the DU. In addition, two separate combined exposure areas for soil were evaluated to represent expected receptor exposure to the entire island: the Iona Island Exposure Area and the Former Dump Area Exposure Area. The first exposure area (Iona Island Exposure Area) included the AOCs, ASTs, and former transformers. The second exposure area (Former Dump Area Exposure Area) included DU-17 through DU-22.

The HHRA indicates there are no exceedances of the carcinogenic risk thresholds for any receptors evaluated for any of the individual DUs or the two exposure areas. The non-cancer hazard index thresholds were below the acceptable threshold of 1.0 for all receptors evaluated for all of the individual DUs and the two exposure areas, except the construction worker exposure to DU-13, DU-18, and the Former Dump Exposure Area (DU-17 through DU-19). A breakdown by target organ did not reveal any target organs above the acceptable threshold of 1.0 for the construction workers exposure to DU-13 and DU-18. Therefore, the HHRA did not reveal potential concerns for carcinogenic risks or non-cancer hazards for any receptor's exposure to each DU or the two combined exposure areas.

Lead was evaluated separately from the carcinogenic risks and non-cancer hazards. Lead was evaluated through the use of the EPA's ALM. Lead was identified as a COPC in DU-7, DU-17, DU-18, and the Former Dump Exposure Area (which includes DU-17 and DU-18). To achieve a specific level of protectiveness, EPA has established that a typical (or hypothetical) child would have an estimated risk of no more than 5 percent exceeding the reference blood-lead level of 5 µg/dL. Results of the ALM revealed greater than 5 percent of the population exceeded the reference blood-lead level of 5 µg/dL for the following receptors:

- Construction workers exposed to surface soil at DU-7 in the upland area, and surface and subsurface soil at DU-17 and DU-18 covering the eastern portion of AOC #16 - Area D (former Dumping Area), the Former Dump Area Exposure Area, and sediment from IHRS-DU-01 (Iona Island Hudson River shoreline adjacent to AOC #16 – Area D [former Dumping Area])

- Park personnel exposed to surface and subsurface soil at DU-17 and DU-18 and sediment within IHRS-DU-01

- Recreational users exposed to sediment within IHRS-DU-01.

It is noted that the Former Dump Area Exposure Area, which includes DU-17 and DU-18, is a marshy area that is covered with vegetation and subject to tidal influence that makes access difficult. The Former Dump Area is also identified as a future nature preserve/wetland area. No

construction or other activities are expected in this area and actual contact with this area is minimal and unlikely to result in human health concerns. Additionally, construction worker exposure represents exposures that are usually controlled using standard health and safety protocols and personal protective equipment. Potential lead risk concerns identified for the construction worker within DU-7, DU-17, DU-18, and the Former Dump Exposure Area do not warrant further evaluation or risk management decisions.

As noted in Section 7.2, the park personnel potential exposure to one specific DU for an entire year is not an expected scenario. The park personnel are more likely to be exposed to environmental media over the entire island for activities such as grass mowing, site inspections, and general maintenance. For this reason, the exposure to the entire island is better represented by an average (or mean) concentration of the DUs across the site, which includes all DUs sampled (i.e., DU-1 through DU-7, DU-9 through DU-19, IHRS, RRDS, and TWS). It is noted that this mean concentration does not include the areas of the site not sampled and likely overestimates the true mean lead concentration across the Site. The mean soil lead concentration across all DUs is 667 mg/kg, revealing less than 5% of the population exceeds the target blood-lead level. The results of the ALM modeling for the mean lead concentration across the DUs show no potential concerns for the park personnel exposure to lead based upon expected exposures. Therefore, the park personnel exposure to Iona Island does not warrant further evaluation or risk management decisions.

The recreational user exposure to lead within the IHRS DU did reveal significant exceedance of the acceptable blood-lead threshold. Unlike the park personnel expected exposure, the recreational user may spend a significant amount of time at the IHRS DU. This DU is located along the Hudson River and is a flat area where boaters may visit, and the recreational user exposure is an exposure that is difficult to control on Iona Island. While sediments in this area are generally sandy with larger grain size that is difficult to adhere to the skin surface, there is a potential for contact, sample results from the IHRS DU reveal potential transport of contaminants from AOC #16 (Dumping Area) along the surface via overland runoff and erosion and into shoreline sediments. As a result, there are sufficient potential concerns for a recreational user exposure to the IHRS DU to warrant additional evaluation and/or risk management decisions in a Feasibility Study. Sample results from the RRDS and TWS DUs on the tidal marsh side of Iona Island do not reveal impacts from AOC #16 or potential risk concerns for receptors, which reveals the tidal marsh area is disconnected from the Former Dump Area.

In conclusion, based upon potential receptors and their expected exposure to the site, there are no risk concerns for potential receptor exposures to Iona Island associated media, except the recreational user exposure to the IHRS DU.

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FIGURES

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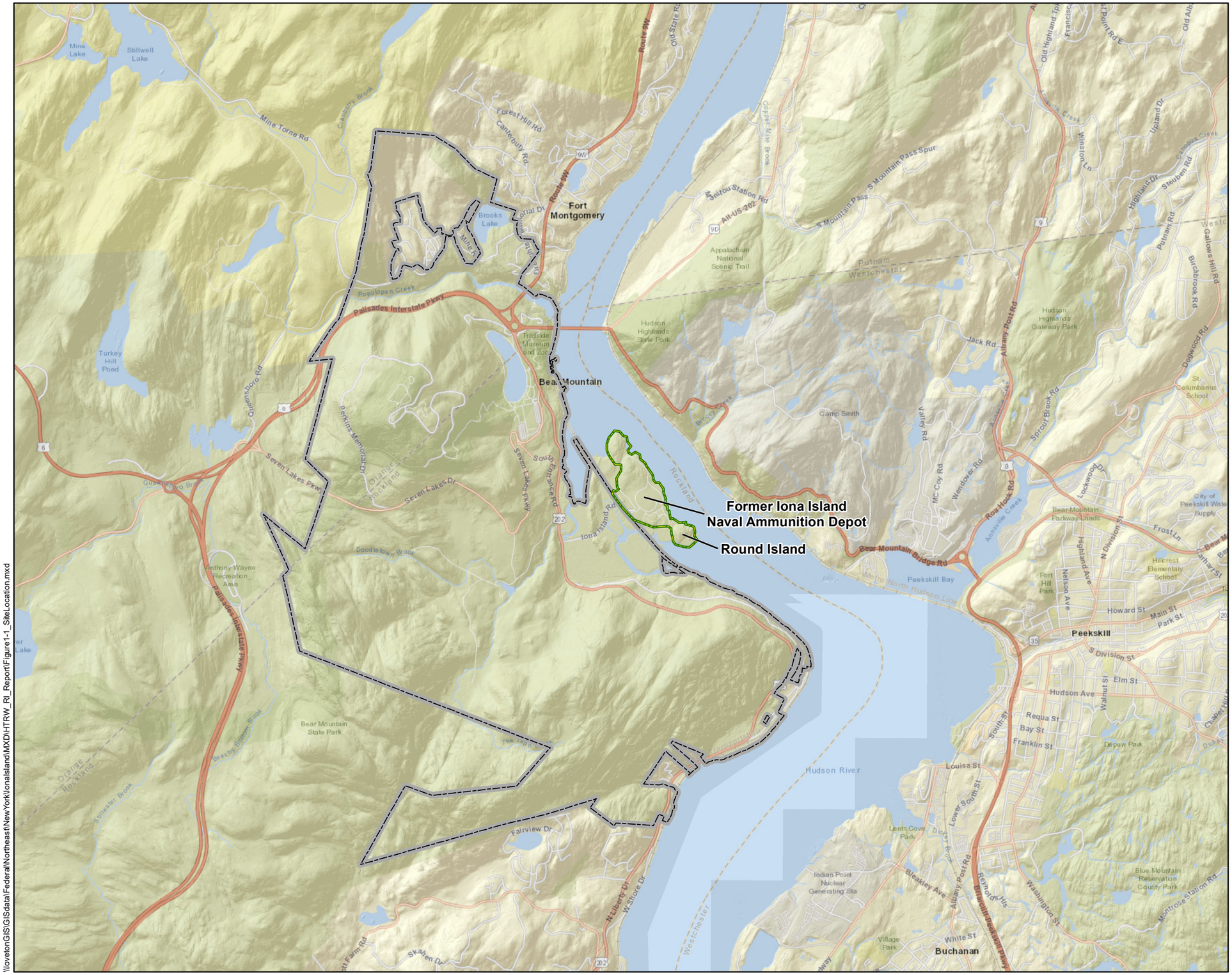

VICINITY MAP

Legend

- FUDS Boundary
- Bear Mountain State Park Boundary (NYS Office of Parks, Recreation & Historic Preservation, 2018)

0 0.5 1
Miles
1 in = 1 miles

N

FIGURE 1
General Location of the Iona Island Naval Ammunition Depot Formerly Used Defense Site

HAZARDOUS TOXIC AND RADIOACTIVE WASTE REMEDIAL INVESTIGATION REPORT

Source
Basemap: ESRI World Street Map - ArcGIS Online Map Service (ESRI 2009).
DEM: 2012, Photo Science, Inc., Coastal New York LiDAR (Hydro Flattened Raster DEM), 1-Meter Resolution, New York State GIS

Map Date: 9/19/2022

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HTRW Areas of Concern		
AOC #	**Building(s)/Area**	**Historical Use**
1	Former Building 103	Paint and Oil Storage
2	Former Building 121	Incinerator
3	Former Building 123	Garage Building
4	Former Buildings 124 to 128	Sewage Disposal Plant (and Suspected Outfall)
5	Former Building 207	Marine Garage Building
6	Former Building 213	Paint Locker for Building 202
7	Former Building 215	Garage Building
8	Former Building 219	Garage Building
9	Former Building 220	Garage Building
10	Former Building 406	Tin, Electrical and Annealing Shop Building
11	Former Building 407	Paint Shop and Pipe Shop
12	Former Building 410	Power House
13	Area A	One Former Fuel Oil AST (2,500 gallons) located near Former Building 233
14	Area B	One Former Fuel Oil AST (size unknown) located near Dock 131
15	Area C	Two Former Fuel Oil ASTs (size unknown) located near Former Building 417
16	Area D	Dumping Area
17	Area E	Former Coal Trestle and Storage Area – located near Former Building 410
18	Area F	Former Coal Storage Area – located near Former Building 215
19	Transformers 1, 2, 3	Three Former Transformers
Former Buildings with Significant Potential for Explosive Hazard		
Building		**Historical Use**
Former Building 609		Mine Loading Plant
Former Building 506		Filling House #3
Former Building 503		Filling House #6
Former Building 404		Filling House #1
Former Building 307		Filling House #5
Former Building 306		Filling House #2
Former Building 202		Shell House #5 & D Plant

VICINITY MAP

Legend

- FUDS Boundary
- HTRW Project Areas of Concern
- FormerTransformers
- Remaining Structure (Not FUDS Eligible)

0 300 600
Feet
1 in = 300 ft

N

FIGURE 2
HTRW Project Areas of Concern

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial: EA Engineering, Science, and Technology. April 7, 2020

Map Date: 9/19/2022

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HTRW Areas of Concern		
AOC #	**Building(s)/Area**	**Historical Use**
1	Former Building 103	Paint and Oil Storage
2	Former Building 121	Incinerator
3	Former Building 123	Garage Building
4	Former Buildings 124 to 128	Sewage Disposal Plant (and Suspected Outfall)
5	Former Building 207	Marine Garage Building
6	Former Building 213	Paint Locker for Building 202
7	Former Building 215	Garage Building
8	Former Building 219	Garage Building
9	Former Building 220	Garage Building
10	Former Building 406	Tin, Electrical and Annealing Shop Building
11	Former Building 407	Paint Shop and Pipe Shop
12	Former Building 410	Power House
13	Area A	One Former Fuel Oil AST (2,500 gallons) located near Former Building 233
14	Area B	One Former Fuel Oil AST (size unknown) located near Dock 131
15	Area C	Two Former Fuel Oil ASTs (size unknown) located near Former Building 417
16	Area D	Dumping Area
17	Area E	Former Coal Trestle and Storage Area – located near Former Building 410
18	Area F	Former Coal Storage Area – located near Former Building 215
19	Transformers 1, 2, 3	Three Former Transformers
Existing Structures / Not FUDS Eligible		
Building		**Historical Use**
Building 201		Empty Projectile Magazine
Building 212		Former Marine Barracks
Building 217		Fire Station and Labor Office Building
Building 222		Miscellaneous Storage Building
Building 508		Bag Charge Magazine
Building 603		Pyrotechnic Magazine

VICINITY MAP

Legend

- FUDS Boundary
- HTRW Project Areas of Concern
- FormerTransformers
- Former Buildings with Significant Potential for Explosive Hazard (Included in the HTRW RI pending direction of contracting offer)
- Remaining Structure (Not FUDS Eligible)
- Previous Elevated Concentration of COPC (Greeley-Polhemus 1997 and Alion 2008)
- 1-Acre DU
- 60 x 60 ft DU
- Explosives Building DU

0 300 600
Feet
1 in = 300 ft

N

FIGURE 3
Phase I Onsite Soil Incremental Sampling Decision Units

HAZARDOUS TOXIC AND RADIOACTIVE WASTE REMEDIAL INVESTIGATION REPORT

Source
Aerial: EA Engineering, Science, and Technology. April, 7 2020

Map Date: 9/19/2022

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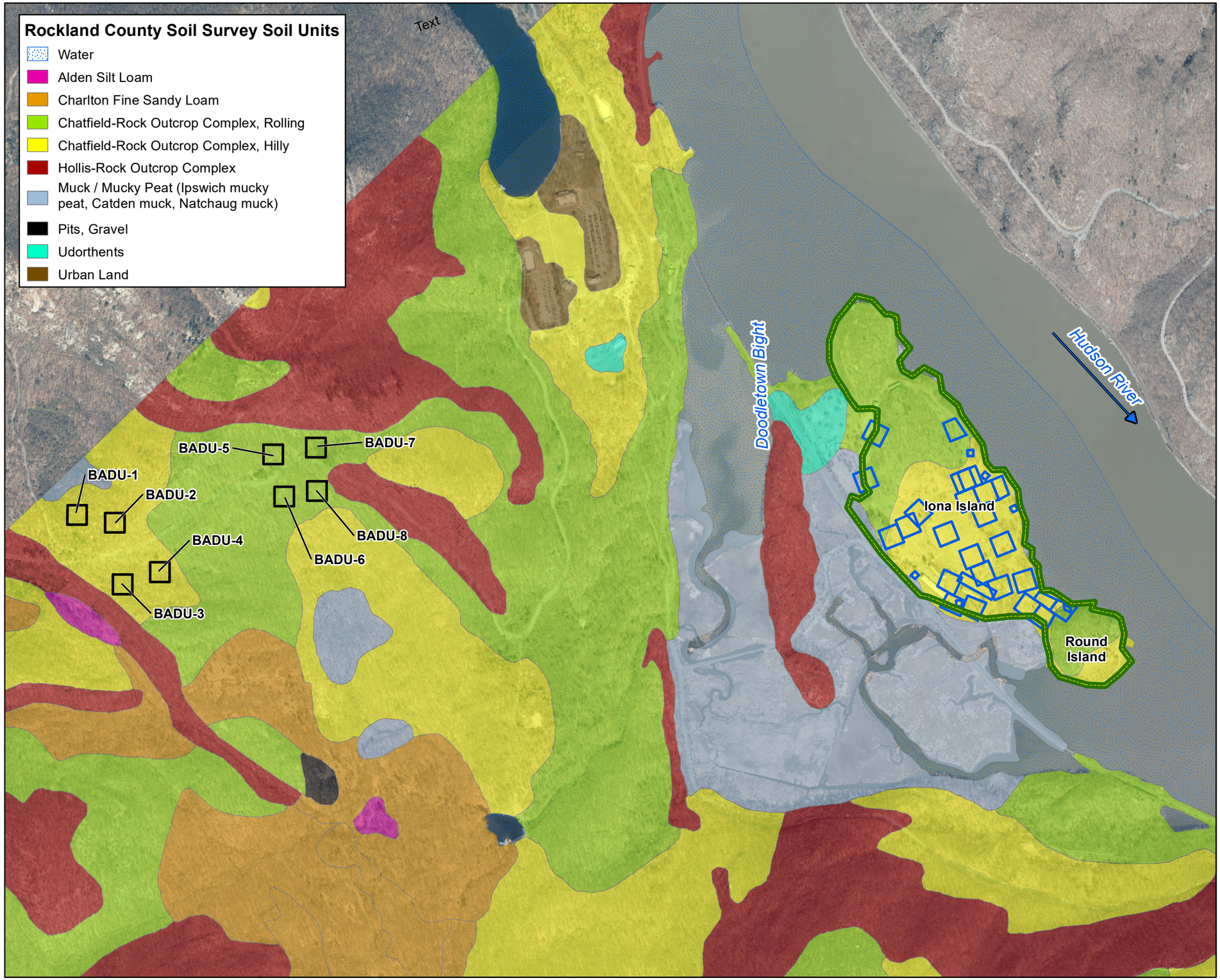


VICINITY MAP

Legend

- FUDS Boundary
- Bear Mountain State Park 200x200 ft Surface and Subsurface Soil DU
- Onsite DU

0 1,000 2,000
Feet
1 in = 1,000 ft

N

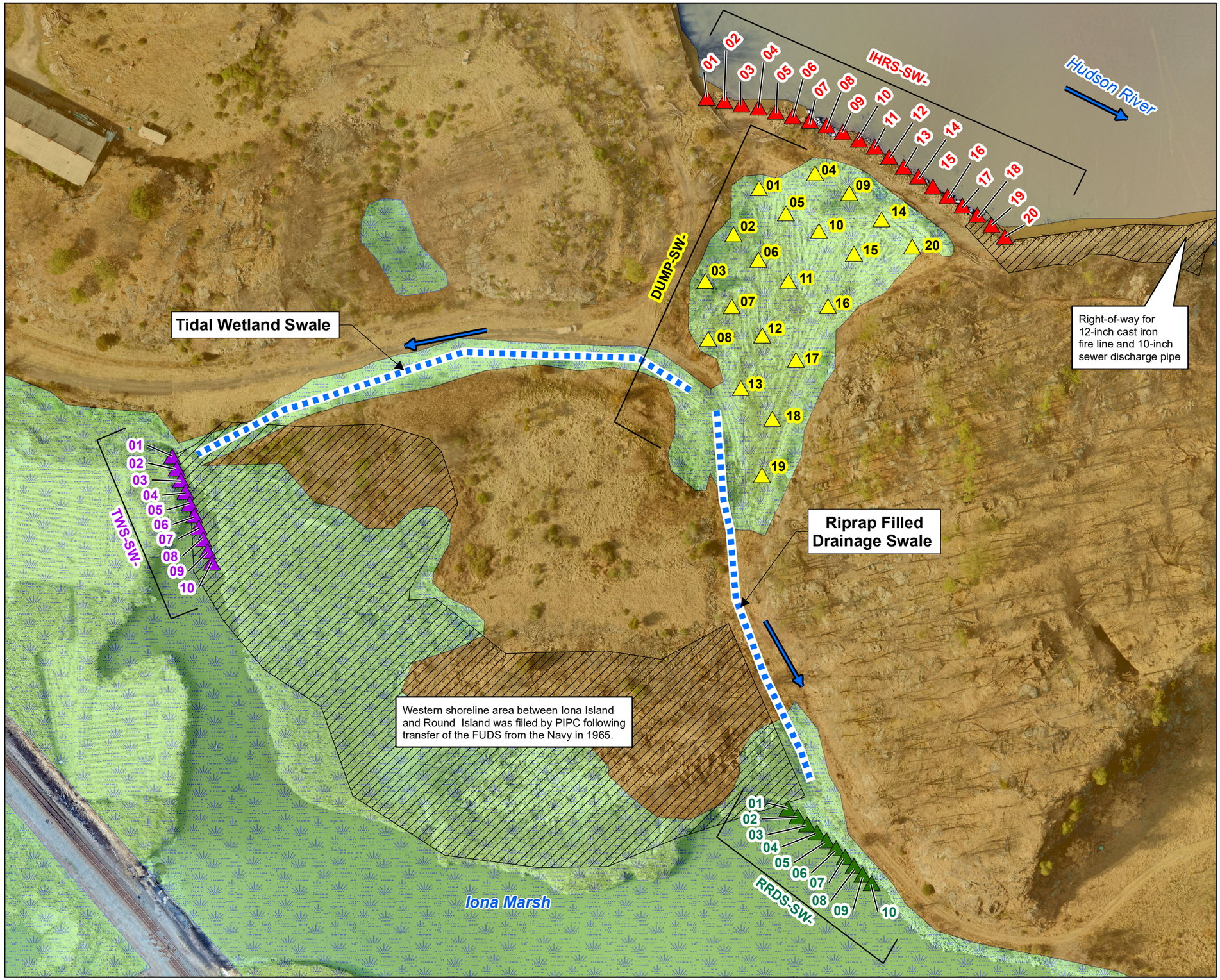
FIGURE 4
Phase I Background Soil Incremental Sampling Decision Units

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Sources
Aerial: October, 12, 2018. Maxar Technologies.
ESRI ArcGIS Online Map Service.
Soil Units: USDA NRCS 2013

Map Date: 9/19/2022

\\lovetonGIS\GIS\data\Federal\Northeast\NewYork\IonaIsland\MXD\HTRW_RI_Report\Figure3-2_Phase1_BackgroundSamplingLocations.mxd



VICINITY MAP

Legend

- AOC #16 – Area D (former Dumping Area)
- Upland
- Marsh/Wetland
- ISM Sediment Decision Unit
- Surface Water Migration Pathway

Surface Water Sampling Location

- Iona Island Hudson River Shoreline
- AOC #16 – Area D (former Dumping Area)
- Iona Marsh Tidal Wetland Swale Outlet
- Iona Marsh Riprap Filled Drainage Swale Outlet
- Surface Water Flow Direction

0 100 200
Feet
1 in = 100 ft

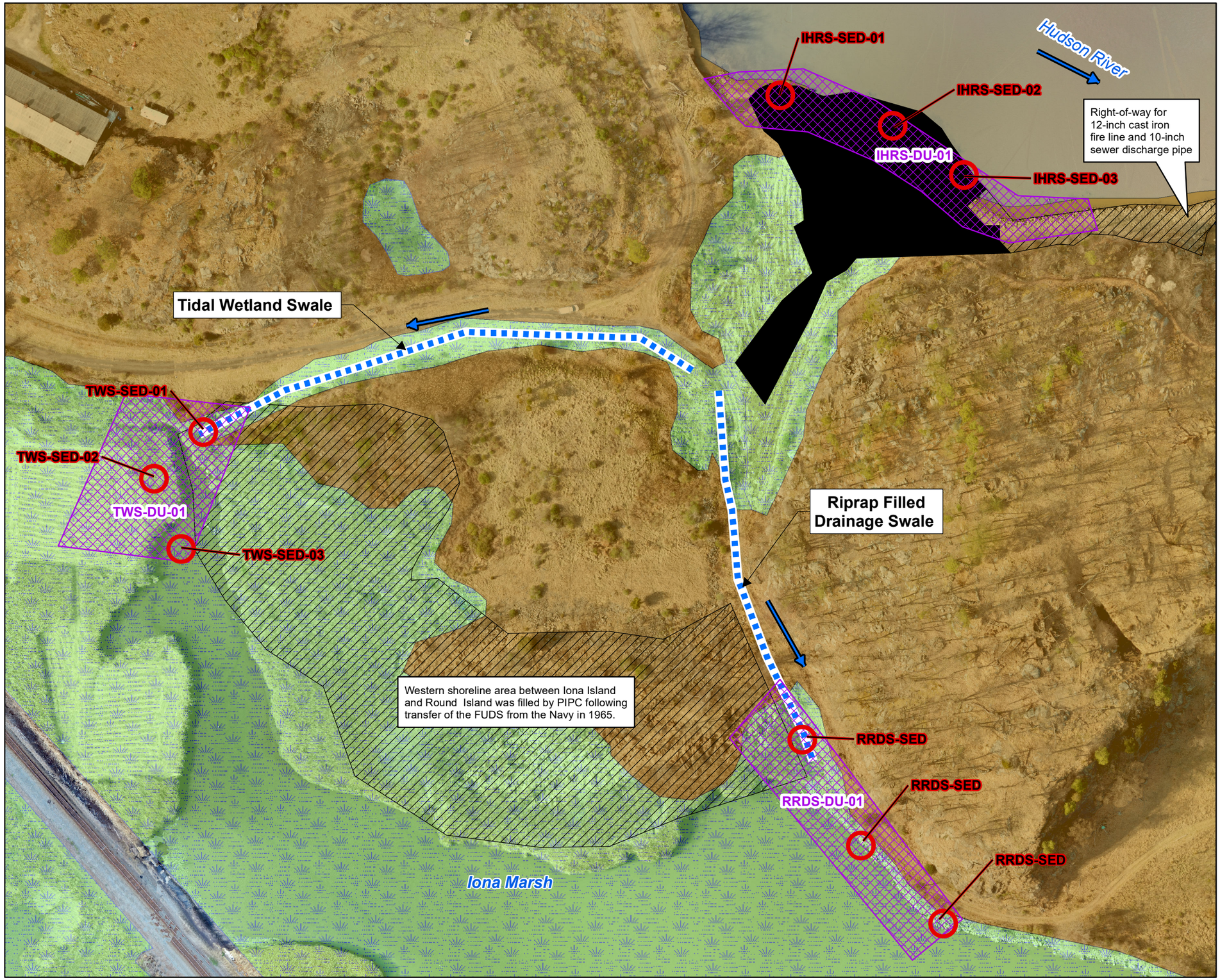
N

FIGURE 5
Phase II Iona Island Surface Water Sampling Locations

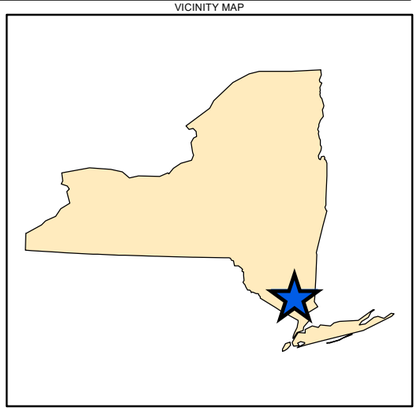
HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial and Topographic Contours: EA Engineering, Science, and Technology. April, 7 2020
Disturbed Ground/Fill Area and AOC Boundaries: USAGC 2018
Upland and Marsh/Wetland: 2020 EA Shoreline Reconnaissance
Map Date: 9/19/2022

\\lovetonGIS\GIS\data\Federal\Northeast\NewYork\IonaIsland\MXD\HTRW_RI_Report\Figure3-5_PhaseII_OnsiteSWLocations.mxd



VICINITY MAP



Legend

- AOC #16 – Area D (former Dumping Area)
- Upland
- Marsh/Wetland
- ISM Sediment Decision Unit
- Surface Water Migration Pathway
- Sediment AVS/SEM Sampling Location
- Surface Water Flow Direction

0 100 200
Feet
1 in = 100 ft

N

FIGURE 6
Phase II Iona Island Sediment Sampling Locations

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial and Topographic Contours: EA Engineering, Science, and Technology. April, 7 2020
Disturbed Ground/Fill Area and AOC Boundaries: USAGC 2018
Upland and Marsh/Wetland: 2020 EA Shoreline Reconnaissance
Map Date: 9/19/2022

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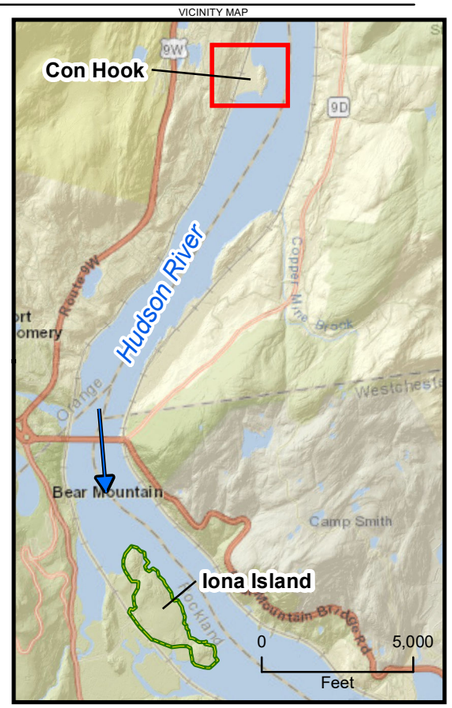

Legend

- Background Sediment Sampling Unit
- Discrete Surface Water Sampling Location
- Surface Water Flow Direction

0 200 400
Feet
1 in = 200 ft

N

FIGURE 7
Con Hook Background Surface Water and Sediment Sampling Locations

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial: ESRI ArcGIS Online Map Service (ESRI 2009b).
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Map Date: 9/19/2022

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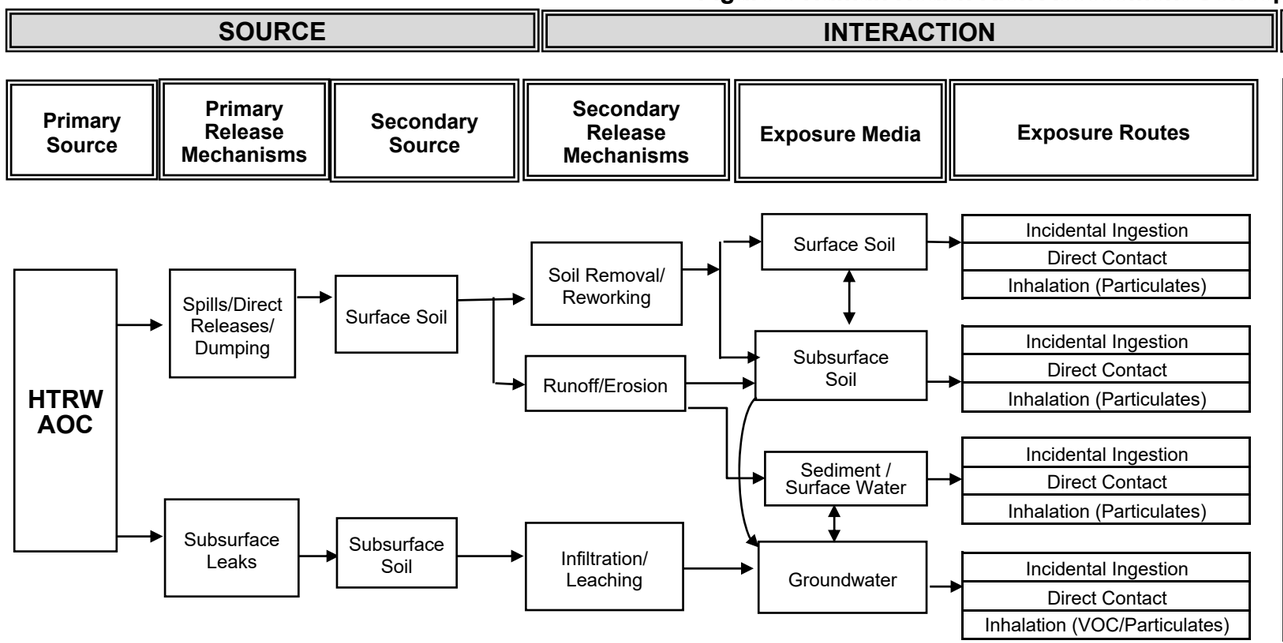
Figure 8 Human Health Risk Assessment Conceptual Site Model



HUMAN RECEPTORS

Current and Future Park Personnel	Future Construction Workers	Current and Future Trespassers	Current and Future Researchers	Current and Future Recreational Users	Current and Future Campers/Boy Scouts
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
◑	◑	○	○	○	◑
◑	◑	○	○	○	◑
◑	◑	○	○	○	◑
◑	○	◑	○	●	◑
◑	○	◑	○	●	◑
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○

LEGEND

● Complete Pathway; confirmed receptor and media interaction (i.e., a source, migration route, and receptor have been identified).

◑ Potentially Complete Pathway; receptor and media interaction; however, the exposure may be limited, either due to the type of receptor or the nature of the source, and has not been confirmed.

○ Incomplete Pathway; no receptor and media interaction. No evaluation is conducted.

NOTES

Surface soil = defined as the interval from 0 to 6 inches bgs.
Subsurface soil = defined as the interval from 6 to 36 inches bgs.
VOC = Volatile Organic Compound

TABLES

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Table 1a Human Health Risk Assessment Contaminants of Potential Concern - Soil

Constituent	CAS No.	95UCL (mg/kg)	EPA Residential Soil RSL[(1)] (mg/kg)	Exceeds Background?	COPC
DU-1 (AOC 10 – Former Building 406)					
Aluminum	7429-90-5	11000	7700	No	No
Arsenic	7440-38-2	14.6	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	8.01	2.3	**Yes**	**Yes**
Iron	7439-89-6	17,100	5500	No	No
Manganese	7439-96-5	488	180	**Yes**	**Yes**
Thallium	7440-28-0	0.156	0.078	No	No
Benzo(a)pyrene	50-32-8	0.2	0.11	No	No
DU-2 (AOC 17 – Former Coal Trestle and Storage Area)					
Aluminum	7429-90-5	13,000	7700	No	No
Arsenic	7440-38-2	15.1	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	7.95	2.3	**Yes**	**Yes**
Iron	7439-89-6	20,100	5500	No	No
Manganese	7439-96-5	690	180	**Yes**	**Yes**
Thallium	7440-28-0	0.13	0.078	No	No
Benzo(a)anthracene	56-55-3	4.76	1.1	**Yes**	**Yes**
Benzo(a)pyrene	50-32-8	3.84	0.11	**Yes**	**Yes**
Benzo(b)fluoranthene	205-99-2	5.59	1.1	**Yes**	**Yes**
Dibenz(a,h)anthracene	53-70-3	0.608	0.11	**Yes**	**Yes**
Indeno(1,2,3-c,d)pyrene	193-39-5	2.57	1.1	**Yes**	**Yes**
DU-3 (AOC 11 – Former Building 407; AOC 12 – Former Building 410)					
Aluminum	7429-90-5	13,000	7700	No	No
Arsenic	7440-38-2	17.2	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	8.52	2.3	**Yes**	**Yes**
Iron	7439-89-6	20,100	5500	No	No
Manganese	7439-96-5	740	180	**Yes**	**Yes**
Thallium	7440-28-0	0.148	0.078	No	No
Benzo(a)pyrene	50-32-8	0.871	0.11	No	No
Benzo(b)fluoranthene	205-99-2	1.34	1.1	No	No
Dibenz(a,h)anthracene	53-70-3	0.151	0.11	No	No
DU-4					
Aluminum	7429-90-5	10,000	7700	No	No
Arsenic	7440-38-2	54.2	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	8.56	2.3	**Yes**	**Yes**
Iron	7439-89-6	20,800	5500	No	No
Manganese	7439-96-5	575	180	**Yes**	**Yes**
Thallium	7440-28-0	0.236	0.078	No	No
Benzo(a)anthracene	56-55-3	1.67	1.1	**Yes**	**Yes**
Benzo(a)pyrene	50-32-8	1.1	0.11	**Yes**	**Yes**
Benzo(b)fluoranthene	205-99-2	3.61	1.1	**Yes**	**Yes**
Dibenz(a,h)anthracene	53-70-3	0.33	0.11	**Yes**	**Yes**
Indeno(1,2,3-c,d)pyrene	193-39-5	1.18	1.1	**Yes**	**Yes**
DU-5 (AOC 3 – Former Building 123)					
Aluminum	7429-90-5	13,000	7700	No	No
Arsenic	7440-38-2	12.8	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	8.05	2.3	No	No
Iron	7439-89-6	21,100	5500	**Yes**	**Yes**
Manganese	7439-96-5	883	180	**Yes**	**Yes**

Table 1a Human Health Risk Assessment Contaminants of Potential Concern - Soil

Constituent	CAS No.	95UCL (mg/kg)	EPA Residential Soil RSL[1] (mg/kg)	Exceeds Background?	COPC
Thallium	7440-28-0	0.118	0.078	No	No
Benzo(a)pyrene	50-32-8	0.437	0.11	No	No
DU-6					
Aluminum	7429-90-5	13,600	7700	No	No
Arsenic	7440-38-2	13.5	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	9.33	2.3	**Yes**	**Yes**
Iron	7439-89-6	21,200	5500	No	No
Manganese	7439-96-5	1,130	180	**Yes**	**Yes**
Thallium	7440-28-0	0.175	0.078	No	No
DU-7					
Aluminum	7429-90-5	12,100	7700	No	No
Antimony	7440-36-0	3.82	3.1	No	No
Arsenic	7440-38-2	18.8	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	7.25	2.3	No	No
Iron	7439-89-6	20,100	5500	No	No
Lead[2]	7439-92-1	1,087	400	**Yes**	**Yes**
Manganese	7439-96-5	757	180	**Yes**	**Yes**
Thallium	7440-28-0	0.232	0.078	**Yes**	**Yes**
DU-9 (AOC 8 – Former Building 219; AOC 9 – Former Building 220))					
Aluminum	7429-90-5	12,100	7700	No	No
Arsenic	7440-38-2	7.59	0.68	No	No
Cobalt	7440-48-4	7.82	2.3	**Yes**	**Yes**
Iron	7439-89-6	17,800	5500	No	No
Manganese	7439-96-5	546	180	**Yes**	**Yes**
Thallium	7440-28-0	0.162	0.078	No	No
Benzo(a)pyrene	50-32-8	0.254	0.11	No	No
DU-10					
Aluminum	7429-90-5	12,900	7700	No	No
Arsenic	7440-38-2	8.36	0.68	No	No
Cobalt	7440-48-4	8.47	2.3	**Yes**	**Yes**
Iron	7439-89-6	20,200	5500	No	No
Manganese	7439-96-5	610	180	**Yes**	**Yes**
Thallium	7440-28-0	0.15	0.078	No	No
DU-11 (AOC 18 – Former Coal Storage Area)					
Aluminum	7429-90-5	11,900	7700	No	No
Arsenic	7440-38-2	47.4	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	7.24	2.3	**Yes**	**Yes**
Iron	7439-89-6	21,200	5500	No	No
Manganese	7439-96-5	600	180	**Yes**	**Yes**
Thallium	7440-28-0	0.254	0.078	**Yes**	**Yes**
Benzo(a)anthracene	56-55-3	1.3	1.1	**Yes**	**Yes**
Benzo(a)pyrene	50-32-8	1.53	0.11	**Yes**	**Yes**
Benzo(b)fluoranthene	205-99-2	1.97	1.1	**Yes**	**Yes**
Dibenz(a,h)anthracene	53-70-3	0.281	0.11	**Yes**	**Yes**
Indeno(1,2,3-c,d)pyrene	193-39-5	1.37	1.1	**Yes**	**Yes**
DU-12 (AOC 6 – Former Building 213)					
Aluminum	7429-90-5	11,000	7700	No	No
Arsenic	7440-38-2	15.1	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	8.19	2.3	**Yes**	**Yes**

Table 1a Human Health Risk Assessment Contaminants of Potential Concern - Soil

Constituent	CAS No.	95UCL (mg/kg)	EPA Residential Soil RSL[(1)] (mg/kg)	Exceeds Background?	COPC
Iron	7439-89-6	17,000	5500	No	No
Manganese	7439-96-5	1,050	180	**Yes**	**Yes**
Thallium	7440-28-0	0.161	0.078	No	No
Benzo(a)anthracene	56-55-3	2.89	1.1	**Yes**	**Yes**
Benzo(a)pyrene	50-32-8	2.47	0.11	**Yes**	**Yes**
Benzo(b)fluoranthene	205-99-2	3.95	1.1	**Yes**	**Yes**
Dibenz(a,h)anthracene	53-70-3	0.571	0.11	**Yes**	**Yes**
Indeno(1,2,3-c,d)pyrene	193-39-5	2.23	1.1	**Yes**	**Yes**
DU-13 (AOC 1 – Former Building 103)					
Aluminum	7429-90-5	12,800	7700	No	No
Antimony	7440-36-0	3.46	3.1	**Yes**	**Yes**
Arsenic	7440-38-2	12.5	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	8.96	2.3	**Yes**	**Yes**
Copper	7440-50-8	885	310	**Yes**	**Yes**
Iron	7439-89-6	19,800	5500	**Yes**	**Yes**
Manganese	7439-96-5	1,320	180	**Yes**	**Yes**
Thallium	7440-28-0	0.196	0.078	No	No
Benzo(a)anthracene	56-55-3	24.5	1.1	**Yes**	**Yes**
Benzo(a)pyrene	50-32-8	18.6	0.11	**Yes**	**Yes**
Benzo(b)fluoranthene	205-99-2	25.2	1.1	**Yes**	**Yes**
Dibenz(a,h)anthracene	53-70-3	3.64	0.11	**Yes**	**Yes**
Indeno(1,2,3-c,d)pyrene	193-39-5	12.9	1.1	**Yes**	**Yes**
DU-14					
Aluminum	7429-90-5	11,800	7700	No	No
Arsenic	7440-38-2	19.5	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	7.67	2.3	**Yes**	**Yes**
Iron	7439-89-6	17,800	5500	No	No
Manganese	7439-96-5	760	180	**Yes**	**Yes**
Thallium	7440-28-0	0.145	0.078	No	No
DU-15					
Aluminum	7429-90-5	11,000	7700	No	No
Arsenic	7440-38-2	7.68	0.68	No	No
Cobalt	7440-48-4	6.91	2.3	**Yes**	**Yes**
Iron	7439-89-6	19,800	5500	No	No
Manganese	7439-96-5	531	180	**Yes**	**Yes**
Thallium	7440-28-0	0.171	0.078	No	No
DU-16 (AOC 4 – Former Buildings 124, 125, 126, 127, and 128)					
Aluminum	7429-90-5	16,500	7700	No	No
Arsenic	7440-38-2	7.56	0.68	No	No
Cobalt	7440-48-4	8.97	2.3	**Yes**	**Yes**
Iron	7439-89-6	23,500	5500	**Yes**	**Yes**
Manganese	7439-96-5	465	180	**Yes**	**Yes**
Thallium	7440-28-0	0.138	0.078	No	No
Benzo(a)pyrene	50-32-8	0.689	0.11	No	No
Dibenz(a,h)anthracene	53-70-3	0.151	0.11	No	No
DU-17 (Dump Area)					
Surface Soil (0 to 6 inches)					
Aluminum	7429-90-5	8,300	7700	No	No

Table 1a Human Health Risk Assessment Contaminants of Potential Concern - Soil

Constituent	CAS No.	95UCL (mg/kg)	EPA Residential Soil RSL[1] (mg/kg)	Exceeds Background?	COPC
Antimony	7440-36-0	12.4	3.1	**Yes**	**Yes**
Arsenic	7440-38-2	15	0.68	**Yes**	**Yes**
Cadmium	7440-43-9	33.2	0.71	**Yes**	**Yes**
Cobalt	7440-48-4	8.87	2.3	No	No
Copper	7440-50-8	442	310	**Yes**	**Yes**
Iron	7439-89-6	22,700	5500	**Yes**	**Yes**
Lead[2]	7439-92-1	1,867	400	**Yes**	**Yes**
Manganese	7439-96-5	484	180	**Yes**	**Yes**
Thallium	7440-28-0	0.187	0.078	**Yes**	**Yes**
Zinc	7440-66-6	10,000	2300	**Yes**	**Yes**
Benzo(a)anthracene	56-55-3	1.19	1.1	No	No
Benzo(a)pyrene	50-32-8	0.997	0.11	No	No
Benzo(b)fluoranthene	205-99-2	1.73	1.1	No	No
Dibenz(a,h)anthracene	53-70-3	0.193	0.11	No	No
Subsurface Soil (6 to 36 inches)					
Antimony	7440-36-0	5.09	3.1	**Yes**	**Yes**
Arsenic	7440-38-2	27.2	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	7.2	2.3	No	No
Iron	7439-89-6	27,100	5500	**Yes**	**Yes**
Lead[2]	7439-92-1	1,573	400	**Yes**	**Yes**
Thallium	7440-28-0	0.96	0.078	**Yes**	**Yes**
Zinc	7440-66-6	3,850	2300	**Yes**	**Yes**
Benzo(a)pyrene	50-32-8	0.72	0.11	No	No
Benzo(b)fluoranthene	205-99-2	1.47	1.1	No	No
Dibenz(a,h)anthracene	53-70-3	0.224	0.11	No	No
DU-18 (Dump Area)					
Surface Soil (0 to 6 inches)					
Aluminum	7429-90-5	16,000	7700	No	No
Antimony	7440-36-0	7.42	3.1	**Yes**	**Yes**
Arsenic	7440-38-2	23.1	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	8.04	2.3	**Yes**	**Yes**
Copper	7440-50-8	3,010	310	**Yes**	**Yes**
Iron	7439-89-6	44,000	5500	**Yes**	**Yes**
Lead[2]	7439-92-1	1,433	400	**Yes**	**Yes**
Manganese	7439-96-5	652	180	**Yes**	**Yes**
Mercury	7439-97-6	6.33	1.1	**Yes**	**Yes**
Thallium	7440-28-0	0.29	0.078	No	No
Zinc	7440-66-6	3,520	2300	**Yes**	**Yes**
Benzo(a)anthracene	56-55-3	1.37	1.1	No	No
Benzo(a)pyrene	50-32-8	1.27	0.11	**Yes**	**Yes**
Benzo(b)fluoranthene	205-99-2	2.14	1.1	**Yes**	**Yes**
Dibenz(a,h)anthracene	53-70-3	0.255	0.11	**Yes**	**Yes**
Aroclor 1260	11096-82-5	0.383	0.24	**Yes**	**Yes**
Subsurface Soil (6 to 36 inches)					
Antimony	7440-36-0	19.6	3.1	**Yes**	**Yes**
Arsenic	7440-38-2	21.2	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	9.5	2.3	No	No
Copper	7440-50-8	6,070	310	**Yes**	**Yes**
Iron	7439-89-6	50,200	5500	**Yes**	**Yes**
Lead[2]	7439-92-1	2,433	400	**Yes**	**Yes**

Table 1a Human Health Risk Assessment Contaminants of Potential Concern - Soil

Constituent	CAS No.	95UCL (mg/kg)	EPA Residential Soil RSL[(1)] (mg/kg)	Exceeds Background?	COPC
Manganese	7439-96-5	555	180	**Yes**	**Yes**
Mercury	7439-97-6	3.19	1.1	**Yes**	**Yes**
Thallium	7440-28-0	0.411	0.078	**Yes**	**Yes**
Zinc	7440-66-6	7,850	2300	**Yes**	**Yes**
Benzo(a)anthracene	56-55-3	0.995	1.1	No	No
Benzo(a)pyrene	50-32-8	1.27	0.11	No	No
Benzo(b)fluoranthene	205-99-2	1.93	1.1	No	No
Dibenz(a,h)anthracene	53-70-3	0.299	0.11	No	No
DU-19 (Dump Area)					
Surface Soil (0 to 6 inches)					
Aluminum	7429-90-5	31,700	7700	**Yes**	**Yes**
Arsenic	7440-38-2	16	0.68	**Yes**	**Yes**
Cobalt	7440-48-4	22.7	2.3	**Yes**	**Yes**
Iron	7439-89-6	45,700	5500	**Yes**	**Yes**
Manganese	7439-96-5	517	180	**Yes**	**Yes**
Thallium	7440-28-0	0.156	0.078	No	No
Vanadium	7440-62-2	57.8	39	No	No
Benzo(a)anthracene	56-55-3	3.6	1.1	**Yes**	**Yes**
Benzo(a)pyrene	50-32-8	2.66	0.11	**Yes**	**Yes**
Benzo(b)fluoranthene	205-99-2	4.75	1.1	**Yes**	**Yes**
Dibenz(a,h)anthracene	53-70-3	0.524	0.11	**Yes**	**Yes**
Indeno(1,2,3-c,d)pyrene	193-39-5	2.06	1.1	**Yes**	**Yes**
Subsurface Soil (6 to 36 inches)					
Aluminum	7429-90-5	28,700	7700	**Yes**	**Yes**
Arsenic	7440-38-2	3.15	0.68	No	No
Cobalt	7440-48-4	19.5	2.3	**Yes**	**Yes**
Iron	7439-89-6	38,500	5500	**Yes**	**Yes**
Manganese	7439-96-5	291	180	No	No
Thallium	7440-28-0	0.0804	0.078	No	No
Vanadium	7440-62-2	64.2	39	**Yes**	**Yes**
DU-20 (AOC 13 – Former Fuel Oil AST)					
Benzo(a)pyrene	50-32-8	0.185	0.11	No	No
DU-21 (AOC 14 – Former Fuel Oil AST)					
Benzo(a)pyrene	50-32-8	0.319	0.11	No	No
DU-22 (AOC 15 – Former Fuel Oil AST)					
Benzo(a)anthracene	56-55-3	2.6	1.1	**Yes**	**Yes**
Benzo(a)pyrene	50-32-8	2.48	0.11	**Yes**	**Yes**
Benzo(b)fluoranthene	205-99-2	4.090	1.1	**Yes**	**Yes**
Dibenz(a,h)anthracene	53-70-3	0.513	0.11	**Yes**	**Yes**
Indeno(1,2,3-c,d)pyrene	193-39-5	1.550	1.1	**Yes**	**Yes**

Notes:
(1) EPA, 2022a. Residential Soil Regional Screening Level (RSL) Table, Dated May 2022. Protective of a target cancer risk of 1×10^{-6} and hazard quotient of 0.1.
(2) Lead DU concentrations are represented by the mean concentration of the replicate samples.
COPC = constituent of potential concern
DU = decision unit
mg/kg = milligrams per kilogram
RSL = regional screening level

Table 1b Human Health Risk Assessment Contaminants of Potential Concern - Sediment

Constituent	CAS No.	95UCL (mg/kg)	EPA Residential Soil RSL[(1)] (mg/kg)	Exceeds Background?	COPC
Iona Island Hudson River Shoreline (IHRS)					
Antimony	7440-36-0	123	3.1	**Yes**	**Yes**
Arsenic	7440-38-2	36.2	0.68	**Yes**	**Yes**
Cadmium	7440-43-9	9.86	0.71	**Yes**	**Yes**
Cobalt	7440-48-4	15.3	2.3	No	No
Copper	7440-50-8	10,100	310	**Yes**	**Yes**
Iron	7439-89-6	192,000	55,00	**Yes**	**Yes**
Lead	7439-92-1	9,900[(2)]	400	**Yes**	**Yes**
Manganese	7439-96-5	1,200	180	No	No
Thallium	7440-28-0	0.083	0.078	**Yes**	**Yes**
Vanadium	7440-62-2	39.1	39	No	No
Zinc	7440-66-6	3,930	2,300	No	No
Rip Rap Drainage Swale (RRDS)					
Aluminum	7429-90-5	22,500	7700	No	No
Arsenic	7440-38-2	9.82	0.68	**Yes**	**Yes**
Cadmium	7440-43-9	0.979	0.71	No	No
Iron	7439-89-6	37,600	5,500	**Yes**	**Yes**
Manganese	7439-96-5	2,870	180	**Yes**	**Yes**
Thallium	7440-28-0	0.207	0.078	No	No
Tidal Wetland Swale (TWS)					
Aluminum	7429-90-5	16,600	7700	No	No
Arsenic	7440-38-2	9.69	0.68	**Yes**	**Yes**
Cadmium	7440-43-9	3.19	0.71	**Yes**	**Yes**
Cobalt	7440-48-4	14.3	2.3	**Yes**	**Yes**
Iron	7439-89-6	38,100	5500	**Yes**	**Yes**
Manganese	7439-96-5	1,270	180	**Yes**	**Yes**
Thallium	7440-28-0	0.18	0.078	No	No

Notes:
(1) EPA, 2022a. Residential Soil Regional Screening Level (RSL) Table, Dated May 2022. Protective of a target cancer risk of 1×10^{-6} and hazard quotient of 0.1.
(2) The concentration for lead is the mean concentration of the replicate samples.
COPC = constituent of potential concern
DU = decision unit
mg/kg = milligrams per kilogram
RSL = regional screening level

Table 1c Human Health Risk Assessment Contaminants of Potential Concern – Surface Water

Constituent	CAS No.	Maximum Concentration (ug/L)	EPA Tapwater RSL[(1)] (ug/L)	EPA MCL (ug/L)	Exceeds Background?	COPC
Iona Island Hudson River Shoreline (IHRS)						
No chemicals above screening criteria						
Rip Rap Drainage Swale (RRDS)						
Manganese	7439-96-5	130	43	NA	No	No
Tidal Wetland Swale (TWS)						
Manganese	7439-96-5	120	43	NA	No	No
AOC #16 – Area D (former Dumping Area) (DUMP)						
Antimony	7440-36-0	1.4	0.78	6	No	No
Thallium	7440-28-0	0.02	0.17	2	No	No

(1) EPA, 2022a. Tapwater Regional Screening Level (RSL) Table, Dated May 2022. Protective of a target cancer risk of 1×10^{-6} and hazard quotient of 0.1. Notes:
COPC = constituent of potential concern
NA = not applicable
ug/L = micrograms per liter
RSL = regional screening level

Table 2 Reasonable Maximum Exposure Parameters

Definition	Parameter	Units	Current/Future Park Personnel	Current/Future Researcher	Future Construction Worker	Recreational User			Current/Future Adolescent Trespasser (12 to 18 years)	Current/Future Campers (Boy Scouts)	References
						Adult	Adolescent (6 to 16 years)	Child (2-6 years)			
General Parameters											
Body Weight	BW	kg	80	80	80	80	56.8	16	57	45	USEPA 2011, 2014
Exposure Duration	ED	years	25	3	1	20	10	4	6	13	BPJ; USEPA 2011, 2014
Averaging Time	AT										
Noncarcinogenic		days	9,125	1,095	365	7,300	3,650	1,460	2,190	4,745	USEPA 1989
Carcinogenic		days	25,550	25,550	25,550	25,550	25,550	25,550	25,550	25,550	USEPA 1989
Surface and Subsurface Soil Incidental Ingestion Pathway											
Soil Incidental Ingestion Rate	IRS	mg/day	100	100	330	100	200	200	100	200	USEPA 1991, 2002, 2014
Soil Exposure Frequency	EF	days/year	160	52	250	31	31	31	16	20	BPJ; USEPA 2011, 2014
Conversion Factor	CF_1	kg/mg	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	USEPA 1989
Surface Soil Dermal Contact Pathway											
Skin Surface Area	SA	$cm^{2.}$	3,527	3,527	3,527	6,032	4,645	2,107	4,645	3,947	USEPA 2011, 2014
Skin Adherence Factor	AF	mg/cm^2	0.12	0.3	0.3	0.07	0.2	0.2	0.2	0.2	USEPA 2011, 2014
Soil Exposure Frequency	EF	days/year	160	52	250	31	31	31	16	20	BPJ; USEPA 2011, 2014
Dermal Absorption Factor	ABS	unitless	chemical-specific	chemical-specific	chemical-specific	chemical-specific	chemical-specific	chemical-specific	chemical-specific	chemical-specific	USEPA 2004
Conversion Factor	CF_1	kg/mg	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	USEPA 1989
Subsurface Soil Dermal Contact Pathway											
Skin Surface Area	SA	$cm^{2.}$	NA	NA	3,527	NA	NA	NA	NA	3,947	USEPA 2011, 2014
Skin Adherence Factor	AF	mg/cm^2	NA	NA	0.9	NA	NA	NA	NA	3.3	USEPA 2004
Soil Exposure Frequency	EF	days/year	NA	NA	250	NA	NA	NA	NA	20	BPJ; USEPA 2011, 2014
Dermal Absorption Factor	ABS	unitless	chemical-specific	chemical-specific	chemical-specific	chemical-specific	chemical-specific	chemical-specific	chemical-specific	chemical-specific	USEPA 2004
Conversion Factor	CF_1	kg/mg	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	USEPA 1989
Surface and Subsurface Soil Inhalation Pathway											
Particulate Emission Factor	PEF	m^3/kg	1.21E+09	1.21E+09	Site-specific	1.21E+09	1.21E+09	1.21E+09	1.21E+09	1.21E+09	NYSDEC 2006
Soil Exposure Frequency	EF	days/year	160	52	250	31	31	31	16	20	BPJ; USEPA 2011, 2014
Exposure Time	ET	hour/day	8	8	11.5	4	4	4	4	24	BPJ; USEPA 1989, 2011
Conversion Factor	CF_2	ug/mg	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	USEPA 2009
Conversion Factor	CF_3	hours/day	24	24	24	24	24	24	24	24	USEPA 2009
Sediment Incidental Ingestion Pathway											
Sediment Incidental Ingestion Rate	IRS	mg/day	50	50	NA	50	50	50	50	50	USEPA 1991, 2002, 2014
Sediment Exposure Frequency	EF	days/year	80	52	NA	31	31	31	NA	20	BPJ; USEPA 2011, 2014
Conversion Factor	CF_1	kg/mg	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	USEPA 1989
Sediment Dermal Contact Pathway											
Skin Surface Area	SA	$cm^{2.}$	3,527	NA	NA	6,032	4,645	2,107	4,645	3,947	USEPA 2011, 2014
Skin Adherence Factor	AF	mg/cm^2	0.9	NA	NA	0.9	3.3	3.3	3.3	3.3	USEPA 2004
Sediment Exposure Frequency	EF	days/year	80	NA	NA	31	31	31	16	20	USEPA 2011, 2014
Dermal Absorption Factor	ABS	unitless	chemical-specific	chemical-specific	chemical-specific	chemical-specific	chemical-specific	chemical-specific	chemical-specific	chemical-specific	USEPA 2004
Conversion Factor	CF_1	kg/mg	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06	USEPA 1989

Notes:
NA = Not applicable

References:
BPJ = Best Professional Judgement

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TABLE 3
NON-CANCER TOXICITY DATA - ORAL/DERMAL

Constituents of Potential Concern	Chronic/ Subchronic	Oral RfD Value (mg/kg-day)	Oral to Dermal Adjustment Factor (GI ABS) (1)	Adjusted Dermal RfD (2) (mg/kg bw-day)	Primary Target Organ	Combined Uncertainty/ Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (3) (mm/dd/yy)
Inorganics								
ALUMINUM	Chronic	1.0E+00	1.00E+00	1.0E+00	Neurological	100/1	PPRTV	10/23/2006
ANTIMONY	Chronic	4.0E-04	1.50E-01	6.0E-05	Blood	1000/1	IRIS	7/28/2020
ARSENIC	Chronic	3.0E-04	1.00E+00	3.0E-04	Skin, Cardiovascular	3/1	IRIS	7/28/2020
COBALT	Chronic	3.0E-04	1.00E+00	3.0E-04	Thyroid	3000/1	PPRTV	8/25/2008
COPPER	Chronic	4.0E-02	1.00E+00	4.0E-02	Gastrointestinal System	NA/NA	HEAST	1997
IRON	Chronic	7.0E-01	1.00E+00	7.0E-01	Gastrointestinal System	1.5/1	PPRTV	9/11/2006
MANGANESE	Chronic	1.4E-01	1.00E+00	1.4E-01	Central Nervous System	1/3	IRIS	7/28/2020
MERCURY	Chronic	3.0E-04	7.00E-02	2.1E-05	Nervous System, Developmental	10/1	IRIS	7/28/2020
LEAD	Chronic	NA	1.00E+00	NA	NA	NA/NA	IRIS	7/28/2020
THALLIUM	Chronic	1.0E-05	1.00E+00	1.0E-05	Hair	3000/1	PPRTV-X	11/1/2012
VANADIUM	Chronic	5.0E-03	2.60E-02	1.3E-04	Skin	100/1	IRIS	7/28/2020
ZINC	Chronic	3.0E-01	1.00E+00	3.0E-01	Immune System, Blood	3/1	IRIS	7/28/2020
Polyaromatic Hydrocarbons								
BENZO(A)ANTHRACENE	NA	NA	1.00E+00	NA	NA	NA/NA	IRIS	7/28/2020
BENZO(B)FLUORANTHENE	NA	NA	1.00E+00	NA	NA	NA/NA	IRIS	7/28/2020
BENZO(A)PYRENE	Chronic	3.0E-04	1.00E+00	3.0E-04	Developmental System	300/1	IRIS	7/28/2020
DIBENZ(A,H)ANTHRACENE	NA	NA	1.00E+00	NA	NA	NA/NA	IRIS	7/28/2020
INDENO(1,2,3-C,D)PYRENE	NA	NA	1.00E+00	NA	NA	NA/NA	IRIS	7/28/2020
PCBS								
AROCLOR-1260	NA	NA	1.00E+00	NA	NA	NA	IRIS	7/28/2020

Notes:

NA = Not Available
RfD = Reference Dose
mg/kg-day = milligram per kilogram-day
GI ABS = Gastrointestinal Absorption Fraction

(1) Taken from USEPA 2004 Guidance.

(2) Dermal toxicological values adjusted from oral values using USEPA 2004 recommended chemical-specific gastrointestinal absorption factors (GI ABS). RfDs are multiplied by the GI ABS.

(3) IRIS - Integrated Risk Information System. For IRIS values, the date IRIS was searched is provided. Available at: http://www.epa.gov/iris/
HEAST - Health Effects Assessment Summary Tables. For HEAST values, the date of HEAST is provided.
PPRTV - Provisional Peer-Reviewed Toxicity Value. For PPRTV values, the date of the issue paper is provided. Available at:http://hhpprtv.ornl.gov/
PPRTV-X - Provisional Peer-Reviewed Toxicity Value, Appendix Screening Value. The date of the issue paper is provided.

TABLE 4
NON-CANCER TOXICITY DATA - INHALATION

Constituents of Potential Concern	Chronic/ Subchronic	Value Inhalation (RfC) (mg/m^3)	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfC Target Organ	Dates (1) (mm/dd/yy)
Inorganics						
ALUMINUM	Chronic	5.0E-03	Neurological	300/1	PPRTV	10/23/2006
ANTIMONY	NA	NA	NA	NA	IRIS	7/28/2020
ARSENIC	Chronic	1.5E-05	Reproductive, Cardiovascular System	NA	CalEPA	7/1/2020
COBALT	Chronic	6.0E-06	Respiratory System	300/1	PPRTV	8/25/2008
COPPER	NA	NA	NA	NA	HEAST	1997
IRON	NA	NA	NA	NA	PPRTV	6/16/2005
MANGANESE	Chronic	5.0E-05	Central Nervous System	1000/1	IRIS	7/28/2020
MERCURY	Chronic	3.0E-04	Central Nervous System	30/1	IRIS	7/28/2020
LEAD	NA	NA	NA	NA	IRIS	7/28/2020
THALLIUM	NA	NA	NA	NA	IRIS	7/28/2020
VANADIUM	Chronic	1.0E-04	Respiratory System	30/1	ATSDR	9/1/2020
ZINC	NA	NA	NA	NA	IRIS	7/28/2020
Polyaromatic Hydrocarbons						
BENZO(A)ANTHRACENE	NA	NA	NA	NA	IRIS	7/28/2020
BENZO(B)FLUORANTHENE	NA	NA	NA	NA	IRIS	7/28/2020
BENZO(A)PYRENE	Chronic	2.0E-06	Developmental System	3000/1	IRIS	7/28/2020
DIBENZ(A,H)ANTHRACENE	NA	NA	NA	NA	IRIS	7/28/2020
INDENO(1,2,3-C,D)PYRENE	NA	NA	NA	NA	IRIS	7/28/2020
PCBs						
AROCLOR-1260	NA	NA	NA	NA	IRIS	7/28/2020

Notes:
NA = Not Available
RfC = Reference Concentration
mg/m^3 = milligrams per cubic meter
(1) IRIS - Integrated Risk Information System. For IRIS values, the date IRIS was searched is provided. Available at: http://www.epa.gov/iris/
HEAST - Health Effects Assessment Summary Tables. For HEAST values, the date of HEAST is provided.
PPRTV - Provisional Peer-Reviewed Toxicity Value. For PPRTV values, the date of the issue paper is provided. Available at:http://hhpprtv.ornl.gov/
CalEPA - California Environmental Protection Agency. For CalEPA values, the date searched is provided.

TABLE 5
CANCER TOXICITY DATA - ORAL/DERMAL

Constituents of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor (GI ABS) (1)	Absorbed Cancer Slope Factor for Dermal (2)	Units	Weight of Evidence/Cancer Guideline Description	Mutagenic Compound	Source	Date (3) (mm/dd/yy)
Inorganics								
ALUMINUM	NA	1.00E+00	NA	per (mg/kg-day)	NA		PPRTV	10/23/2006
ANTIMONY	NA	1.50E-01	NA	per (mg/kg-day)	NA		IRIS	7/28/2020
ARSENIC	1.5E+00	1.00E+00	1.5E+00	per (mg/kg-day)	A		IRIS	7/28/2020
COBALT	NA	1.00E+00	NA	per (mg/kg-day)	B2		PPRTV	8/25/2008
COPPER	NA	1.00E+00	NA	per (mg/kg-day)	D		IRIS	2/18/2019
IRON	NA	1.00E+00	NA	per (mg/kg-day)	NA		PPRTV	7/29/2005
MANGANESE	NA	1.00E+00	NA	per (mg/kg-day)	D		IRIS	7/28/2020
MERCURY	NA	7.00E-02	NA	per (mg/kg-day)	C		IRIS	2/18/2019
LEAD	NA	1.00E+00	NA	per (mg/kg-day)	B2		IRIS	7/28/2020
THALLIUM	NA	1.00E+00	NA	per (mg/kg-day)	NA		IRIS	7/28/2020
VANADIUM	NA	2.60E-02	NA	per (mg/kg-day)	C		ATSDR	9/1/2020
ZINC	NA	1.00E+00	NA	per (mg/kg-day)	D		IRIS	7/28/2020
Polyaromatic Hydrocarbons								
BENZO(A)ANTHRACENE	1.0E-01	1.00E+00	1.0E-01	per (mg/kg-day)	B2	M	IRIS	7/28/2020
BENZO(B)FLUORANTHENE	1.0E-01	1.00E+00	1.0E-01	per (mg/kg-day)	B2	M	IRIS	7/28/2020
BENZO(A)PYRENE	1.0E+00	1.00E+00	1.0E+00	per (mg/kg-day)	A	M	IRIS	7/28/2020
DIBENZ(A,H)ANTHRACENE	1.0E+00	1.00E+00	1.0E+00	per (mg/kg-day)	B2	M	IRIS	7/28/2020
INDENO(1,2,3-C,D)PYRENE	1.0E-01	1.00E+00	1.0E-01	per (mg/kg-day)	B2	M	IRIS	7/28/2020
PCBs								
AROCLOR-1260	2.0E+00	1.00E+00	2.0E+00	per (mg/kg-day)	B2		IRIS	7/28/2020

M = Mutagenic mode of action
NA = Not Available
mg/kg-day = milligram per kilogram-day
GI ABS = Gastrointestinal Absorption Fraction

(1) Taken from USEPA 2004 Guidance.
(2) Dermal Toxicological values adjusted from oral values using USEPA 2004 recommended chemical-specific gastrointestinal absorption factors (GI ABS). Cancer slope factors are divided by the GI ABS.
(3) IRIS - Integrated Risk Information System. For IRIS values, the date IRIS was searched is provided. Available at: http://www.epa.gov/iris/
PPRTV - Provisional Peer-Reviewed Toxicity Value, the date of the issue paper is provided. Available at:http://hhpprtv.ornl.gov/
ATSDR - Agency for Toxic Substances and Disease Registry. For ATSDR values, the date of the MRL is provided.

Weight of Evidence:
A - Human carcinogen
B1 - Probable human carcinogen - indicate that limited human data are available
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity
SU - Suggestive evidence of carcinogenic potential

TABLE 6
CANCER TOXICITY DATA - INHALATION

Constituents of Potential Concern	Unit Risk		Weight of Evidence/Cancer Guideline Description	Mutagenic	Unit Risk	
	Value	Units			Source	Date [1]
Inorganics						
ALUMINUM	NA	per (ug/m^3)	NA		PPRTV	10/23/2006
ANTIMONY	NA	per (ug/m^3)	NA		IRIS	7/28/2020
ARSENIC	4.3E-03	per (ug/m^3)	A		IRIS	7/28/2020
COBALT	9.0E-03	per (ug/m^3)	B2		PPRTV	8/25/2008
COPPER	NA	per (ug/m^3)	D		IRIS	7/28/2020
IRON	NA	per (ug/m^3)	NA		PPRTV	7/29/2005
MANGANESE	NA	per (ug/m^3)	D		IRIS	7/28/2020
MERCURY	NA	per (ug/m^3)	C		IRIS	2/18/2019
LEAD	NA	per (ug/m^3)	B2		IRIS	7/28/2020
THALLIUM	NA	per (ug/m^3)	NA		IRIS	7/28/2020
VANADIUM	NA	per (ug/m^3)	C		IRIS	7/28/2020
ZINC	NA	per (ug/m^3)	D		IRIS	7/28/2020
Polyaromatic Hydrocarbons						
BENZO(A)ANTHRACENE	6.0E-05	per (ug/m^3)	B2	M	IRIS	7/28/2020
BENZO(B)FLUORANTHENE	6.0E-05	per (ug/m^3)	B2	M	IRIS	7/28/2020
BENZO(A)PYRENE	6.0E-04	per (ug/m^3)	A	M	IRIS	7/28/2020
DIBENZ(A,H)ANTHRACENE	6.0E-04	per (ug/m^3)	B2	M	IRIS	7/28/2020
INDENO(1,2,3-C,D)PYRENE	6.0E-05	per (ug/m^3)	B2	M	IRIS	7/28/2020
PCBs						
AROCLOR-1260	5.7E-04	per (ug/m^3)	B2		IRIS	7/28/2020

M = Mutagenic Mode of Action
NA = Not Available

(1) IRIS - Integrated Risk Information System. For IRIS values, the date IRIS was searched is provided. Available at: http://www.epa.gov/iris/
PPRTV - Provisional Peer-Reviewed Toxicity Value, the date of the issue paper is provided. Available at:http://hhpprtv.ornl.gov/
CalEPA - California Environmental Protection Agency, Cancer Potency Factors
ATSDR - Agency for Toxic Substances and Disease Registry. For ATSDR values, the date of the MRL is provided.

Weight of Evidence:
A - Human carcinogen
B1 - Probable human carcinogen - indicate that limited human data are available
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity
SU - Suggestive evidence of carcinogenic potential

TABLE 7
CHEMICAL-SPECIFIC PARAMETERS

Constituents of Potential Concern	Absorption Factor	Reference	GI ABS	Reference
Inorganics				
ALUMINUM	NA	U.S. EPA, 2004	1.00E+00	U.S. EPA, 2004
ANTIMONY	NA	U.S. EPA, 2004	1.50E-01	U.S. EPA, 2004
ARSENIC	0.03	U.S. EPA, 2004	1.00E+00	U.S. EPA, 2004
COBALT	NA	U.S. EPA, 2004	1.00E+00	U.S. EPA, 2004
COPPER	NA	U.S. EPA, 2004	1.00E+00	U.S. EPA, 2004
IRON	NA	U.S. EPA, 2004	1.00E+00	U.S. EPA, 2004
MANGANESE	NA	U.S. EPA, 2004	1.00E+00	U.S. EPA, 2004
MERCURY	NA	U.S. EPA, 2004	7.00E-02	U.S. EPA, 2004
LEAD	NA	U.S. EPA, 2004	1.00E+00	U.S. EPA, 2004
THALLIUM	NA	U.S. EPA, 2004	1.00E+00	U.S. EPA, 2004
VANADIUM	NA	U.S. EPA, 2004	2.60E-02	U.S. EPA, 2004
ZINC	NA	U.S. EPA, 2004	1.00E+00	U.S. EPA, 2004
Polyaromatic Hydrocarbons				
BENZO(A)ANTHRACENE	0.13	U.S. EPA, 2004	1.00E+00	U.S. EPA, 2004
BENZO(B)FLUORANTHENE	0.13	U.S. EPA, 2004	1.00E+00	U.S. EPA, 2004
BENZO(A)PYRENE	0.13	U.S. EPA, 2004	1.00E+00	U.S. EPA, 2004
DIBENZ(A,H)ANTHRACENE	0.13	U.S. EPA, 2004	1.00E+00	U.S. EPA, 2004
INDENO(1,2,3-C,D)PYRENE	0.13	U.S. EPA, 2004	1.00E+00	U.S. EPA, 2004
PCBs				
AROCLOR-1260	0.14	U.S. EPA, 2004	1.00E+00	U.S. EPA, 2004

NA = Data not available.
GI ABS = Gastrointestinal Absorption Fraction
U.S. EPA, 2004 = U.S. Environmental Protection Agency, 2004. *Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment).* Final Guidance.

TABLE 8
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU1

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU1	Ingestion	**Inorganics**												
				ARSENIC	1.46E+01	(mg/kg)	1.71E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.6E-06	4.80E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.6E-02
				COBALT	8.01E+00	(mg/kg)	1.57E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.39E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				MANGANESE	4.88E+02	(mg/kg)	9.55E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.67E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.9E-03
			Exp. Route Total								**2.6E-06**					**3.3E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.46E+01	(mg/kg)	3.63E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.4E-07	1.02E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.4E-03
				COBALT	8.01E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	4.88E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**5.4E-07**					**3.4E-03**
		Exposure Point Total									**3.1E-06**					**3.6E-02**
	Exposure Medium Total										**3.1E-06**					**3.6E-02**
	Air	DU1	Inhalation	**Inorganics**												
				ARSENIC	1.21E-08	(mg/m^3)	6.30E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	2.7E-09	1.76E-09	(mg/m^3)	1.50E-05	(mg/m^3)	1.2E-04
				COBALT	6.62E-09	(mg/m^3)	3.45E-07	(ug/m^3)	9.00E-03	per (ug/m^3)	3.1E-09	9.67E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.6E-04
				MANGANESE	4.03E-07	(mg/m^3)	2.10E-05	(ug/m^3)	NA	per (ug/m^3)	--	5.89E-08	(mg/m^3)	5.00E-05	(mg/m^3)	1.2E-03
			Exp. Route Total								**5.8E-09**					**1.5E-03**
		Exposure Point Total									**5.8E-09**					**1.5E-03**
	Exposure Medium Total										**5.8E-09**					**1.5E-03**
Soil Total											**3.1E-06**					**3.7E-02**
										Total of Receptor Risks Across All Media	**3.1E-06**			Total of Receptor Hazards Across All Media		**3.7E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 9
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU1

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU1	Ingestion	**Inorganics**												
				ARSENIC	1.46E+01	(mg/kg)	6.69E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.0E-07	1.56E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.2E-03
				COBALT	8.01E+00	(mg/kg)	6.11E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.43E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.8E-03
				MANGANESE	4.88E+02	(mg/kg)	3.72E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	8.69E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	6.2E-04
			Exp. Route Total								**1.0E-07**					**1.1E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.46E+01	(mg/kg)	3.54E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.3E-08	8.25E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.8E-03
				COBALT	8.01E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	4.88E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**5.3E-08**					**2.8E-03**
		Exposure Point Total									**1.5E-07**					**1.3E-02**
	Exposure Medium Total										**1.5E-07**					**1.3E-02**
	Air	DU1	Inhalation	**Inorganics**												
				ARSENIC	1.21E-08	(mg/m^3)	2.46E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.1E-10	5.73E-10	(mg/m^3)	1.50E-05	(mg/m^3)	3.8E-05
				COBALT	6.62E-09	(mg/m^3)	1.35E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.2E-10	3.14E-10	(mg/m^3)	6.00E-06	(mg/m^3)	5.2E-05
				MANGANESE	4.03E-07	(mg/m^3)	8.21E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.92E-08	(mg/m^3)	5.00E-05	(mg/m^3)	3.8E-04
			Exp. Route Total								**2.3E-10**					**4.7E-04**
		Exposure Point Total									**2.3E-10**					**4.7E-04**
	Exposure Medium Total										**2.3E-10**					**4.7E-04**
Soil Total											**1.5E-07**					**1.4E-02**
										Total of Receptor Risks Across All Media	**1.5E-07**				Total of Receptor Hazards Across All Media	**1.4E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 10
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU1

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU1	Ingestion	**Inorganics**												
				ARSENIC	1.46E+01	(mg/kg)	3.89E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.8E-07	2.72E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.1E-02
				COBALT	8.01E+00	(mg/kg)	3.56E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.49E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.3E-02
				MANGANESE	4.88E+02	(mg/kg)	2.17E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.52E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.1E-02
			Exp. Route Total								**5.8E-07**					**1.8E-01**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.46E+01	(mg/kg)	6.24E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.4E-08	4.36E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				COBALT	8.01E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	4.88E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**9.4E-08**					**1.5E-02**
		Exposure Point Total									**6.8E-07**					**2.0E-01**
	Exposure Medium Total										**6.8E-07**					**2.0E-01**
	Air	DU1	Inhalation	**Inorganics**												
				ARSENIC	7.09E-07	(mg/m^3)	3.66E-06	(ug/m^3)	4.3E-03	per (ug/m^3)	1.6E-08	2.56E-07	(mg/m^3)	1.50E-05	(mg/m^3)	1.7E-02
				COBALT	3.89E-07	(mg/m^3)	2.01E-06	(ug/m^3)	9.0E-03	per (ug/m^3)	1.8E-08	1.40E-07	(mg/m^3)	6.00E-06	(mg/m^3)	2.3E-02
				MANGANESE	2.37E-05	(mg/m^3)	1.22E-04	(ug/m^3)	NA	per (ug/m^3)	--	8.55E-06	(mg/m^3)	5.00E-05	(mg/m^3)	1.7E-01
			Exp. Route Total								**3.4E-08**					**2.1E-01**
		Exposure Point Total									**3.4E-08**					**2.1E-01**
	Exposure Medium Total										**3.4E-08**					**2.1E-01**
Soil Total											**7.1E-07**					**4.1E-01**
										Total of Receptor Risks Across All Media	**7.1E-07**				Total of Receptor Hazards Across All Media	**4.1E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 11
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU1

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU1	Ingestion	**Inorganics**												
				ARSENIC	1.46E+01	(mg/kg)	2.66E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.0E-07	9.30E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.1E-03
				COBALT	8.01E+00	(mg/kg)	2.43E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	8.50E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.8E-03
				MANGANESE	4.88E+02	(mg/kg)	1.48E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	5.18E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.7E-04
			Exp. Route Total								**4.0E-07**					**6.3E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.46E+01	(mg/kg)	5.61E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.4E-08	1.96E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.5E-04
				COBALT	8.01E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	4.88E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**8.4E-08**					**6.5E-04**
		Exposure Point Total									**4.8E-07**					**7.0E-03**
	Exposure Medium Total										**4.8E-07**					**7.0E-03**
	Air	DU1	Inhalation	**Inorganics**												
				ARSENIC	1.21E-08	(mg/m^3)	4.88E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	2.1E-10	1.71E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.1E-05
				COBALT	6.62E-09	(mg/m^3)	2.68E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	2.4E-10	9.37E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.6E-05
				MANGANESE	4.03E-07	(mg/m^3)	1.63E-06	(ug/m^3)	NA	per (ug/m^3)	--	5.71E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.1E-04
			Exp. Route Total								**4.5E-10**					**1.4E-04**
		Exposure Point Total									**4.5E-10**					**1.4E-04**
	Exposure Medium Total										**4.5E-10**					**1.4E-04**
Soil Total											**4.8E-07**					**7.1E-03**
										Total of Receptor Risks Across All Media	**4.8E-07**				Total of Receptor Hazards Across All Media	**7.1E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 12
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU1

Scenario Timeframe: Current/Future
Receptor Population: Recreator (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU1	Ingestion	**Inorganics**												
				ARSENIC	1.46E+01	(mg/kg)	3.74E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.6E-07	4.37E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				COBALT	8.01E+00	(mg/kg)	3.42E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	3.99E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-02
				MANGANESE	4.88E+02	(mg/kg)	2.08E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.43E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.7E-03
			Exp. Route Total								**5.6E-07**					**3.0E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.46E+01	(mg/kg)	8.69E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.3E-07	1.01E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.4E-03
				COBALT	8.01E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	4.88E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**1.3E-07**					**3.4E-03**
		Exposure Point Total									**6.9E-07**					**3.3E-02**
	Exposure Medium Total										**6.9E-07**					**3.3E-02**
	Air	DU1	Inhalation	**Inorganics**												
				ARSENIC	1.21E-08	(mg/m^3)	2.44E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.0E-10	2.85E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.9E-05
				COBALT	6.62E-09	(mg/m^3)	1.34E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.2E-10	1.56E-10	(mg/m^3)	6.00E-06	(mg/m^3)	2.6E-05
				MANGANESE	4.03E-07	(mg/m^3)	8.16E-07	(ug/m^3)	NA	per (ug/m^3)	--	9.51E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.9E-04
			Exp. Route Total								**2.3E-10**					**2.4E-04**
		Exposure Point Total									**2.3E-10**					**2.4E-04**
	Exposure Medium Total										**2.3E-10**					**2.4E-04**
Soil Total											**6.9E-07**					**3.3E-02**
										Total of Receptor Risks Across All Media	**6.9E-07**				Total of Receptor Hazards Across All Media	**3.3E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 13
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU1

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU1	Ingestion	**Inorganics**												
				ARSENIC	1.46E+01	(mg/kg)	5.31E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.0E-07	9.30E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.1E-02
				COBALT	8.01E+00	(mg/kg)	4.86E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	8.50E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.8E-02
				MANGANESE	4.88E+02	(mg/kg)	2.96E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	5.18E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.7E-03
			Exp. Route Total								**8.0E-07**					**6.3E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.46E+01	(mg/kg)	5.60E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.4E-08	9.80E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.3E-03
				COBALT	8.01E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	4.88E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**8.4E-08**					**3.3E-03**
		Exposure Point Total									**8.8E-07**					**6.6E-02**
	Exposure Medium Total										**8.8E-07**					**6.6E-02**
Soil	Air	DU1	Inhalation	**Inorganics**												
				ARSENIC	1.21E-08	(mg/m^3)	9.76E-09	(ug/m^3)	4.30E-03	per (ug/m^3)	4.2E-11	1.71E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.1E-05
				COBALT	6.62E-09	(mg/m^3)	5.35E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	4.8E-11	9.37E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.6E-05
				MANGANESE	4.03E-07	(mg/m^3)	3.26E-07	(ug/m^3)	NA	per (ug/m^3)	--	5.71E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.1E-04
			Exp. Route Total								**9.0E-11**					**1.4E-04**
		Exposure Point Total									**9.0E-11**					**1.4E-04**
	Exposure Medium Total										**9.0E-11**					**1.4E-04**
Soil Total											**8.8E-07**					**6.6E-02**
										Total of Receptor Risks Across All Media	**8.8E-07**			Total of Receptor Hazards Across All Media		**6.6E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 14
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU1

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU1	Ingestion	**Inorganics**												
				ARSENIC	1.46E+01	(mg/kg)	5.77E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.7E-08	6.74E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.2E-03
				COBALT	8.01E+00	(mg/kg)	5.28E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	6.16E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.1E-03
				MANGANESE	4.88E+02	(mg/kg)	3.22E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	3.75E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.7E-04
			Exp. Route Total								**8.7E-08**					**4.6E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.46E+01	(mg/kg)	2.68E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.0E-08	3.13E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.0E-03
				COBALT	8.01E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	4.88E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**4.0E-08**					**1.0E-03**
		Exposure Point Total									**1.3E-07**					**5.6E-03**
	Exposure Medium Total										**1.3E-07**					**5.6E-03**
	Air	DU1	Inhalation	**Inorganics**												
				ARSENIC	1.21E-08	(mg/m^3)	7.56E-09	(ug/m^3)	4.30E-03	per (ug/m^3)	3.2E-11	8.82E-11	(mg/m^3)	1.50E-05	(mg/m^3)	5.9E-06
				COBALT	6.62E-09	(mg/m^3)	4.15E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	3.7E-11	4.84E-11	(mg/m^3)	6.00E-06	(mg/m^3)	8.1E-06
				MANGANESE	4.03E-07	(mg/m^3)	2.53E-07	(ug/m^3)	NA	per (ug/m^3)	--	2.95E-09	(mg/m^3)	5.00E-05	(mg/m^3)	5.9E-05
			Exp. Route Total								**7.0E-11**					**7.3E-05**
		Exposure Point Total									**7.0E-11**					**7.3E-05**
	Exposure Medium Total										**7.0E-11**					**7.3E-05**
Soil Total											**1.3E-07**					**5.7E-03**
										Total of Receptor Risks Across All Media	**1.3E-07**				Total of Receptor Hazards Across All Media	**5.7E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 15
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU1

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU1	Ingestion	**Inorganics**												
				ARSENIC	1.46E+01	(mg/kg)	3.96E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.9E-07	2.13E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.1E-03
				COBALT	8.01E+00	(mg/kg)	3.62E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.95E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.5E-03
				MANGANESE	4.88E+02	(mg/kg)	2.21E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.19E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	8.5E-04
			Exp. Route Total								**5.9E-07**					**1.4E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.46E+01	(mg/kg)	7.82E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.2E-07	4.21E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-03
				COBALT	8.01E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	4.88E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**1.2E-07**					**1.4E-03**
		Exposure Point Total									**7.1E-07**					**1.6E-02**
	Exposure Medium Total										**7.1E-07**					**1.6E-02**
	Air	DU1	Inhalation	**Inorganics**												
				ARSENIC	1.21E-08	(mg/m^3)	1.23E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	5.3E-10	6.61E-10	(mg/m^3)	1.50E-05	(mg/m^3)	4.4E-05
				COBALT	6.62E-09	(mg/m^3)	6.74E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	6.1E-10	3.63E-10	(mg/m^3)	6.00E-06	(mg/m^3)	6.0E-05
				MANGANESE	4.03E-07	(mg/m^3)	4.10E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.21E-08	(mg/m^3)	5.00E-05	(mg/m^3)	4.4E-04
			Exp. Route Total								**1.1E-09**					**5.5E-04**
		Exposure Point Total									**1.1E-09**					**5.5E-04**
	Exposure Medium Total										**1.1E-09**					**5.5E-04**
Soil Total											**7.1E-07**					**1.6E-02**
										Total of Receptor Risks Across All Media	**7.1E-07**				Total of Receptor Hazards Across All Media	**1.6E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 16
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU1

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	2.6E-06	5.4E-07	2.7E-09	3.1E-06	ARSENIC	Skin, Cardiovascular	1.6E-02	3.4E-03	1.2E-04	2.0E-02
			COBALT	--	--	3.1E-09	3.1E-09	COBALT	Thyroid	1.5E-02	--	1.6E-04	1.5E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.9E-03	--	1.2E-03	3.1E-03
			(Total)	2.6E-06	5.4E-07	5.8E-09	3.1E-06		(Total)	3.3E-02	3.4E-03	1.5E-03	3.7E-02
Total Risk Across Surface Soil							**3.1E-06**	**Total Hazard Index Across Surface Soil**					**3.7E-02**
Total Risk Across All Media and All Exposure Routes							**3E-06**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.04**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 17
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU1

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	1.0E-07	5.3E-08	1.1E-10	1.5E-07	ARSENIC	Skin, Cardiovascular	5.2E-03	2.8E-03	3.8E-05	8.0E-03
			COBALT	--	--	1.2E-10	1.2E-10	COBALT	Thyroid	4.8E-03	--	5.2E-05	4.8E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	6.2E-04	--	3.8E-04	1.0E-03
			(Total)	1.0E-07	5.3E-08	2.3E-10	1.5E-07		(Total)	1.1E-02	2.8E-03	4.7E-04	1.4E-02
Total Risk Across Surface Soil							**1.5E-07**	**Total Hazard Index Across Surface Soil**					**1.4E-02**
Total Risk Across All Media and All Exposure Routes							**2E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.01**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 18
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU1

Location: Iona Island
Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	5.8E-07	9.4E-08	1.6E-08	6.9E-07	ARSENIC	Skin, Cardiovascular	9.1E-02	1.5E-02	1.7E-02	1.2E-01
			COBALT	--	--	1.8E-08	1.8E-08	COBALT	Thyroid	8.3E-02	--	2.3E-02	1.1E-01
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.1E-02	--	1.7E-01	1.8E-01
			(Total)	5.8E-07	9.4E-08	3.4E-08	7.1E-07		(Total)	1.8E-01	1.5E-02	2.1E-01	4.1E-01
Total Risk Across Surface Soil							**7.1E-07**	**Total Hazard Index Across Surface Soil**					**4.1E-01**
Total Risk Across All Media and All Exposure Routes							**7E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.4**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 19
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU1

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	4.0E-07	8.4E-08	2.1E-10	4.8E-07	ARSENIC	Skin, Cardiovascular	3.1E-03	6.5E-04	1.1E-05	3.8E-03
			COBALT	--	--	2.4E-10	2.4E-10	COBALT	Thyroid	2.8E-03	--	1.6E-05	2.9E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.7E-04	--	1.1E-04	4.8E-04
			(Total)	4.0E-07	8.4E-08	4.5E-10	4.8E-07		(Total)	6.3E-03	6.5E-04	1.4E-04	7.1E-03
Total Risk Across Surface Soil							**4.8E-07**	**Total Hazard Index Across Surface Soil**					**7.1E-03**
Total Risk Across All Media and All Exposure Routes							**5E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.007**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 20
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU1

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	5.6E-07	1.3E-07	1.0E-10	6.9E-07	ARSENIC	Skin, Cardiovascular	1.5E-02	3.4E-03	1.9E-05	1.8E-02
			COBALT	--	--	1.2E-10	1.2E-10	COBALT	Thyroid	1.3E-02	--	2.6E-05	1.3E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.7E-03	--	1.9E-04	1.9E-03
			(Total)	5.6E-07	1.3E-07	2.3E-10	6.9E-07		(Total)	3.0E-02	3.4E-03	2.4E-04	3.3E-02
Total Risk Across Surface Soil							**6.9E-07**	**Total Hazard Index Across Surface Soil**					**3.3E-02**
Total Risk Across All Media and All Exposure Routes							**7E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.03**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 21
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU1

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	8.0E-07	8.4E-08	4.2E-11	8.8E-07	ARSENIC	Skin, Cardiovascular	3.1E-02	3.3E-03	1.1E-05	3.4E-02
			COBALT	--	--	4.8E-11	4.8E-11	COBALT	Thyroid	2.8E-02	--	1.6E-05	2.8E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.7E-03	--	1.1E-04	3.8E-03
			(Total)	8.0E-07	8.4E-08	9.0E-11	8.8E-07		(Total)	6.3E-02	3.3E-03	1.4E-04	6.6E-02
Total Risk Across Surface Soil							**8.8E-07**	**Total Hazard Index Across Surface Soil**					**6.6E-02**
Total Risk Across All Media and All Exposure Routes							**9E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.07**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 22
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU1

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	8.7E-08	4.0E-08	3.2E-11	1.3E-07	ARSENIC	Skin, Cardiovascular	2.2E-03	1.0E-03	5.9E-06	3.3E-03
			COBALT	--	--	3.7E-11	3.7E-11	COBALT	Thyroid	2.1E-03	--	8.1E-06	2.1E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.7E-04	--	5.9E-05	3.3E-04
			(Total)	8.7E-08	4.0E-08	7.0E-11	1.3E-07		(Total)	4.6E-03	1.0E-03	7.3E-05	5.7E-03
Total Risk Across Surface Soil							**1.3E-07**	**Total Hazard Index Across Surface Soil**					**5.7E-03**
Total Risk Across All Media and All Exposure Routes							**1E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.006**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 23
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU1

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (5 to 18 yea

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	5.9E-07	1.2E-07	5.3E-10	7.1E-07	ARSENIC	Skin, Cardiovascular	7.1E-03	1.4E-03	4.4E-05	8.6E-03
			COBALT	--	--	6.1E-10	6.1E-10	COBALT	Thyroid	6.5E-03	--	6.0E-05	6.6E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	8.5E-04	--	4.4E-04	1.3E-03
			(Total)	5.9E-07	1.2E-07	1.1E-09	7.1E-07		(Total)	1.4E-02	1.4E-03	5.5E-04	1.6E-02
Total Risk Across Surface Soil							**7.1E-07**	**Total Hazard Index Across Surface Soil**					**1.6E-02**
Total Risk Across All Media and All Exposure Routes							**7E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 24
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU2

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU2	Ingestion	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	1.77E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.7E-06	4.96E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.7E-02
				COBALT	7.95E+00	(mg/kg)	1.56E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.36E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				MANGANESE	6.90E+02	(mg/kg)	1.35E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	3.78E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.7E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	4.76E+00	(mg/kg)	9.32E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	9.3E-08	2.61E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	5.59E+00	(mg/kg)	1.09E-06	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.1E-07	3.06E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	3.84E+00	(mg/kg)	7.51E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	7.5E-07	2.10E-06	(mg/kg-day)	3.0E-04	(mg/kg-day)	7.0E-03
				DIBENZ(A,H)ANTHRACENE	6.08E-01	(mg/kg)	1.19E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.2E-07	3.33E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.57E+00	(mg/kg)	5.03E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	5.0E-08	1.41E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.8E-06**					**4.1E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	3.75E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.6E-07	1.05E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.5E-03
				COBALT	7.95E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.90E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	4.76E+00	(mg/kg)	5.13E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	5.1E-08	1.44E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	5.59E+00	(mg/kg)	6.02E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	6.0E-08	1.69E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	3.84E+00	(mg/kg)	4.13E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.1E-07	1.16E-06	(mg/kg-day)	3.0E-04	(mg/kg-day)	3.9E-03
				DIBENZ(A,H)ANTHRACENE	6.08E-01	(mg/kg)	6.55E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	6.5E-08	1.83E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.57E+00	(mg/kg)	2.77E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.8E-08	7.75E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.2E-06**					**7.4E-03**
		Exposure Point Total									**5.0E-06**					**4.8E-02**
	Exposure Medium Total										**5.0E-06**					**4.8E-02**

TABLE 24
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU2

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Air	DU2	Inhalation	**Inorganics**												
				ARSENIC	1.25E-08	(mg/m^3)	6.51E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	2.8E-09	1.82E-09	(mg/m^3)	1.50E-05	(mg/m^3)	1.2E-04
				COBALT	6.57E-09	(mg/m^3)	3.43E-07	(ug/m^3)	9.00E-03	per (ug/m^3)	3.1E-09	9.60E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.6E-04
				MANGANESE	5.70E-07	(mg/m^3)	2.98E-05	(ug/m^3)	NA	per (ug/m^3)	--	8.33E-08	(mg/m^3)	5.00E-05	(mg/m^3)	1.7E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	3.93E-09	(mg/m^3)	2.05E-07	(ug/m^3)	6.00E-05	per (ug/m^3)	1.2E-11	5.75E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	4.62E-09	(mg/m^3)	2.41E-07	(ug/m^3)	6.00E-05	per (ug/m^3)	1.4E-11	6.75E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	3.17E-09	(mg/m^3)	1.66E-07	(ug/m^3)	6.00E-04	per (ug/m^3)	9.9E-11	4.64E-10	(mg/m^3)	2.00E-06	(mg/m^3)	2.3E-04
				DIBENZ(A,H)ANTHRACENE	5.02E-10	(mg/m^3)	2.62E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	1.6E-11	7.34E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	2.12E-09	(mg/m^3)	1.11E-07	(ug/m^3)	6.00E-05	per (ug/m^3)	6.7E-12	3.10E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**6.0E-09**					**2.2E-03**
		Exposure Point Total									**6.0E-09**					**2.2E-03**
	Exposure Medium Total										**6.0E-09**					**2.2E-03**
Soil Total											**5.0E-06**					**5.0E-02**
										Total of Receptor Risks Across All Media	**5.0E-06**				Total of Receptor Hazards Across All Media	**5.0E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 25
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU2

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU2	Ingestion	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	6.91E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.0E-07	1.61E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.4E-03
				COBALT	7.95E+00	(mg/kg)	6.07E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.42E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.7E-03
				MANGANESE	6.90E+02	(mg/kg)	5.27E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.23E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	8.8E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	4.76E+00	(mg/kg)	3.63E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.6E-09	8.48E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	5.59E+00	(mg/kg)	4.27E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.3E-09	9.95E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	3.84E+00	(mg/kg)	2.93E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.9E-08	6.84E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	2.3E-03
				DIBENZ(A,H)ANTHRACENE	6.08E-01	(mg/kg)	4.64E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.6E-09	1.08E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.57E+00	(mg/kg)	1.96E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.0E-09	4.58E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.5E-07**					**1.3E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	3.66E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.5E-08	8.54E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.8E-03
				COBALT	7.95E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.90E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	4.76E+00	(mg/kg)	5.00E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	5.0E-09	1.17E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	5.59E+00	(mg/kg)	5.87E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	5.9E-09	1.37E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	3.84E+00	(mg/kg)	4.03E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.0E-08	9.41E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	3.1E-03
				DIBENZ(A,H)ANTHRACENE	6.08E-01	(mg/kg)	6.38E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	6.4E-09	1.49E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.57E+00	(mg/kg)	2.70E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.7E-09	6.30E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.2E-07**					**6.0E-03**
		Exposure Point Total									**2.6E-07**					**1.9E-02**
	Exposure Medium Total										**2.6E-07**					**1.9E-02**

TABLE 25
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU2

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU2	Inhalation	**Inorganics**												
				ARSENIC	1.25E-08	(mg/m^3)	2.54E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.1E-10	5.93E-10	(mg/m^3)	1.50E-05	(mg/m^3)	4.0E-05
				COBALT	6.57E-09	(mg/m^3)	1.34E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.2E-10	3.12E-10	(mg/m^3)	6.00E-06	(mg/m^3)	5.2E-05
				MANGANESE	5.70E-07	(mg/m^3)	1.16E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.71E-08	(mg/m^3)	5.00E-05	(mg/m^3)	5.4E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	3.93E-09	(mg/m^3)	8.01E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	4.8E-13	1.87E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	4.62E-09	(mg/m^3)	9.40E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	5.6E-13	2.19E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	3.17E-09	(mg/m^3)	6.46E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	3.9E-12	1.51E-10	(mg/m^3)	2.00E-06	(mg/m^3)	7.5E-05
				DIBENZ(A,H)ANTHRACENE	5.02E-10	(mg/m^3)	1.02E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	6.1E-13	2.39E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	2.12E-09	(mg/m^3)	4.32E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.6E-13	1.01E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**2.4E-10**					**7.1E-04**
		Exposure Point Total									**2.4E-10**					**7.1E-04**
	Exposure Medium Total										**2.4E-10**					**7.1E-04**
Soil Total											**2.6E-07**					**2.0E-02**
										Total of Receptor Risks Across All Media	**2.6E-07**				Total of Receptor Hazards Across All Media	**2.0E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 26
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU2

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU2	Ingestion	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	4.02E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	6.0E-07	2.82E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.4E-02
				COBALT	7.95E+00	(mg/kg)	3.53E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.47E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.2E-02
				MANGANESE	6.90E+02	(mg/kg)	3.06E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.14E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.5E-02
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	4.76E+00	(mg/kg)	2.11E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.1E-08	1.48E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	5.59E+00	(mg/kg)	2.48E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.5E-08	1.74E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	3.84E+00	(mg/kg)	1.70E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.7E-07	1.19E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.0E-02
				DIBENZ(A,H)ANTHRACENE	6.08E-01	(mg/kg)	2.70E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.7E-08	1.89E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.57E+00	(mg/kg)	1.14E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.1E-08	7.99E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**8.6E-07**					**2.3E-01**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	6.45E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.7E-08	4.51E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				COBALT	7.95E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.90E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	4.76E+00	(mg/kg)	8.81E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	8.8E-09	6.17E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	5.59E+00	(mg/kg)	1.03E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.0E-08	7.24E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	3.84E+00	(mg/kg)	7.11E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	7.1E-08	4.97E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.7E-02
				DIBENZ(A,H)ANTHRACENE	6.08E-01	(mg/kg)	1.13E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.1E-08	7.88E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.57E+00	(mg/kg)	4.76E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.8E-09	3.33E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.0E-07**					**3.2E-02**
		Exposure Point Total									**1.1E-06**					**2.6E-01**
	Exposure Medium Total										**1.1E-06**					**2.6E-01**

TABLE 26
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU2

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Air	DU2	Inhalation	**Inorganics**												
				ARSENIC	7.33E-07	(mg/m^3)	3.78E-06	(ug/m^3)	4.3E-03	per (ug/m^3)	1.6E-08	2.65E-07	(mg/m^3)	1.50E-05	(mg/m^3)	1.8E-02
				COBALT	3.86E-07	(mg/m^3)	1.99E-06	(ug/m^3)	9.0E-03	per (ug/m^3)	1.8E-08	1.39E-07	(mg/m^3)	6.00E-06	(mg/m^3)	2.3E-02
				MANGANESE	3.35E-05	(mg/m^3)	1.73E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.21E-05	(mg/m^3)	5.00E-05	(mg/m^3)	2.4E-01
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.31E-07	(mg/m^3)	1.19E-06	(ug/m^3)	6.0E-05	per (ug/m^3)	7.2E-11	8.34E-08	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.71E-07	(mg/m^3)	1.40E-06	(ug/m^3)	6.0E-05	per (ug/m^3)	8.4E-11	9.80E-08	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.86E-07	(mg/m^3)	9.61E-07	(ug/m^3)	6.0E-04	per (ug/m^3)	5.8E-10	6.73E-08	(mg/m^3)	2.00E-06	(mg/m^3)	3.4E-02
				DIBENZ(A,H)ANTHRACENE	2.95E-08	(mg/m^3)	1.52E-07	(ug/m^3)	6.0E-04	per (ug/m^3)	9.1E-11	1.07E-08	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.25E-07	(mg/m^3)	6.43E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	3.9E-11	4.50E-08	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**3.5E-08**					**3.2E-01**
		Exposure Point Total									**3.5E-08**					**3.2E-01**
	Exposure Medium Total										**3.5E-08**					**3.2E-01**
Soil Total											**1.1E-06**					**5.8E-01**
										Total of Receptor Risks Across All Media	**1.1E-06**			Total of Receptor Hazards Across All Media		**5.8E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 27
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU2

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU2	Ingestion	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	2.75E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.1E-07	9.62E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.2E-03
				COBALT	7.95E+00	(mg/kg)	2.41E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	8.44E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.8E-03
				MANGANESE	6.90E+02	(mg/kg)	2.09E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	7.33E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	5.2E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	4.76E+00	(mg/kg)	1.44E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.4E-08	5.05E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	5.59E+00	(mg/kg)	1.70E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.7E-08	5.93E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	3.84E+00	(mg/kg)	1.16E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.2E-07	4.08E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.4E-03
				DIBENZ(A,H)ANTHRACENE	6.08E-01	(mg/kg)	1.84E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.8E-08	6.45E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.57E+00	(mg/kg)	7.80E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	7.8E-09	2.73E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**5.9E-07**					**7.9E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	5.80E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.7E-08	2.03E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.8E-04
				COBALT	7.95E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.90E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	4.76E+00	(mg/kg)	7.93E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	7.9E-09	2.77E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	5.59E+00	(mg/kg)	9.31E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	9.3E-09	3.26E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	3.84E+00	(mg/kg)	6.39E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	6.4E-08	2.24E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	7.5E-04
				DIBENZ(A,H)ANTHRACENE	6.08E-01	(mg/kg)	1.01E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.0E-08	3.54E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.57E+00	(mg/kg)	4.28E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.3E-09	1.50E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.8E-07**					**1.4E-03**
		Exposure Point Total									**7.7E-07**					**9.3E-03**
	Exposure Medium Total										**7.7E-07**					**9.3E-03**

TABLE 27
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU2

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU2	Inhalation	**Inorganics**												
				ARSENIC	1.25E-08	(mg/m^3)	5.05E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	2.2E-10	1.77E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.2E-05
				COBALT	6.57E-09	(mg/m^3)	2.66E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	2.4E-10	9.30E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.6E-05
				MANGANESE	5.70E-07	(mg/m^3)	2.31E-06	(ug/m^3)	NA	per (ug/m^3)	--	8.07E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.6E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	3.93E-09	(mg/m^3)	1.59E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	9.5E-13	5.57E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	4.62E-09	(mg/m^3)	1.87E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	1.1E-12	6.54E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	3.17E-09	(mg/m^3)	1.28E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	7.7E-12	4.49E-11	(mg/m^3)	2.00E-06	(mg/m^3)	2.2E-05
				DIBENZ(A,H)ANTHRACENE	5.02E-10	(mg/m^3)	2.03E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	1.2E-12	7.11E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	2.12E-09	(mg/m^3)	8.59E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	5.2E-13	3.01E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**4.7E-10**					**2.1E-04**
		Exposure Point Total									**4.7E-10**					**2.1E-04**
	Exposure Medium Total										**4.7E-10**					**2.1E-04**
Soil Total											**7.7E-07**					**9.5E-03**
										Total of Receptor Risks Across All Media	**7.7E-07**				Total of Receptor Hazards Across All Media	**9.5E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 28
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU2

Scenario Timeframe: Current/Future
Receptor Population: Recreator (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU2	Ingestion	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	3.87E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.8E-07	4.52E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				COBALT	7.95E+00	(mg/kg)	3.40E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	3.96E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-02
				MANGANESE	6.90E+02	(mg/kg)	2.95E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.44E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.5E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	4.76E+00	(mg/kg)	6.10E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	6.1E-08	2.37E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	5.59E+00	(mg/kg)	7.16E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	7.2E-08	2.79E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	3.84E+00	(mg/kg)	4.92E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	4.9E-07	1.91E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.4E-03
				DIBENZ(A,H)ANTHRACENE	6.08E-01	(mg/kg)	7.79E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	7.8E-08	3.03E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.57E+00	(mg/kg)	3.29E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.3E-08	1.28E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.3E-06**					**3.7E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	8.99E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.3E-07	1.05E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.5E-03
				COBALT	7.95E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.90E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	4.76E+00	(mg/kg)	3.68E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.7E-08	1.43E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	5.59E+00	(mg/kg)	4.33E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	4.3E-08	1.68E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	3.84E+00	(mg/kg)	2.97E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	3.0E-07	1.16E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.9E-03
				DIBENZ(A,H)ANTHRACENE	6.08E-01	(mg/kg)	4.71E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	4.7E-08	1.83E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.57E+00	(mg/kg)	1.99E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.0E-08	7.74E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**5.8E-07**					**7.3E-03**
		Exposure Point Total									**1.9E-06**					**4.4E-02**
	Exposure Medium Total										**1.9E-06**					**4.4E-02**

TABLE 28
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU2

Scenario Timeframe: Current/Future
Receptor Population: Recreator (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU2	Inhalation	**Inorganics**												
				ARSENIC	1.25E-08	(mg/m^3)	2.52E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.1E-10	2.94E-10	(mg/m^3)	1.50E-05	(mg/m^3)	2.0E-05
				COBALT	6.57E-09	(mg/m^3)	1.33E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.2E-10	1.55E-10	(mg/m^3)	6.00E-06	(mg/m^3)	2.6E-05
				MANGANESE	5.70E-07	(mg/m^3)	1.15E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.35E-08	(mg/m^3)	5.00E-05	(mg/m^3)	2.7E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	3.93E-09	(mg/m^3)	2.39E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	1.4E-12	9.28E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	4.62E-09	(mg/m^3)	2.80E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	1.7E-12	1.09E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	3.17E-09	(mg/m^3)	1.93E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	1.2E-11	7.49E-11	(mg/m^3)	2.00E-06	(mg/m^3)	3.7E-05
				DIBENZ(A,H)ANTHRACENE	5.02E-10	(mg/m^3)	3.05E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	1.8E-12	1.19E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	2.12E-09	(mg/m^3)	1.29E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	7.7E-13	5.01E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**2.5E-10**					**3.5E-04**
		Exposure Point Total									**2.5E-10**					**3.5E-04**
	Exposure Medium Total										**2.5E-10**					**3.5E-04**
Soil Total											**1.9E-06**					**4.5E-02**
										Total of Receptor Risks Across All Media	**1.9E-06**				Total of Receptor Hazards Across All Media	**4.5E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 29
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU2

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU2	Ingestion	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	5.50E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.2E-07	9.62E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.2E-02
				COBALT	7.95E+00	(mg/kg)	4.82E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	8.44E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.8E-02
				MANGANESE	6.90E+02	(mg/kg)	4.19E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	7.33E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	5.2E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	4.76E+00	(mg/kg)	8.66E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	8.7E-08	5.05E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	5.59E+00	(mg/kg)	1.02E-06	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.0E-07	5.93E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	3.84E+00	(mg/kg)	6.99E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	7.0E-07	4.08E-06	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.4E-02
				DIBENZ(A,H)ANTHRACENE	6.08E-01	(mg/kg)	1.11E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.1E-07	6.45E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.57E+00	(mg/kg)	4.68E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.7E-08	2.73E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.9E-06**					**7.9E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	5.79E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.7E-08	1.01E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.4E-03
				COBALT	7.95E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.90E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	4.76E+00	(mg/kg)	2.37E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.4E-08	1.38E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	5.59E+00	(mg/kg)	2.79E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.8E-08	1.63E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	3.84E+00	(mg/kg)	1.91E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.9E-07	1.12E-06	(mg/kg-day)	3.0E-04	(mg/kg-day)	3.7E-03
				DIBENZ(A,H)ANTHRACENE	6.08E-01	(mg/kg)	3.03E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.0E-08	1.77E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.57E+00	(mg/kg)	1.28E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.3E-08	7.47E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.7E-07**					**7.1E-03**
		Exposure Point Total									**2.2E-06**					**8.6E-02**
	Exposure Medium Total										**2.2E-06**					**8.6E-02**

TABLE 29
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU2

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU2	Inhalation	**Inorganics**												
				ARSENIC	1.25E-08	(mg/m^3)	1.01E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	4.3E-11	1.77E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.2E-05
				COBALT	6.57E-09	(mg/m^3)	5.31E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	4.8E-11	9.30E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.6E-05
				MANGANESE	5.70E-07	(mg/m^3)	4.61E-07	(ug/m^3)	NA	per (ug/m^3)	--	8.07E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.6E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	3.93E-09	(mg/m^3)	9.55E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	5.7E-13	5.57E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	4.62E-09	(mg/m^3)	1.12E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	6.7E-13	6.54E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	3.17E-09	(mg/m^3)	7.70E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	4.6E-12	4.49E-11	(mg/m^3)	2.00E-06	(mg/m^3)	2.2E-05
				DIBENZ(A,H)ANTHRACENE	5.02E-10	(mg/m^3)	1.22E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	7.3E-13	7.11E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	2.12E-09	(mg/m^3)	5.15E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	3.1E-13	3.01E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**9.8E-11**					**2.1E-04**
		Exposure Point Total									**9.8E-11**					**2.1E-04**
	Exposure Medium Total										**9.8E-11**					**2.1E-04**
Soil Total											**2.2E-06**					**8.6E-02**
										Total of Receptor Risks Across All Media	**2.2E-06**				Total of Receptor Hazards Across All Media	**8.6E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 30
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU2

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU2	Ingestion	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	5.97E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.0E-08	6.97E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.3E-03
				COBALT	7.95E+00	(mg/kg)	5.24E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	6.11E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.0E-03
				MANGANESE	6.90E+02	(mg/kg)	4.55E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	5.31E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.8E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	4.76E+00	(mg/kg)	9.41E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	9.4E-09	3.66E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	5.59E+00	(mg/kg)	1.11E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.1E-08	4.30E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	3.84E+00	(mg/kg)	7.59E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	7.6E-08	2.95E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.8E-04
				DIBENZ(A,H)ANTHRACENE	6.08E-01	(mg/kg)	1.20E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.2E-08	4.68E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.57E+00	(mg/kg)	5.08E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	5.1E-09	1.98E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.0E-07**					**5.7E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	2.77E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.2E-08	3.24E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.1E-03
				COBALT	7.95E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.90E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	4.76E+00	(mg/kg)	1.14E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.1E-08	4.42E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	5.59E+00	(mg/kg)	1.34E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.3E-08	5.19E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	3.84E+00	(mg/kg)	9.17E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	9.2E-08	3.57E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.2E-03
				DIBENZ(A,H)ANTHRACENE	6.08E-01	(mg/kg)	1.45E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.5E-08	5.65E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.57E+00	(mg/kg)	6.14E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	6.1E-09	2.39E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.8E-07**					**2.3E-03**
		Exposure Point Total									**3.8E-07**					**8.0E-03**
	Exposure Medium Total										**3.8E-07**					**8.0E-03**

TABLE 30
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU2

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Air	DU2	Inhalation	**Inorganics**												
				ARSENIC	1.25E-08	(mg/m^3)	7.81E-09	(ug/m^3)	4.30E-03	per (ug/m^3)	3.4E-11	9.12E-11	(mg/m^3)	1.50E-05	(mg/m^3)	6.1E-06
				COBALT	6.57E-09	(mg/m^3)	4.11E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	3.7E-11	4.80E-11	(mg/m^3)	6.00E-06	(mg/m^3)	8.0E-06
				MANGANESE	5.70E-07	(mg/m^3)	3.57E-07	(ug/m^3)	NA	per (ug/m^3)	--	4.17E-09	(mg/m^3)	5.00E-05	(mg/m^3)	8.3E-05
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	3.93E-09	(mg/m^3)	7.39E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	4.4E-13	2.87E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	4.62E-09	(mg/m^3)	8.68E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	5.2E-13	3.38E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	3.17E-09	(mg/m^3)	5.96E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	3.6E-12	2.32E-11	(mg/m^3)	2.00E-06	(mg/m^3)	1.2E-05
				DIBENZ(A,H)ANTHRACENE	5.02E-10	(mg/m^3)	9.44E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	5.7E-13	3.67E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	2.12E-09	(mg/m^3)	3.99E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.4E-13	1.55E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**7.6E-11**					**1.1E-04**
		Exposure Point Total									**7.6E-11**					**1.1E-04**
	Exposure Medium Total										**7.6E-11**					**1.1E-04**
Soil Total											**3.8E-07**					**8.1E-03**
										Total of Receptor Risks Across All Media	**3.8E-07**				Total of Receptor Hazards Across All Media	**8.1E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 31
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU2

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU2	Ingestion	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	4.10E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	6.1E-07	2.21E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.4E-03
				COBALT	7.95E+00	(mg/kg)	3.60E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.94E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.5E-03
				MANGANESE	6.90E+02	(mg/kg)	3.12E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.68E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.2E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	4.76E+00	(mg/kg)	6.46E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	6.5E-08	1.16E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	5.59E+00	(mg/kg)	7.58E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	7.6E-08	1.36E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	3.84E+00	(mg/kg)	5.21E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	5.2E-07	9.35E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.1E-03
				DIBENZ(A,H)ANTHRACENE	6.08E-01	(mg/kg)	8.25E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	8.2E-08	1.48E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.57E+00	(mg/kg)	3.49E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.5E-08	6.26E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.4E-06**					**1.8E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	8.09E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.2E-07	4.35E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-03
				COBALT	7.95E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.90E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	4.76E+00	(mg/kg)	3.31E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.3E-08	5.95E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	5.59E+00	(mg/kg)	3.89E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.9E-08	6.99E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	3.84E+00	(mg/kg)	2.67E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.7E-07	4.80E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.6E-03
				DIBENZ(A,H)ANTHRACENE	6.08E-01	(mg/kg)	4.23E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	4.2E-08	7.60E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.57E+00	(mg/kg)	1.79E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.8E-08	3.21E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**5.2E-07**					**3.1E-03**
		Exposure Point Total									**1.9E-06**					**2.1E-02**
	Exposure Medium Total										**1.9E-06**					**2.1E-02**

TABLE 31
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU2

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU2	Inhalation	**Inorganics**												
				ARSENIC	1.25E-08	(mg/m^3)	1.27E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	5.5E-10	6.84E-10	(mg/m^3)	1.50E-05	(mg/m^3)	4.6E-05
				COBALT	6.57E-09	(mg/m^3)	6.69E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	6.0E-10	3.60E-10	(mg/m^3)	6.00E-06	(mg/m^3)	6.0E-05
				MANGANESE	5.70E-07	(mg/m^3)	5.80E-06	(ug/m^3)	NA	per (ug/m^3)	--	3.12E-08	(mg/m^3)	5.00E-05	(mg/m^3)	6.2E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	3.93E-09	(mg/m^3)	1.20E-07	(ug/m^3)	6.00E-05	per (ug/m^3)	7.2E-12	2.16E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	4.62E-09	(mg/m^3)	1.41E-07	(ug/m^3)	6.00E-05	per (ug/m^3)	8.5E-12	2.53E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	3.17E-09	(mg/m^3)	9.69E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	5.8E-11	1.74E-10	(mg/m^3)	2.00E-06	(mg/m^3)	8.7E-05
				DIBENZ(A,H)ANTHRACENE	5.02E-10	(mg/m^3)	1.53E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	9.2E-12	2.75E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	2.12E-09	(mg/m^3)	6.48E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	3.9E-12	1.16E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.2E-09**					**8.2E-04**
		Exposure Point Total									**1.2E-09**					**8.2E-04**
	Exposure Medium Total										**1.2E-09**					**8.2E-04**
Soil Total											**1.9E-06**					**2.2E-02**
										Total of Receptor Risks Across All Media	**1.9E-06**				Total of Receptor Hazards Across All Media	**2.2E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 32
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU2

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	2.7E-06	5.6E-07	2.8E-09	3.2E-06	ARSENIC	Skin, Cardiovascular	1.7E-02	3.5E-03	1.2E-04	2.0E-02
			COBALT	--	--	3.1E-09	3.1E-09	COBALT	Thyroid	1.5E-02	--	1.6E-04	1.5E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.7E-03	--	1.7E-03	4.4E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	9.3E-08	5.1E-08	1.2E-11	1.4E-07	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.1E-07	6.0E-08	1.4E-11	1.7E-07	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	7.5E-07	4.1E-07	9.9E-11	1.2E-06	BENZO(A)PYRENE	Developmental System	7.0E-03	3.9E-03	2.3E-04	1.1E-02
			DIBENZ(A,H)ANTHRACENE	1.2E-07	6.5E-08	1.6E-11	1.8E-07	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	5.0E-08	2.8E-08	6.7E-12	7.8E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	3.8E-06	1.2E-06	6.0E-09	5.0E-06		(Total)	4.1E-02	7.4E-03	2.2E-03	5.0E-02
Total Risk Across Surface Soil							**5.0E-06**	**Total Hazard Index Across Surface Soil**					**5.0E-02**
Total Risk Across All Media and All Exposure Routes							**5E-06**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.05**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 33
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU2

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	1.0E-07	5.5E-08	1.1E-10	1.6E-07	ARSENIC	Skin, Cardiovascular	5.4E-03	2.8E-03	4.0E-05	8.3E-03
			COBALT	--	--	1.2E-10	1.2E-10	COBALT	Thyroid	4.7E-03	--	5.2E-05	4.8E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	8.8E-04	--	5.4E-04	1.4E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	3.6E-09	5.0E-09	4.8E-13	8.6E-09	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	4.3E-09	5.9E-09	5.6E-13	1.0E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	2.9E-08	4.0E-08	3.9E-12	7.0E-08	BENZO(A)PYRENE	Developmental System	2.3E-03	3.1E-03	7.5E-05	5.5E-03
			DIBENZ(A,H)ANTHRACENE	4.6E-09	6.4E-09	6.1E-13	1.1E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.0E-09	2.7E-09	2.6E-13	4.7E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	1.5E-07	1.2E-07	2.4E-10	2.6E-07		(Total)	1.3E-02	6.0E-03	7.1E-04	2.0E-02
							Total Risk Across Surface Soil	**2.6E-07**					**Total Hazard Index Across Surface Soil**	**2.0E-02**
							Total Risk Across All Media and All Exposure Routes	**3E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 34
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU2

Location: Iona Island
Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	6.0E-07	9.7E-08	1.6E-08	7.2E-07	ARSENIC	Skin, Cardiovascular	9.4E-02	1.5E-02	1.8E-02	1.3E-01
			COBALT	--	--	1.8E-08	1.8E-08	COBALT	Thyroid	8.2E-02	--	2.3E-02	1.1E-01
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.5E-02	--	2.4E-01	2.6E-01
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	2.1E-08	8.8E-09	7.2E-11	3.0E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	2.5E-08	1.0E-08	8.4E-11	3.5E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.7E-07	7.1E-08	5.8E-10	2.4E-07	BENZO(A)PYRENE	Developmental System	4.0E-02	1.7E-02	3.4E-02	9.0E-02
			DIBENZ(A,H)ANTHRACENE	2.7E-08	1.1E-08	9.1E-11	3.8E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	1.1E-08	4.8E-09	3.9E-11	1.6E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	8.6E-07	2.0E-07	3.5E-08	1.1E-06		(Total)	2.3E-01	3.2E-02	3.2E-01	5.8E-01
						Total Risk Across Surface Soil	**1.1E-06**					**Total Hazard Index Across Surface Soil**	**5.8E-01**
						Total Risk Across All Media and All Exposure Routes	**1E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.6**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 35
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU2

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	4.1E-07	8.7E-08	2.2E-10	5.0E-07	ARSENIC	Skin, Cardiovascular	3.2E-03	6.8E-04	1.2E-05	3.9E-03
			COBALT	--	--	2.4E-10	2.4E-10	COBALT	Thyroid	2.8E-03	--	1.6E-05	2.8E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	5.2E-04	--	1.6E-04	6.8E-04
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	1.4E-08	7.9E-09	9.5E-13	2.2E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.7E-08	9.3E-09	1.1E-12	2.6E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.2E-07	6.4E-08	7.7E-12	1.8E-07	BENZO(A)PYRENE	Developmental System	1.4E-03	7.5E-04	2.2E-05	2.1E-03
			DIBENZ(A,H)ANTHRACENE	1.8E-08	1.0E-08	1.2E-12	2.9E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	7.8E-09	4.3E-09	5.2E-13	1.2E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	5.9E-07	1.8E-07	4.7E-10	7.7E-07		(Total)	7.9E-03	1.4E-03	2.1E-04	9.5E-03
							Total Risk Across Surface Soil	**7.7E-07**					**Total Hazard Index Across Surface Soil**	**9.5E-03**
							Total Risk Across All Media and All Exposure Routes	**8E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.01**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 36
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU2

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	5.8E-07	1.3E-07	1.1E-10	7.2E-07	ARSENIC	Skin, Cardiovascular	1.5E-02	3.5E-03	2.0E-05	1.9E-02
			COBALT	--	--	1.2E-10	1.2E-10	COBALT	Thyroid	1.3E-02	--	2.6E-05	1.3E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.5E-03	--	2.7E-04	2.7E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	6.1E-08	3.7E-08	1.4E-12	9.8E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	7.2E-08	4.3E-08	1.7E-12	1.1E-07	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	4.9E-07	3.0E-07	1.2E-11	7.9E-07	BENZO(A)PYRENE	Developmental System	6.4E-03	3.9E-03	3.7E-05	1.0E-02
			DIBENZ(A,H)ANTHRACENE	7.8E-08	4.7E-08	1.8E-12	1.2E-07	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	3.3E-08	2.0E-08	7.7E-13	5.3E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	1.3E-06	5.8E-07	2.5E-10	1.9E-06		(Total)	3.7E-02	7.3E-03	3.5E-04	4.5E-02
							Total Risk Across Surface Soil	**1.9E-06**					**Total Hazard Index Across Surface Soil**	**4.5E-02**
							Total Risk Across All Media and All Exposure Routes	**2E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.04**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 37
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU2

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	8.2E-07	8.7E-08	4.3E-11	9.1E-07	ARSENIC	Skin, Cardiovascular	3.2E-02	3.4E-03	1.2E-05	3.5E-02
			COBALT	--	--	4.8E-11	4.8E-11	COBALT	Thyroid	2.8E-02	--	1.6E-05	2.8E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	5.2E-03	--	1.6E-04	5.4E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	8.7E-08	2.4E-08	5.7E-13	1.1E-07	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.0E-07	2.8E-08	6.7E-13	1.3E-07	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	7.0E-07	1.9E-07	4.6E-12	8.9E-07	BENZO(A)PYRENE	Developmental System	1.4E-02	3.7E-03	2.2E-05	1.7E-02
			DIBENZ(A,H)ANTHRACENE	1.1E-07	3.0E-08	7.3E-13	1.4E-07	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	4.7E-08	1.3E-08	3.1E-13	6.0E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	1.9E-06	3.7E-07	9.8E-11	2.2E-06		(Total)	7.9E-02	7.1E-03	2.1E-04	8.6E-02
							Total Risk Across Surface Soil	**2.2E-06**					**Total Hazard Index Across Surface Soil**	**8.6E-02**
							Total Risk Across All Media and All Exposure Routes	**2E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.09**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 38
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU2

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	9.0E-08	4.2E-08	3.4E-11	1.3E-07	ARSENIC	Skin, Cardiovascular	2.3E-03	1.1E-03	6.1E-06	3.4E-03
			COBALT	--	--	3.7E-11	3.7E-11	COBALT	Thyroid	2.0E-03	--	8.0E-06	2.0E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.8E-04	--	8.3E-05	4.6E-04
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	9.4E-09	1.1E-08	4.4E-13	2.1E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.1E-08	1.3E-08	5.2E-13	2.4E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	7.6E-08	9.2E-08	3.6E-12	1.7E-07	BENZO(A)PYRENE	Developmental System	9.8E-04	1.2E-03	1.2E-05	2.2E-03
			DIBENZ(A,H)ANTHRACENE	1.2E-08	1.5E-08	5.7E-13	2.7E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	5.1E-09	6.1E-09	2.4E-13	1.1E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	2.0E-07	1.8E-07	7.6E-11	3.8E-07		(Total)	5.7E-03	2.3E-03	1.1E-04	8.1E-03
							Total Risk Across Surface Soil	**3.8E-07**					**Total Hazard Index Across Surface Soil**	**8.1E-03**
							Total Risk Across All Media and All Exposure Routes	**4E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.008**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 39
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU2

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	6.1E-07	1.2E-07	5.5E-10	7.4E-07	ARSENIC	Skin, Cardiovascular	7.4E-03	1.5E-03	4.6E-05	8.9E-03
			COBALT	--	--	6.0E-10	6.0E-10	COBALT	Thyroid	6.5E-03	--	6.0E-05	6.5E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.2E-03	--	6.2E-04	1.8E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	6.5E-08	3.3E-08	7.2E-12	9.8E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	7.6E-08	3.9E-08	8.5E-12	1.1E-07	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	5.2E-07	2.7E-07	5.8E-11	7.9E-07	BENZO(A)PYRENE	Developmental System	3.1E-03	1.6E-03	8.7E-05	4.8E-03
			DIBENZ(A,H)ANTHRACENE	8.2E-08	4.2E-08	9.2E-12	1.2E-07	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	3.5E-08	1.8E-08	3.9E-12	5.3E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	1.4E-06	5.2E-07	1.2E-09	1.9E-06		(Total)	1.8E-02	3.1E-03	8.2E-04	2.2E-02
							Total Risk Across Surface Soil	**1.9E-06**					**Total Hazard Index Across Surface Soil**	**2.2E-02**
							Total Risk Across All Media and All Exposure Routes	**2E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 40
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU3

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU3	Ingestion	**Inorganics**												
				ARSENIC	1.72E+01	(mg/kg)	2.02E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.0E-06	5.65E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.9E-02
				COBALT	8.52E+00	(mg/kg)	1.67E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.67E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.6E-02
				MANGANESE	7.40E+02	(mg/kg)	1.45E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	4.05E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.9E-03
			Exp. Route Total								**3.0E-06**					**3.7E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.72E+01	(mg/kg)	4.27E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	6.4E-07	1.20E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.0E-03
				COBALT	8.52E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	7.40E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**6.4E-07**					**4.0E-03**
		Exposure Point Total									**3.7E-06**					**4.1E-02**
	Exposure Medium Total										**3.7E-06**					**4.1E-02**
	Air	DU3	Inhalation	**Inorganics**												
				ARSENIC	1.42E-08	(mg/m^3)	7.42E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	3.2E-09	2.08E-09	(mg/m^3)	1.50E-05	(mg/m^3)	1.4E-04
				COBALT	7.04E-09	(mg/m^3)	3.67E-07	(ug/m^3)	9.00E-03	per (ug/m^3)	3.3E-09	1.03E-09	(mg/m^3)	6.00E-06	(mg/m^3)	1.7E-04
				MANGANESE	6.12E-07	(mg/m^3)	3.19E-05	(ug/m^3)	NA	per (ug/m^3)	--	8.94E-08	(mg/m^3)	5.00E-05	(mg/m^3)	1.8E-03
			Exp. Route Total								**6.5E-09**					**2.1E-03**
		Exposure Point Total									**6.5E-09**					**2.1E-03**
	Exposure Medium Total										**6.5E-09**					**2.1E-03**
Soil Total											**3.7E-06**					**4.3E-02**
										Total of Receptor Risks Across All Media	**3.7E-06**				Total of Receptor Hazards Across All Media	**4.3E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 41
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU3

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU3	Ingestion	**Inorganics**												
				ARSENIC	1.72E+01	(mg/kg)	7.88E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.2E-07	1.84E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.1E-03
				COBALT	8.52E+00	(mg/kg)	6.50E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.52E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.1E-03
				MANGANESE	7.40E+02	(mg/kg)	5.65E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.32E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	9.4E-04
			Exp. Route Total								**1.2E-07**					**1.2E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.72E+01	(mg/kg)	4.17E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	6.3E-08	9.72E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.2E-03
				COBALT	8.52E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	7.40E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**6.3E-08**					**3.2E-03**
		Exposure Point Total									**1.8E-07**					**1.5E-02**
	Exposure Medium Total										**1.8E-07**					**1.5E-02**
	Air	DU3	Inhalation	**Inorganics**												
				ARSENIC	1.42E-08	(mg/m^3)	2.89E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.2E-10	6.75E-10	(mg/m^3)	1.50E-05	(mg/m^3)	4.5E-05
				COBALT	7.04E-09	(mg/m^3)	1.43E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.3E-10	3.34E-10	(mg/m^3)	6.00E-06	(mg/m^3)	5.6E-05
				MANGANESE	6.12E-07	(mg/m^3)	1.24E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.90E-08	(mg/m^3)	5.00E-05	(mg/m^3)	5.8E-04
			Exp. Route Total								**2.5E-10**					**6.8E-04**
		Exposure Point Total									**2.5E-10**					**6.8E-04**
	Exposure Medium Total										**2.5E-10**					**6.8E-04**
Soil Total											**1.8E-07**					**1.6E-02**
										Total of Receptor Risks Across All Media	**1.8E-07**				Total of Receptor Hazards Across All Media	**1.6E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 42
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU3

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU3	Ingestion	**Inorganics**												
				ARSENIC	1.72E+01	(mg/kg)	4.58E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	6.9E-07	3.21E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.1E-01
				COBALT	8.52E+00	(mg/kg)	3.78E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.65E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.8E-02
				MANGANESE	7.40E+02	(mg/kg)	3.29E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.30E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.6E-02
			Exp. Route Total								**6.9E-07**					**2.1E-01**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.72E+01	(mg/kg)	7.35E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.1E-07	5.14E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.7E-02
				COBALT	8.52E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	7.40E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**1.1E-07**					**1.7E-02**
		Exposure Point Total									**8.0E-07**					**2.3E-01**
	Exposure Medium Total										**8.0E-07**					**2.3E-01**
	Air	DU3	Inhalation	**Inorganics**												
				ARSENIC	8.35E-07	(mg/m^3)	4.31E-06	(ug/m^3)	4.3E-03	per (ug/m^3)	1.9E-08	3.01E-07	(mg/m^3)	1.50E-05	(mg/m^3)	2.0E-02
				COBALT	4.14E-07	(mg/m^3)	2.13E-06	(ug/m^3)	9.0E-03	per (ug/m^3)	1.9E-08	1.49E-07	(mg/m^3)	6.00E-06	(mg/m^3)	2.5E-02
				MANGANESE	3.59E-05	(mg/m^3)	1.85E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.30E-05	(mg/m^3)	5.00E-05	(mg/m^3)	2.6E-01
			Exp. Route Total								**3.8E-08**					**3.0E-01**
		Exposure Point Total									**3.8E-08**					**3.0E-01**
	Exposure Medium Total										**3.8E-08**					**3.0E-01**
Soil Total											**8.4E-07**					**5.3E-01**
										Total of Receptor Risks Across All Media	**8.4E-07**			Total of Receptor Hazards Across All Media		**5.3E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 43
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU3

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU3	Ingestion	**Inorganics**												
				ARSENIC	1.72E+01	(mg/kg)	3.13E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.7E-07	1.10E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.7E-03
				COBALT	8.52E+00	(mg/kg)	2.58E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	9.05E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.0E-03
				MANGANESE	7.40E+02	(mg/kg)	2.24E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	7.86E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	5.6E-04
			Exp. Route Total								**4.7E-07**					**7.2E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.72E+01	(mg/kg)	6.61E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.9E-08	2.31E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.7E-04
				COBALT	8.52E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	7.40E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**9.9E-08**					**7.7E-04**
		Exposure Point Total									**5.7E-07**					**8.0E-03**
	Exposure Medium Total										**5.7E-07**					**8.0E-03**
	Air	DU3	Inhalation	**Inorganics**												
				ARSENIC	1.42E-08	(mg/m^3)	5.75E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	2.5E-10	2.01E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.3E-05
				COBALT	7.04E-09	(mg/m^3)	2.85E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	2.6E-10	9.97E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.7E-05
				MANGANESE	6.12E-07	(mg/m^3)	2.47E-06	(ug/m^3)	NA	per (ug/m^3)	--	8.66E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.7E-04
			Exp. Route Total								**5.0E-10**					**2.0E-04**
		Exposure Point Total									**5.0E-10**					**2.0E-04**
	Exposure Medium Total										**5.0E-10**					**2.0E-04**
Soil Total											**5.7E-07**					**8.2E-03**
										Total of Receptor Risks Across All Media	**5.7E-07**				Total of Receptor Hazards Across All Media	**8.2E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 44
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU3

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU3	Ingestion	**Inorganics**												
				ARSENIC	1.72E+01	(mg/kg)	4.41E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	6.6E-07	5.14E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.7E-02
				COBALT	8.52E+00	(mg/kg)	3.64E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	4.25E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-02
				MANGANESE	7.40E+02	(mg/kg)	3.16E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.69E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.6E-03
			Exp. Route Total								**6.6E-07**					**3.4E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.72E+01	(mg/kg)	1.02E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.5E-07	1.19E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.0E-03
				COBALT	8.52E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	7.40E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**1.5E-07**					**4.0E-03**
		Exposure Point Total									**8.1E-07**					**3.8E-02**
	Exposure Medium Total										**8.1E-07**					**3.8E-02**
	Air	DU3	Inhalation	**Inorganics**												
				ARSENIC	1.42E-08	(mg/m^3)	2.87E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.2E-10	3.35E-10	(mg/m^3)	1.50E-05	(mg/m^3)	2.2E-05
				COBALT	7.04E-09	(mg/m^3)	1.42E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.3E-10	1.66E-10	(mg/m^3)	6.00E-06	(mg/m^3)	2.8E-05
				MANGANESE	6.12E-07	(mg/m^3)	1.24E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.44E-08	(mg/m^3)	5.00E-05	(mg/m^3)	2.9E-04
			Exp. Route Total								**2.5E-10**					**3.4E-04**
		Exposure Point Total									**2.5E-10**					**3.4E-04**
	Exposure Medium Total										**2.5E-10**					**3.4E-04**
Soil Total											**8.2E-07**					**3.8E-02**
										Total of Receptor Risks Across All Media	**8.2E-07**				Total of Receptor Hazards Across All Media	**3.8E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 45
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU3

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU3	Ingestion	**Inorganics**												
				ARSENIC	1.72E+01	(mg/kg)	6.26E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.4E-07	1.10E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.7E-02
				COBALT	8.52E+00	(mg/kg)	5.17E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	9.05E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.0E-02
				MANGANESE	7.40E+02	(mg/kg)	4.49E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	7.86E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	5.6E-03
			Exp. Route Total								**9.4E-07**					**7.2E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.72E+01	(mg/kg)	6.60E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.9E-08	1.15E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.8E-03
				COBALT	8.52E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	7.40E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**9.9E-08**					**3.8E-03**
		Exposure Point Total									**1.0E-06**					**7.6E-02**
	Exposure Medium Total										**1.0E-06**					**7.6E-02**
	Air	DU3	Inhalation	**Inorganics**												
				ARSENIC	1.42E-08	(mg/m^3)	1.15E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	4.9E-11	2.01E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.3E-05
				COBALT	7.04E-09	(mg/m^3)	5.70E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	5.1E-11	9.97E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.7E-05
				MANGANESE	6.12E-07	(mg/m^3)	4.95E-07	(ug/m^3)	NA	per (ug/m^3)	--	8.66E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.7E-04
			Exp. Route Total								**1.0E-10**					**2.0E-04**
		Exposure Point Total									**1.0E-10**					**2.0E-04**
	Exposure Medium Total										**1.0E-10**					**2.0E-04**
Soil Total											**1.0E-06**					**7.6E-02**
										Total of Receptor Risks Across All Media	**1.0E-06**			Total of Receptor Hazards Across All Media		**7.6E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 46
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU3

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU3	Ingestion	**Inorganics**												
				ARSENIC	1.72E+01	(mg/kg)	6.80E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.0E-07	7.94E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.6E-03
				COBALT	8.52E+00	(mg/kg)	5.62E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	6.55E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.2E-03
				MANGANESE	7.40E+02	(mg/kg)	4.88E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	5.69E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.1E-04
			Exp. Route Total								**1.0E-07**					**5.2E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.72E+01	(mg/kg)	3.16E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.7E-08	3.69E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.2E-03
				COBALT	8.52E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	7.40E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**4.7E-08**					**1.2E-03**
		Exposure Point Total									**1.5E-07**					**6.5E-03**
	Exposure Medium Total										**1.5E-07**					**6.5E-03**
	Air	DU3	Inhalation	**Inorganics**												
				ARSENIC	1.42E-08	(mg/m^3)	8.90E-09	(ug/m^3)	4.30E-03	per (ug/m^3)	3.8E-11	1.04E-10	(mg/m^3)	1.50E-05	(mg/m^3)	6.9E-06
				COBALT	7.04E-09	(mg/m^3)	4.41E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	4.0E-11	5.14E-11	(mg/m^3)	6.00E-06	(mg/m^3)	8.6E-06
				MANGANESE	6.12E-07	(mg/m^3)	3.83E-07	(ug/m^3)	NA	per (ug/m^3)	--	4.47E-09	(mg/m^3)	5.00E-05	(mg/m^3)	8.9E-05
			Exp. Route Total								**7.8E-11**					**1.0E-04**
		Exposure Point Total									**7.8E-11**					**1.0E-04**
	Exposure Medium Total										**7.8E-11**					**1.0E-04**
Soil Total											**1.5E-07**					**6.6E-03**
										Total of Receptor Risks Across All Media	**1.5E-07**				Total of Receptor Hazards Across All Media	**6.6E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 47
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU3

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU3	Ingestion	**Inorganics**												
				ARSENIC	1.72E+01	(mg/kg)	4.67E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.0E-07	2.51E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.4E-03
				COBALT	8.52E+00	(mg/kg)	3.85E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.07E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.9E-03
				MANGANESE	7.40E+02	(mg/kg)	3.35E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.80E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.3E-03
			Exp. Route Total								**7.0E-07**					**1.7E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.72E+01	(mg/kg)	9.21E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.4E-07	4.96E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.7E-03
				COBALT	8.52E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	7.40E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**1.4E-07**					**1.7E-03**
		Exposure Point Total									**8.4E-07**					**1.8E-02**
	Exposure Medium Total										**8.4E-07**					**1.8E-02**
	Air	DU3	Inhalation	**Inorganics**												
				ARSENIC	1.42E-08	(mg/m^3)	1.45E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	6.2E-10	7.79E-10	(mg/m^3)	1.50E-05	(mg/m^3)	5.2E-05
				COBALT	7.04E-09	(mg/m^3)	7.17E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	6.4E-10	3.86E-10	(mg/m^3)	6.00E-06	(mg/m^3)	6.4E-05
				MANGANESE	6.12E-07	(mg/m^3)	6.22E-06	(ug/m^3)	NA	per (ug/m^3)	--	3.35E-08	(mg/m^3)	5.00E-05	(mg/m^3)	6.7E-04
			Exp. Route Total								**1.3E-09**					**7.9E-04**
		Exposure Point Total									**1.3E-09**					**7.9E-04**
	Exposure Medium Total										**1.3E-09**					**7.9E-04**
Soil Total											**8.4E-07**					**1.9E-02**
										Total of Receptor Risks Across All Media	**8.4E-07**				Total of Receptor Hazards Across All Media	**1.9E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 48
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU6

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk			Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Cancer Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU6	Ingestion	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	1.59E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.4E-06	4.44E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				COBALT	9.33E+00	(mg/kg)	1.83E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	5.11E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.7E-02
				MANGANESE	1.13E+03	(mg/kg)	2.21E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	6.19E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.4E-03
			Exp. Route Total								**2.4E-06**					**3.6E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	3.35E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.0E-07	9.39E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.1E-03
				COBALT	9.33E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.13E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**5.0E-07**					**3.1E-03**
		Exposure Point Total									**2.9E-06**					**3.9E-02**
	Exposure Medium Total										**2.9E-06**					**3.9E-02**
	Air	DU6	Inhalation	**Inorganics**												
				ARSENIC	1.12E-08	(mg/m^3)	5.82E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	2.5E-09	1.63E-09	(mg/m^3)	1.50E-05	(mg/m^3)	1.1E-04
				COBALT	7.71E-09	(mg/m^3)	4.02E-07	(ug/m^3)	9.00E-03	per (ug/m^3)	3.6E-09	1.13E-09	(mg/m^3)	6.00E-06	(mg/m^3)	1.9E-04
				MANGANESE	9.34E-07	(mg/m^3)	4.87E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.36E-07	(mg/m^3)	5.00E-05	(mg/m^3)	2.7E-03
			Exp. Route Total								**6.1E-09**					**3.0E-03**
		Exposure Point Total									**6.1E-09**					**3.0E-03**
	Exposure Medium Total										**6.1E-09**					**3.0E-03**
Soil Total											**2.9E-06**					**4.2E-02**
										Total of Receptor Risks Across All Media	**2.9E-06**				Total of Receptor Hazards Across All Media	**4.2E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 49
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU6

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU6	Ingestion	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	6.18E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.3E-08	1.44E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.8E-03
				COBALT	9.33E+00	(mg/kg)	7.12E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.66E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.5E-03
				MANGANESE	1.13E+03	(mg/kg)	8.62E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	2.01E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.4E-03
			Exp. Route Total								**9.3E-08**					**1.2E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	3.27E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.9E-08	7.63E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.5E-03
				COBALT	9.33E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.13E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**4.9E-08**					**2.5E-03**
		Exposure Point Total									**1.4E-07**					**1.4E-02**
	Exposure Medium Total										**1.4E-07**					**1.4E-02**
	Air	DU6	Inhalation	**Inorganics**												
				ARSENIC	1.12E-08	(mg/m^3)	2.27E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	9.8E-11	5.30E-10	(mg/m^3)	1.50E-05	(mg/m^3)	3.5E-05
				COBALT	7.71E-09	(mg/m^3)	1.57E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.4E-10	3.66E-10	(mg/m^3)	6.00E-06	(mg/m^3)	6.1E-05
				MANGANESE	9.34E-07	(mg/m^3)	1.90E-06	(ug/m^3)	NA	per (ug/m^3)	--	4.43E-08	(mg/m^3)	5.00E-05	(mg/m^3)	8.9E-04
			Exp. Route Total								**2.4E-10**					**9.8E-04**
		Exposure Point Total									**2.4E-10**					**9.8E-04**
	Exposure Medium Total										**2.4E-10**					**9.8E-04**
Soil Total											**1.4E-07**					**1.5E-02**
										Total of Receptor Risks Across All Media	**1.4E-07**				Total of Receptor Hazards Across All Media	**1.5E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 50
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU6

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU6	Ingestion	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	3.60E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.4E-07	2.52E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.4E-02
				COBALT	9.33E+00	(mg/kg)	4.14E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.90E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.7E-02
				MANGANESE	1.13E+03	(mg/kg)	5.02E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.51E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.5E-02
			Exp. Route Total								**5.4E-07**					**2.1E-01**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	5.77E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.6E-08	4.04E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-02
				COBALT	9.33E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.13E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**8.6E-08**					**1.3E-02**
		Exposure Point Total									**6.3E-07**					**2.2E-01**
	Exposure Medium Total										**6.3E-07**					**2.2E-01**
	Air	DU6	Inhalation	**Inorganics**												
				ARSENIC	6.55E-07	(mg/m^3)	3.38E-06	(ug/m^3)	4.3E-03	per (ug/m^3)	1.5E-08	2.37E-07	(mg/m^3)	1.50E-05	(mg/m^3)	1.6E-02
				COBALT	4.53E-07	(mg/m^3)	2.34E-06	(ug/m^3)	9.0E-03	per (ug/m^3)	2.1E-08	1.64E-07	(mg/m^3)	6.00E-06	(mg/m^3)	2.7E-02
				MANGANESE	5.49E-05	(mg/m^3)	2.83E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.98E-05	(mg/m^3)	5.00E-05	(mg/m^3)	4.0E-01
			Exp. Route Total								**3.6E-08**					**4.4E-01**
		Exposure Point Total									**3.6E-08**					**4.4E-01**
	Exposure Medium Total										**3.6E-08**					**4.4E-01**
Soil Total											**6.6E-07**					**6.6E-01**
										Total of Receptor Risks Across All Media	**6.6E-07**			Total of Receptor Hazards Across All Media		**6.6E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 51
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU6

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU6	Ingestion	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	2.46E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.7E-07	8.60E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.9E-03
				COBALT	9.33E+00	(mg/kg)	2.83E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	9.91E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.3E-03
				MANGANESE	1.13E+03	(mg/kg)	3.43E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.20E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	8.6E-04
			Exp. Route Total								**3.7E-07**					**7.0E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	5.19E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.8E-08	1.82E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.1E-04
				COBALT	9.33E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.13E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**7.8E-08**					**6.1E-04**
		Exposure Point Total									**4.5E-07**					**7.6E-03**
	Exposure Medium Total										**4.5E-07**					**7.6E-03**
	Air	DU6	Inhalation	**Inorganics**												
				ARSENIC	1.12E-08	(mg/m^3)	4.51E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.9E-10	1.58E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.1E-05
				COBALT	7.71E-09	(mg/m^3)	3.12E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	2.8E-10	1.09E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.8E-05
				MANGANESE	9.34E-07	(mg/m^3)	3.78E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.32E-08	(mg/m^3)	5.00E-05	(mg/m^3)	2.6E-04
			Exp. Route Total								**4.7E-10**					**2.9E-04**
		Exposure Point Total									**4.7E-10**					**2.9E-04**
	Exposure Medium Total										**4.7E-10**					**2.9E-04**
Soil Total											**4.5E-07**					**7.9E-03**
										Total of Receptor Risks Across All Media	**4.5E-07**				Total of Receptor Hazards Across All Media	**7.9E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 52
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU6

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU6	Ingestion	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	3.46E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.2E-07	4.04E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-02
				COBALT	9.33E+00	(mg/kg)	3.99E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	4.65E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.6E-02
				MANGANESE	1.13E+03	(mg/kg)	4.83E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	5.63E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.0E-03
			Exp. Route Total								**5.2E-07**					**3.3E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	8.04E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.2E-07	9.38E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.1E-03
				COBALT	9.33E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.13E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**1.2E-07**					**3.1E-03**
		Exposure Point Total									**6.4E-07**					**3.6E-02**
	Exposure Medium Total										**6.4E-07**					**3.6E-02**
	Air	DU6	Inhalation	**Inorganics**												
				ARSENIC	1.12E-08	(mg/m^3)	2.26E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	9.7E-11	2.63E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.8E-05
				COBALT	7.71E-09	(mg/m^3)	1.56E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.4E-10	1.82E-10	(mg/m^3)	6.00E-06	(mg/m^3)	3.0E-05
				MANGANESE	9.34E-07	(mg/m^3)	1.89E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.20E-08	(mg/m^3)	5.00E-05	(mg/m^3)	4.4E-04
			Exp. Route Total								**2.4E-10**					**4.9E-04**
		Exposure Point Total									**2.4E-10**					**4.9E-04**
	Exposure Medium Total										**2.4E-10**					**4.9E-04**
Soil Total											**6.4E-07**					**3.7E-02**
										Total of Receptor Risks Across All Media	**6.4E-07**				Total of Receptor Hazards Across All Media	**3.7E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 53
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU6

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU6	Ingestion	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	4.91E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.4E-07	8.60E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.9E-02
				COBALT	9.33E+00	(mg/kg)	5.66E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	9.91E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.3E-02
				MANGANESE	1.13E+03	(mg/kg)	6.86E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.20E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	8.6E-03
			Exp. Route Total								**7.4E-07**					**7.0E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	5.18E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.8E-08	9.06E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.0E-03
				COBALT	9.33E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.13E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**7.8E-08**					**3.0E-03**
		Exposure Point Total									**8.1E-07**					**7.3E-02**
	Exposure Medium Total										**8.1E-07**					**7.3E-02**
	Air	DU6	Inhalation	**Inorganics**												
				ARSENIC	1.12E-08	(mg/m^3)	9.02E-09	(ug/m^3)	4.30E-03	per (ug/m^3)	3.9E-11	1.58E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.1E-05
				COBALT	7.71E-09	(mg/m^3)	6.24E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	5.6E-11	1.09E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.8E-05
				MANGANESE	9.34E-07	(mg/m^3)	7.55E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.32E-08	(mg/m^3)	5.00E-05	(mg/m^3)	2.6E-04
			Exp. Route Total								**9.5E-11**					**2.9E-04**
		Exposure Point Total									**9.5E-11**					**2.9E-04**
	Exposure Medium Total										**9.5E-11**					**2.9E-04**
Soil Total											**8.1E-07**					**7.4E-02**
											Total of Receptor Risks Across All Media **8.1E-07**					Total of Receptor Hazards Across All Media **7.4E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 54
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU6

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU6	Ingestion	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	5.34E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.0E-08	6.23E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.1E-03
				COBALT	9.33E+00	(mg/kg)	6.15E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	7.18E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.4E-03
				MANGANESE	1.13E+03	(mg/kg)	7.45E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	8.69E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	6.2E-04
			Exp. Route Total								**8.0E-08**					**5.1E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	2.48E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.7E-08	2.89E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.6E-04
				COBALT	9.33E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.13E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**3.7E-08**					**9.6E-04**
		Exposure Point Total									**1.2E-07**					**6.1E-03**
	Exposure Medium Total										**1.2E-07**					**6.1E-03**
	Air	DU6	Inhalation	**Inorganics**												
				ARSENIC	1.12E-08	(mg/m^3)	6.99E-09	(ug/m^3)	4.30E-03	per (ug/m^3)	3.0E-11	8.15E-11	(mg/m^3)	1.50E-05	(mg/m^3)	5.4E-06
				COBALT	7.71E-09	(mg/m^3)	4.83E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	4.3E-11	5.63E-11	(mg/m^3)	6.00E-06	(mg/m^3)	9.4E-06
				MANGANESE	9.34E-07	(mg/m^3)	5.85E-07	(ug/m^3)	NA	per (ug/m^3)	--	6.82E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.4E-04
			Exp. Route Total								**7.4E-11**					**1.5E-04**
		Exposure Point Total									**7.4E-11**					**1.5E-04**
	Exposure Medium Total										**7.4E-11**					**1.5E-04**
Soil Total											**1.2E-07**					**6.2E-03**
										Total of Receptor Risks Across All Media	**1.2E-07**				Total of Receptor Hazards Across All Media	**6.2E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 55
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU6

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU6	Ingestion	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	3.66E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.5E-07	1.97E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.6E-03
				COBALT	9.33E+00	(mg/kg)	4.22E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.27E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.6E-03
				MANGANESE	1.13E+03	(mg/kg)	5.11E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.75E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.0E-03
			Exp. Route Total								**5.5E-07**					**1.6E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	7.23E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.1E-07	3.89E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-03
				COBALT	9.33E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.13E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**1.1E-07**					**1.3E-03**
		Exposure Point Total									**6.6E-07**					**1.7E-02**
	Exposure Medium Total										**6.6E-07**					**1.7E-02**
	Air	DU6	Inhalation	**Inorganics**												
				ARSENIC	1.12E-08	(mg/m^3)	1.14E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	4.9E-10	6.11E-10	(mg/m^3)	1.50E-05	(mg/m^3)	4.1E-05
				COBALT	7.71E-09	(mg/m^3)	7.85E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	7.1E-10	4.23E-10	(mg/m^3)	6.00E-06	(mg/m^3)	7.0E-05
				MANGANESE	9.34E-07	(mg/m^3)	9.50E-06	(ug/m^3)	NA	per (ug/m^3)	--	5.12E-08	(mg/m^3)	5.00E-05	(mg/m^3)	1.0E-03
			Exp. Route Total								**1.2E-09**					**1.1E-03**
		Exposure Point Total									**1.2E-09**					**1.1E-03**
	Exposure Medium Total										**1.2E-09**					**1.1E-03**
Soil Total											**6.6E-07**					**1.9E-02**
										Total of Receptor Risks Across All Media	**6.6E-07**			Total of Receptor Hazards Across All Media		**1.9E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 56
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU4

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU4	Ingestion	**Inorganics**												
				ARSENIC	5.42E+01	(mg/kg)	6.36E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.5E-06	1.78E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.9E-02
				COBALT	8.56E+00	(mg/kg)	1.68E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.69E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.6E-02
				MANGANESE	5.75E+02	(mg/kg)	1.13E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	3.15E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.3E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.67E+00	(mg/kg)	3.27E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.3E-08	9.15E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.61E+00	(mg/kg)	7.06E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	7.1E-08	1.98E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.10E+00	(mg/kg)	2.15E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.2E-07	6.03E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	2.0E-03
				DIBENZ(A,H)ANTHRACENE	3.30E-01	(mg/kg)	6.46E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	6.5E-08	1.81E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.18E+00	(mg/kg)	2.31E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.3E-08	6.47E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.0E-05**					**7.9E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	5.42E+01	(mg/kg)	1.35E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.0E-06	3.77E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-02
				COBALT	8.56E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.75E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.67E+00	(mg/kg)	1.80E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.8E-08	5.03E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.61E+00	(mg/kg)	3.89E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.9E-08	1.09E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.10E+00	(mg/kg)	1.18E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.2E-07	3.32E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.1E-03
				DIBENZ(A,H)ANTHRACENE	3.30E-01	(mg/kg)	3.55E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.6E-08	9.95E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.18E+00	(mg/kg)	1.27E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.3E-08	3.56E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.2E-06**					**1.4E-02**
		Exposure Point Total									**1.2E-05**					**9.3E-02**
	Exposure Medium Total										**1.2E-05**					**9.3E-02**

TABLE 56
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU4

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Air	DU4	Inhalation	**Inorganics**												
				ARSENIC	4.48E-08	(mg/m^3)	2.34E-06	(ug/m^3)	4.30E-03	per (ug/m^3)	1.0E-08	6.55E-09	(mg/m^3)	1.50E-05	(mg/m^3)	4.4E-04
				COBALT	7.07E-09	(mg/m^3)	3.69E-07	(ug/m^3)	9.00E-03	per (ug/m^3)	3.3E-09	1.03E-09	(mg/m^3)	6.00E-06	(mg/m^3)	1.7E-04
				MANGANESE	4.75E-07	(mg/m^3)	2.48E-05	(ug/m^3)	NA	per (ug/m^3)	--	6.94E-08	(mg/m^3)	5.00E-05	(mg/m^3)	1.4E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.38E-09	(mg/m^3)	7.20E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	4.3E-12	2.02E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.98E-09	(mg/m^3)	1.56E-07	(ug/m^3)	6.00E-05	per (ug/m^3)	9.3E-12	4.36E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	9.09E-10	(mg/m^3)	4.74E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	2.8E-11	1.33E-10	(mg/m^3)	2.00E-06	(mg/m^3)	6.6E-05
				DIBENZ(A,H)ANTHRACENE	2.73E-10	(mg/m^3)	1.42E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	8.5E-12	3.99E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	9.75E-10	(mg/m^3)	5.09E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	3.1E-12	1.42E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.3E-08**					**2.1E-03**
		Exposure Point Total									**1.3E-08**					**2.1E-03**
	Exposure Medium Total										**1.3E-08**					**2.1E-03**
Soil Total											**1.2E-05**					**9.5E-02**
										Total of Receptor Risks Across All Media	**1.2E-05**				Total of Receptor Hazards Across All Media	**9.5E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 57
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU4

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU4	Ingestion	**Inorganics**												
				ARSENIC	5.42E+01	(mg/kg)	2.48E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.7E-07	5.79E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.9E-02
				COBALT	8.56E+00	(mg/kg)	6.53E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.52E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.1E-03
				MANGANESE	5.75E+02	(mg/kg)	4.39E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.02E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	7.3E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.67E+00	(mg/kg)	1.27E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.3E-09	2.97E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.61E+00	(mg/kg)	2.76E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.8E-09	6.43E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.10E+00	(mg/kg)	8.40E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	8.4E-09	1.96E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	6.5E-04
				DIBENZ(A,H)ANTHRACENE	3.30E-01	(mg/kg)	2.52E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.5E-09	5.88E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.18E+00	(mg/kg)	9.01E-09	(mg/kg-day)	1.0E-01	per (mg/kg-day)	9.0E-10	2.10E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.9E-07**					**2.6E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	5.42E+01	(mg/kg)	1.31E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.0E-07	3.06E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.0E-02
				COBALT	8.56E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.75E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.67E+00	(mg/kg)	1.75E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.8E-09	4.09E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.61E+00	(mg/kg)	3.79E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.8E-09	8.84E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.10E+00	(mg/kg)	1.15E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.2E-08	2.69E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	9.0E-04
				DIBENZ(A,H)ANTHRACENE	3.30E-01	(mg/kg)	3.46E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.5E-09	8.08E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.18E+00	(mg/kg)	1.24E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.2E-09	2.89E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.2E-07**					**1.1E-02**
		Exposure Point Total									**6.1E-07**					**3.7E-02**
	Exposure Medium Total										**6.1E-07**					**3.7E-02**

TABLE 57
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU4

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU4	Inhalation	**Inorganics**												
				ARSENIC	4.48E-08	(mg/m^3)	9.12E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	3.9E-10	2.13E-09	(mg/m^3)	1.50E-05	(mg/m^3)	1.4E-04
				COBALT	7.07E-09	(mg/m^3)	1.44E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.3E-10	3.36E-10	(mg/m^3)	6.00E-06	(mg/m^3)	5.6E-05
				MANGANESE	4.75E-07	(mg/m^3)	9.67E-07	(ug/m^3)	NA	per (ug/m^3)	--	2.26E-08	(mg/m^3)	5.00E-05	(mg/m^3)	4.5E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.38E-09	(mg/m^3)	2.81E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.7E-13	6.55E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.98E-09	(mg/m^3)	6.07E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	3.6E-13	1.42E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	9.09E-10	(mg/m^3)	1.85E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	1.1E-12	4.32E-11	(mg/m^3)	2.00E-06	(mg/m^3)	2.2E-05
				DIBENZ(A,H)ANTHRACENE	2.73E-10	(mg/m^3)	5.55E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	3.3E-13	1.30E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	9.75E-10	(mg/m^3)	1.98E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.2E-13	4.63E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**5.2E-10**					**6.7E-04**
		Exposure Point Total									**5.2E-10**					**6.7E-04**
	Exposure Medium Total										**5.2E-10**					**6.7E-04**
Soil Total											**6.1E-07**					**3.8E-02**
										Total of Receptor Risks Across All Media	**6.1E-07**				Total of Receptor Hazards Across All Media	**3.8E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 58
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU4

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU4	Ingestion	**Inorganics**												
				ARSENIC	5.42E+01	(mg/kg)	1.44E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.2E-06	1.01E-04	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.4E-01
				COBALT	8.56E+00	(mg/kg)	3.80E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.66E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.9E-02
				MANGANESE	5.75E+02	(mg/kg)	2.55E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.79E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.3E-02
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.67E+00	(mg/kg)	7.41E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	7.4E-09	5.19E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.61E+00	(mg/kg)	1.60E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.6E-08	1.12E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.10E+00	(mg/kg)	4.88E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.9E-08	3.42E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.1E-02
				DIBENZ(A,H)ANTHRACENE	3.30E-01	(mg/kg)	1.47E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.5E-08	1.03E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.18E+00	(mg/kg)	5.24E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	5.2E-09	3.67E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.3E-06**					**4.5E-01**
			Dermal[1]	**Inorganics**												
				ARSENIC	5.42E+01	(mg/kg)	2.31E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.5E-07	1.62E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.4E-02
				COBALT	8.56E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.75E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.67E+00	(mg/kg)	3.09E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.1E-09	2.16E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.61E+00	(mg/kg)	6.68E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	6.7E-09	4.68E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.10E+00	(mg/kg)	2.04E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.0E-08	1.42E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.7E-03
				DIBENZ(A,H)ANTHRACENE	3.30E-01	(mg/kg)	6.11E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	6.1E-09	4.27E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.18E+00	(mg/kg)	2.18E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.2E-09	1.53E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.9E-07**					**5.9E-02**
		Exposure Point Total									**2.6E-06**					**5.1E-01**
	Exposure Medium Total										**2.6E-06**					**5.1E-01**

TABLE 58
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU4

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU4	Inhalation	**Inorganics**												
				ARSENIC	2.63E-06	(mg/m^3)	1.36E-05	(ug/m^3)	4.3E-03	per (ug/m^3)	5.8E-08	9.50E-07	(mg/m^3)	1.50E-05	(mg/m^3)	6.3E-02
				COBALT	4.16E-07	(mg/m^3)	2.14E-06	(ug/m^3)	9.0E-03	per (ug/m^3)	1.9E-08	1.50E-07	(mg/m^3)	6.00E-06	(mg/m^3)	2.5E-02
				MANGANESE	2.79E-05	(mg/m^3)	1.44E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.01E-05	(mg/m^3)	5.00E-05	(mg/m^3)	2.0E-01
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	8.11E-08	(mg/m^3)	4.18E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	2.5E-11	2.93E-08	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.75E-07	(mg/m^3)	9.04E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	5.4E-11	6.33E-08	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	5.34E-08	(mg/m^3)	2.75E-07	(ug/m^3)	6.0E-04	per (ug/m^3)	1.7E-10	1.93E-08	(mg/m^3)	2.00E-06	(mg/m^3)	9.6E-03
				DIBENZ(A,H)ANTHRACENE	1.60E-08	(mg/m^3)	8.26E-08	(ug/m^3)	6.0E-04	per (ug/m^3)	5.0E-11	5.78E-09	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	5.73E-08	(mg/m^3)	2.95E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	1.8E-11	2.07E-08	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**7.8E-08**					**3.0E-01**
		Exposure Point Total									**7.8E-08**					**3.0E-01**
	Exposure Medium Total										**7.8E-08**					**3.0E-01**
Soil Total											**2.7E-06**					**8.1E-01**
										Total of Receptor Risks Across All Media	**2.7E-06**			Total of Receptor Hazards Across All Media		**8.1E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 59
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU4

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU4	Ingestion	**Inorganics**												
				ARSENIC	5.42E+01	(mg/kg)	9.86E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.5E-06	3.45E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.2E-02
				COBALT	8.56E+00	(mg/kg)	2.60E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	9.09E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.0E-03
				MANGANESE	5.75E+02	(mg/kg)	1.74E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	6.10E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.4E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.67E+00	(mg/kg)	5.07E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	5.1E-09	1.77E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.61E+00	(mg/kg)	1.10E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.1E-08	3.83E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.10E+00	(mg/kg)	3.34E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.3E-08	1.17E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	3.9E-04
				DIBENZ(A,H)ANTHRACENE	3.30E-01	(mg/kg)	1.00E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.0E-08	3.50E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.18E+00	(mg/kg)	3.58E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.6E-09	1.25E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.5E-06**					**1.5E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	5.42E+01	(mg/kg)	2.08E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.1E-07	7.29E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.4E-03
				COBALT	8.56E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.75E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.67E+00	(mg/kg)	2.78E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.8E-09	9.73E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.61E+00	(mg/kg)	6.01E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	6.0E-09	2.10E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.10E+00	(mg/kg)	1.83E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.8E-08	6.41E-08	(mg/kg-day)	3.0E-04	(mg/kg-day)	2.1E-04
				DIBENZ(A,H)ANTHRACENE	3.30E-01	(mg/kg)	5.49E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	5.5E-09	1.92E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.18E+00	(mg/kg)	1.96E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.0E-09	6.88E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.5E-07**					**2.6E-03**
		Exposure Point Total									**1.9E-06**					**1.8E-02**
	Exposure Medium Total										**1.9E-06**					**1.8E-02**

TABLE 59
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU4

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU4	Inhalation	**Inorganics**												
				ARSENIC	4.48E-08	(mg/m^3)	1.81E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	7.8E-10	6.34E-10	(mg/m^3)	1.50E-05	(mg/m^3)	4.2E-05
				COBALT	7.07E-09	(mg/m^3)	2.86E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	2.6E-10	1.00E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.7E-05
				MANGANESE	4.75E-07	(mg/m^3)	1.92E-06	(ug/m^3)	NA	per (ug/m^3)	--	6.73E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.3E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.38E-09	(mg/m^3)	5.58E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	3.3E-13	1.95E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.98E-09	(mg/m^3)	1.21E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	7.2E-13	4.22E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	9.09E-10	(mg/m^3)	3.68E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	2.2E-12	1.29E-11	(mg/m^3)	2.00E-06	(mg/m^3)	6.4E-06
				DIBENZ(A,H)ANTHRACENE	2.73E-10	(mg/m^3)	1.10E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	6.6E-13	3.86E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	9.75E-10	(mg/m^3)	3.94E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.4E-13	1.38E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.0E-09**					**2.0E-04**
		Exposure Point Total									**1.0E-09**					**2.0E-04**
	Exposure Medium Total										**1.0E-09**					**2.0E-04**
Soil Total											**1.9E-06**					**1.8E-02**
										Total of Receptor Risks Across All Media	**1.9E-06**				Total of Receptor Hazards Across All Media	**1.8E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 60
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU4

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU4	Ingestion	**Inorganics**												
				ARSENIC	5.42E+01	(mg/kg)	1.39E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.1E-06	1.62E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.4E-02
				COBALT	8.56E+00	(mg/kg)	3.66E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	4.27E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-02
				MANGANESE	5.75E+02	(mg/kg)	2.46E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.87E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.0E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.67E+00	(mg/kg)	2.14E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.1E-08	8.32E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.61E+00	(mg/kg)	4.63E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	4.6E-08	1.80E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.10E+00	(mg/kg)	1.41E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.4E-07	5.48E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.8E-03
				DIBENZ(A,H)ANTHRACENE	3.30E-01	(mg/kg)	4.23E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	4.2E-08	1.64E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.18E+00	(mg/kg)	1.51E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.5E-08	5.88E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.4E-06**					**7.2E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	5.42E+01	(mg/kg)	3.23E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.8E-07	3.76E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-02
				COBALT	8.56E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.75E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.67E+00	(mg/kg)	1.29E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.3E-08	5.03E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.61E+00	(mg/kg)	2.79E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.8E-08	1.09E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.10E+00	(mg/kg)	8.51E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	8.5E-08	3.31E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.1E-03
				DIBENZ(A,H)ANTHRACENE	3.30E-01	(mg/kg)	2.55E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.6E-08	9.93E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.18E+00	(mg/kg)	9.13E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	9.1E-09	3.55E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**6.4E-07**					**1.4E-02**
		Exposure Point Total									**3.0E-06**					**8.6E-02**
	Exposure Medium Total										**3.0E-06**					**8.6E-02**

TABLE 60
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU4

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU4	Inhalation	**Inorganics**												
				ARSENIC	4.48E-08	(mg/m^3)	9.06E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	3.9E-10	1.06E-09	(mg/m^3)	1.50E-05	(mg/m^3)	7.0E-05
				COBALT	7.07E-09	(mg/m^3)	1.43E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.3E-10	1.67E-10	(mg/m^3)	6.00E-06	(mg/m^3)	2.8E-05
				MANGANESE	4.75E-07	(mg/m^3)	9.61E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.12E-08	(mg/m^3)	5.00E-05	(mg/m^3)	2.2E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.38E-09	(mg/m^3)	8.37E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	5.0E-13	3.26E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.98E-09	(mg/m^3)	1.81E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	1.1E-12	7.04E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	9.09E-10	(mg/m^3)	5.52E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	3.3E-12	2.14E-11	(mg/m^3)	2.00E-06	(mg/m^3)	1.1E-05
				DIBENZ(A,H)ANTHRACENE	2.73E-10	(mg/m^3)	1.65E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	9.9E-13	6.43E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	9.75E-10	(mg/m^3)	5.92E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	3.5E-13	2.30E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**5.2E-10**					**3.3E-04**
		Exposure Point Total									**5.2E-10**					**3.3E-04**
	Exposure Medium Total										**5.2E-10**					**3.3E-04**
Soil Total											**3.0E-06**					**8.6E-02**
										Total of Receptor Risks Across All Media	**3.0E-06**			Total of Receptor Hazards Across All Media		**8.6E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 61
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU4

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU4	Ingestion	**Inorganics**												
				ARSENIC	5.42E+01	(mg/kg)	1.97E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.0E-06	3.45E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.2E-01
				COBALT	8.56E+00	(mg/kg)	5.19E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	9.09E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.0E-02
				MANGANESE	5.75E+02	(mg/kg)	3.49E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	6.10E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.4E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.67E+00	(mg/kg)	3.04E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.0E-08	1.77E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.61E+00	(mg/kg)	6.57E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	6.6E-08	3.83E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.10E+00	(mg/kg)	2.00E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.0E-07	1.17E-06	(mg/kg-day)	3.0E-04	(mg/kg-day)	3.9E-03
				DIBENZ(A,H)ANTHRACENE	3.30E-01	(mg/kg)	6.01E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	6.0E-08	3.50E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.18E+00	(mg/kg)	2.15E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.1E-08	1.25E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.3E-06**					**1.5E-01**
			Dermal[1]	**Inorganics**												
				ARSENIC	5.42E+01	(mg/kg)	2.08E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.1E-07	3.64E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.2E-02
				COBALT	8.56E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.75E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.67E+00	(mg/kg)	8.33E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	8.3E-09	4.86E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.61E+00	(mg/kg)	1.80E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.8E-08	1.05E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.10E+00	(mg/kg)	5.48E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	5.5E-08	3.20E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.1E-03
				DIBENZ(A,H)ANTHRACENE	3.30E-01	(mg/kg)	1.65E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.6E-08	9.60E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.18E+00	(mg/kg)	5.88E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	5.9E-09	3.43E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**4.2E-07**					**1.3E-02**
		Exposure Point Total									**3.8E-06**					**1.7E-01**
	Exposure Medium Total										**3.8E-06**					**1.7E-01**

TABLE 61
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU4

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU4	Inhalation	**Inorganics**												
				ARSENIC	4.48E-08	(mg/m^3)	3.62E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.6E-10	6.34E-10	(mg/m^3)	1.50E-05	(mg/m^3)	4.2E-05
				COBALT	7.07E-09	(mg/m^3)	5.72E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	5.2E-11	1.00E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.7E-05
				MANGANESE	4.75E-07	(mg/m^3)	3.84E-07	(ug/m^3)	NA	per (ug/m^3)	--	6.73E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.3E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.38E-09	(mg/m^3)	3.35E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.0E-13	1.95E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.98E-09	(mg/m^3)	7.24E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	4.3E-13	4.22E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	9.09E-10	(mg/m^3)	2.21E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	1.3E-12	1.29E-11	(mg/m^3)	2.00E-06	(mg/m^3)	6.4E-06
				DIBENZ(A,H)ANTHRACENE	2.73E-10	(mg/m^3)	6.62E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	4.0E-13	3.86E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	9.75E-10	(mg/m^3)	2.37E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.4E-13	1.38E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**2.1E-10**					**2.0E-04**
		Exposure Point Total									**2.1E-10**					**2.0E-04**
	Exposure Medium Total										**2.1E-10**					**2.0E-04**
Soil Total											**3.8E-06**					**1.7E-01**
										Total of Receptor Risks Across All Media	**3.8E-06**				Total of Receptor Hazards Across All Media	**1.7E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 62
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU4

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU4	Ingestion	**Inorganics**												
				ARSENIC	5.42E+01	(mg/kg)	2.14E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.2E-07	2.50E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.3E-03
				COBALT	8.56E+00	(mg/kg)	5.64E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	6.58E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.2E-03
				MANGANESE	5.75E+02	(mg/kg)	3.79E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.42E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.2E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.67E+00	(mg/kg)	3.30E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.3E-09	1.28E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.61E+00	(mg/kg)	7.14E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	7.1E-09	2.78E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.10E+00	(mg/kg)	2.18E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.2E-08	8.46E-08	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.8E-04
				DIBENZ(A,H)ANTHRACENE	3.30E-01	(mg/kg)	6.53E-09	(mg/kg-day)	1.00E+00	per (mg/kg-day)	6.5E-09	2.54E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.18E+00	(mg/kg)	2.33E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.3E-09	9.07E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.6E-07**					**1.1E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	5.42E+01	(mg/kg)	9.96E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.5E-07	1.16E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.9E-03
				COBALT	8.56E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.75E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.67E+00	(mg/kg)	3.99E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	4.0E-09	1.55E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.61E+00	(mg/kg)	8.62E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	8.6E-09	3.35E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.10E+00	(mg/kg)	2.63E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.6E-08	1.02E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.4E-04
				DIBENZ(A,H)ANTHRACENE	3.30E-01	(mg/kg)	7.88E-09	(mg/kg-day)	1.00E+00	per (mg/kg-day)	7.9E-09	3.06E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.18E+00	(mg/kg)	2.82E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.8E-09	1.10E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.0E-07**					**4.2E-03**
		Exposure Point Total									**5.6E-07**					**1.5E-02**
	Exposure Medium Total										**5.6E-07**					**1.5E-02**

TABLE 62
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU4

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU4	Inhalation	**Inorganics**												
				ARSENIC	4.48E-08	(mg/m^3)	2.81E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.2E-10	3.27E-10	(mg/m^3)	1.50E-05	(mg/m^3)	2.2E-05
				COBALT	7.07E-09	(mg/m^3)	4.43E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	4.0E-11	5.17E-11	(mg/m^3)	6.00E-06	(mg/m^3)	8.6E-06
				MANGANESE	4.75E-07	(mg/m^3)	2.98E-07	(ug/m^3)	NA	per (ug/m^3)	--	3.47E-09	(mg/m^3)	5.00E-05	(mg/m^3)	6.9E-05
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.38E-09	(mg/m^3)	2.59E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.6E-13	1.01E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.98E-09	(mg/m^3)	5.60E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	3.4E-13	2.18E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	9.09E-10	(mg/m^3)	1.71E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	1.0E-12	6.64E-12	(mg/m^3)	2.00E-06	(mg/m^3)	3.3E-06
				DIBENZ(A,H)ANTHRACENE	2.73E-10	(mg/m^3)	5.12E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	3.1E-13	1.99E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	9.75E-10	(mg/m^3)	1.83E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.1E-13	7.12E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.6E-10**					**1.0E-04**
		Exposure Point Total									**1.6E-10**					**1.0E-04**
	Exposure Medium Total										**1.6E-10**					**1.0E-04**
Soil Total											**5.6E-07**					**1.5E-02**
										Total of Receptor Risks Across All Media	**5.6E-07**				Total of Receptor Hazards Across All Media	**1.5E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 63
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU4

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU4	Ingestion	**Inorganics**												
				ARSENIC	5.42E+01	(mg/kg)	1.47E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.2E-06	7.92E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.6E-02
				COBALT	8.56E+00	(mg/kg)	3.87E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.08E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.9E-03
				MANGANESE	5.75E+02	(mg/kg)	2.60E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.40E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.0E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.67E+00	(mg/kg)	2.27E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.3E-08	4.07E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.61E+00	(mg/kg)	4.90E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	4.9E-08	8.79E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.10E+00	(mg/kg)	1.49E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.5E-07	2.68E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.9E-04
				DIBENZ(A,H)ANTHRACENE	3.30E-01	(mg/kg)	4.48E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	4.5E-08	8.04E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.18E+00	(mg/kg)	1.60E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.6E-08	2.87E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.5E-06**					**3.5E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	5.42E+01	(mg/kg)	2.90E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.4E-07	1.56E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.2E-03
				COBALT	8.56E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.75E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.67E+00	(mg/kg)	1.16E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.2E-08	2.09E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.61E+00	(mg/kg)	2.51E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.5E-08	4.51E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.10E+00	(mg/kg)	7.66E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	7.7E-08	1.37E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.6E-04
				DIBENZ(A,H)ANTHRACENE	3.30E-01	(mg/kg)	2.30E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.3E-08	4.12E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.18E+00	(mg/kg)	8.22E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	8.2E-09	1.47E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**5.8E-07**					**5.7E-03**
		Exposure Point Total									**3.1E-06**					**4.1E-02**
	Exposure Medium Total										**3.1E-06**					**4.1E-02**

TABLE 63
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU4

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU4	Inhalation	**Inorganics**												
				ARSENIC	4.48E-08	(mg/m^3)	4.56E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	2.0E-09	2.45E-09	(mg/m^3)	1.50E-05	(mg/m^3)	1.6E-04
				COBALT	7.07E-09	(mg/m^3)	7.20E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	6.5E-10	3.88E-10	(mg/m^3)	6.00E-06	(mg/m^3)	6.5E-05
				MANGANESE	4.75E-07	(mg/m^3)	4.84E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.60E-08	(mg/m^3)	5.00E-05	(mg/m^3)	5.2E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.38E-09	(mg/m^3)	4.21E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	2.5E-12	7.56E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.98E-09	(mg/m^3)	9.11E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	5.5E-12	1.63E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	9.09E-10	(mg/m^3)	2.78E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	1.7E-11	4.98E-11	(mg/m^3)	2.00E-06	(mg/m^3)	2.5E-05
				DIBENZ(A,H)ANTHRACENE	2.73E-10	(mg/m^3)	8.33E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	5.0E-12	1.49E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	9.75E-10	(mg/m^3)	2.98E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	1.8E-12	5.34E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**2.6E-09**					**7.7E-04**
		Exposure Point Total									**2.6E-09**					**7.7E-04**
	Exposure Medium Total										**2.6E-09**					**7.7E-04**
Soil Total											**3.1E-06**					**4.2E-02**
										Total of Receptor Risks Across All Media	**3.1E-06**				Total of Receptor Hazards Across All Media	**4.2E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 64
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU4

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	9.5E-06	2.0E-06	1.0E-08	1.2E-05	ARSENIC	Skin, Cardiovascular	5.9E-02	1.3E-02	4.4E-04	7.2E-02
			COBALT	--	--	3.3E-09	3.3E-09	COBALT	Thyroid	1.6E-02	--	1.7E-04	1.6E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.3E-03	--	1.4E-03	3.6E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	3.3E-08	1.8E-08	4.3E-12	5.1E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	7.1E-08	3.9E-08	9.3E-12	1.1E-07	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	2.2E-07	1.2E-07	2.8E-11	3.3E-07	BENZO(A)PYRENE	Developmental System	2.0E-03	1.1E-03	6.6E-05	3.2E-03
			DIBENZ(A,H)ANTHRACENE	6.5E-08	3.6E-08	8.5E-12	1.0E-07	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.3E-08	1.3E-08	3.1E-12	3.6E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	1.0E-05	2.2E-06	1.3E-08	1.2E-05		(Total)	7.9E-02	1.4E-02	2.1E-03	9.5E-02
							Total Risk Across Surface Soil	**1.2E-05**					**Total Hazard Index Across Surface Soil**	**9.5E-02**
							Total Risk Across All Media and All Exposure Routes	**1E-05**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.1**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 65
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU4

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	3.7E-07	2.0E-07	3.9E-10	5.7E-07	ARSENIC	Skin, Cardiovascular	1.9E-02	1.0E-02	1.4E-04	3.0E-02
			COBALT	--	--	1.3E-10	1.3E-10	COBALT	Thyroid	5.1E-03	--	5.6E-05	5.1E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	7.3E-04	--	4.5E-04	1.2E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	1.3E-09	1.8E-09	1.7E-13	3.0E-09	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	2.8E-09	3.8E-09	3.6E-13	6.5E-09	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	8.4E-09	1.2E-08	1.1E-12	2.0E-08	BENZO(A)PYRENE	Developmental System	6.5E-04	9.0E-04	2.2E-05	1.6E-03
			DIBENZ(A,H)ANTHRACENE	2.5E-09	3.5E-09	3.3E-13	6.0E-09	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	9.0E-10	1.2E-09	1.2E-13	2.1E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	3.9E-07	2.2E-07	5.2E-10	6.1E-07		(Total)	2.6E-02	1.1E-02	6.7E-04	3.8E-02
						Total Risk Across Surface Soil	**6.1E-07**					**Total Hazard Index Across Surface Soil**	**3.8E-02**
						Total Risk Across All Media and All Exposure Routes	**6E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.04**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 66
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU4

Location: Iona Island
Scenario Timeframe: Future
Receptor Population: Construction Wo
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	2.2E-06	3.5E-07	5.8E-08	2.6E-06	ARSENIC	Skin, Cardiovascular	3.4E-01	5.4E-02	6.3E-02	4.5E-01
			COBALT	--	--	1.9E-08	1.9E-08	COBALT	Thyroid	8.9E-02	--	2.5E-02	1.1E-01
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.3E-02	--	2.0E-01	2.1E-01
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	7.4E-09	3.1E-09	2.5E-11	1.1E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.6E-08	6.7E-09	5.4E-11	2.3E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	4.9E-08	2.0E-08	1.7E-10	6.9E-08	BENZO(A)PYRENE	Developmental System	1.1E-02	4.7E-03	9.6E-03	2.6E-02
			DIBENZ(A,H)ANTHRACENE	1.5E-08	6.1E-09	5.0E-11	2.1E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	5.2E-09	2.2E-09	1.8E-11	7.4E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	2.3E-06	3.9E-07	7.8E-08	2.7E-06		(Total)	4.5E-01	5.9E-02	3.0E-01	8.1E-01
							Total Risk Across Surface Soil	**2.7E-06**					**Total Hazard Index Across Surface Soil**	**8.1E-01**
							Total Risk Across All Media and All Exposure Routes	**3E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.8**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 67
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU4

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	1.5E-06	3.1E-07	7.8E-10	1.8E-06	ARSENIC	Skin, Cardiovascular	1.2E-02	2.4E-03	4.2E-05	1.4E-02
			COBALT	--	--	2.6E-10	2.6E-10	COBALT	Thyroid	3.0E-03	--	1.7E-05	3.0E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.4E-04	--	1.3E-04	5.7E-04
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	5.1E-09	2.8E-09	3.3E-13	7.8E-09	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.1E-08	6.0E-09	7.2E-13	1.7E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	3.3E-08	1.8E-08	2.2E-12	5.2E-08	BENZO(A)PYRENE	Developmental System	3.9E-04	2.1E-04	6.4E-06	6.1E-04
			DIBENZ(A,H)ANTHRACENE	1.0E-08	5.5E-09	6.6E-13	1.6E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	3.6E-09	2.0E-09	2.4E-13	5.5E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	1.5E-06	3.5E-07	1.0E-09	1.9E-06		(Total)	1.5E-02	2.6E-03	2.0E-04	1.8E-02
							Total Risk Across Surface Soil	**1.9E-06**					**Total Hazard Index Across Surface Soil**	**1.8E-02**
							Total Risk Across All Media and All Exposure Routes	**2E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 68
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU4

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	2.1E-06	4.8E-07	3.9E-10	2.6E-06	ARSENIC	Skin, Cardiovascular	5.4E-02	1.3E-02	7.0E-05	6.7E-02
			COBALT	--	--	1.3E-10	1.3E-10	COBALT	Thyroid	1.4E-02	--	2.8E-05	1.4E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.0E-03	--	2.2E-04	2.3E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	2.1E-08	1.3E-08	5.0E-13	3.4E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	4.6E-08	2.8E-08	1.1E-12	7.4E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.4E-07	8.5E-08	3.3E-12	2.3E-07	BENZO(A)PYRENE	Developmental System	1.8E-03	1.1E-03	1.1E-05	2.9E-03
			DIBENZ(A,H)ANTHRACENE	4.2E-08	2.6E-08	9.9E-13	6.8E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	1.5E-08	9.1E-09	3.5E-13	2.4E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	2.4E-06	6.4E-07	5.2E-10	3.0E-06		(Total)	7.2E-02	1.4E-02	3.3E-04	8.6E-02
							Total Risk Across Surface Soil	**3.0E-06**					**Total Hazard Index Across Surface Soil**	**8.6E-02**
							Total Risk Across All Media and All Exposure Routes	**3E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.09**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 69
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU4

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	3.0E-06	3.1E-07	1.6E-10	3.3E-06	ARSENIC	Skin, Cardiovascular	1.2E-01	1.2E-02	4.2E-05	1.3E-01
			COBALT	--	--	5.2E-11	5.2E-11	COBALT	Thyroid	3.0E-02	--	1.7E-05	3.0E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.4E-03	--	1.3E-04	4.5E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	3.0E-08	8.3E-09	2.0E-13	3.9E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	6.6E-08	1.8E-08	4.3E-13	8.4E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	2.0E-07	5.5E-08	1.3E-12	2.6E-07	BENZO(A)PYRENE	Developmental System	3.9E-03	1.1E-03	6.4E-06	5.0E-03
			DIBENZ(A,H)ANTHRACENE	6.0E-08	1.6E-08	4.0E-13	7.7E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.1E-08	5.9E-09	1.4E-13	2.7E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	3.3E-06	4.2E-07	2.1E-10	3.8E-06		(Total)	1.5E-01	1.3E-02	2.0E-04	1.7E-01
							Total Risk Across Surface Soil	**3.8E-06**					**Total Hazard Index Across Surface Soil**	**1.7E-01**
							Total Risk Across All Media and All Exposure Routes	**4E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.2**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 70
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU4

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	3.2E-07	1.5E-07	1.2E-10	4.7E-07	ARSENIC	Skin, Cardiovascular	8.3E-03	3.9E-03	2.2E-05	1.2E-02
			COBALT	--	--	4.0E-11	4.0E-11	COBALT	Thyroid	2.2E-03	--	8.6E-06	2.2E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.2E-04	--	6.9E-05	3.9E-04
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	3.3E-09	4.0E-09	1.6E-13	7.3E-09	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	7.1E-09	8.6E-09	3.4E-13	1.6E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	2.2E-08	2.6E-08	1.0E-12	4.8E-08	BENZO(A)PYRENE	Developmental System	2.8E-04	3.4E-04	3.3E-06	6.3E-04
			DIBENZ(A,H)ANTHRACENE	6.5E-09	7.9E-09	3.1E-13	1.4E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.3E-09	2.8E-09	1.1E-13	5.2E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	3.6E-07	2.0E-07	1.6E-10	5.6E-07		(Total)	1.1E-02	4.2E-03	1.0E-04	1.5E-02
							Total Risk Across Surface Soil	**5.6E-07**					**Total Hazard Index Across Surface Soil**	**1.5E-02**
							Total Risk Across All Media and All Exposure Routes	**6E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 71
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU4

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (5 to 18 yea

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	2.2E-06	4.4E-07	2.0E-09	2.6E-06	ARSENIC	Skin, Cardiovascular	2.6E-02	5.2E-03	1.6E-04	3.2E-02
			COBALT	--	--	6.5E-10	6.5E-10	COBALT	Thyroid	6.9E-03	--	6.5E-05	7.0E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.0E-03	--	5.2E-04	1.5E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	2.3E-08	1.2E-08	2.5E-12	3.4E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	4.9E-08	2.5E-08	5.5E-12	7.4E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.5E-07	7.7E-08	1.7E-11	2.3E-07	BENZO(A)PYRENE	Developmental System	8.9E-04	4.6E-04	2.5E-05	1.4E-03
			DIBENZ(A,H)ANTHRACENE	4.5E-08	2.3E-08	5.0E-12	6.8E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	1.6E-08	8.2E-09	1.8E-12	2.4E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	2.5E-06	5.8E-07	2.6E-09	3.1E-06		(Total)	3.5E-02	5.7E-03	7.7E-04	4.2E-02
							Total Risk Across Surface Soil	**3.1E-06**					**Total Hazard Index Across Surface Soil**	**4.2E-02**
							Total Risk Across All Media and All Exposure Routes	**3E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.04**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 72
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU5

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU5	Ingestion	**Inorganics**												
				ARSENIC	1.28E+01	(mg/kg)	1.50E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.3E-06	4.21E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-02
				IRON	2.11E+04	(mg/kg)	4.13E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.16E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.7E-02
				MANGANESE	8.83E+02	(mg/kg)	1.73E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	4.84E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.5E-03
			Exp. Route Total								**2.3E-06**					**3.4E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.28E+01	(mg/kg)	3.18E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.8E-07	8.91E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.0E-03
				IRON	2.11E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	8.83E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**4.8E-07**					**3.0E-03**
		Exposure Point Total									**2.7E-06**					**3.7E-02**
	Exposure Medium Total										**2.7E-06**					**3.7E-02**
	Air	DU5	Inhalation	**Inorganics**												
				ARSENIC	1.06E-08	(mg/m^3)	5.52E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	2.4E-09	1.55E-09	(mg/m^3)	1.50E-05	(mg/m^3)	1.0E-04
				IRON	1.74E-05	(mg/m^3)	9.10E-04	(ug/m^3)	NA	per (ug/m^3)	--	2.55E-06	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	7.30E-07	(mg/m^3)	3.81E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.07E-07	(mg/m^3)	5.00E-05	(mg/m^3)	2.1E-03
			Exp. Route Total								**2.4E-09**					**2.2E-03**
		Exposure Point Total									**2.4E-09**					**2.2E-03**
	Exposure Medium Total										**2.4E-09**					**2.2E-03**
Soil Total											**2.7E-06**					**3.9E-02**
										Total of Receptor Risks Across All Media	**2.7E-06**			Total of Receptor Hazards Across All Media		**3.9E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 73
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU5

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU5	Ingestion	**Inorganics**												
				ARSENIC	1.28E+01	(mg/kg)	5.86E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.8E-08	1.37E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.6E-03
				IRON	2.11E+04	(mg/kg)	1.61E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	3.76E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	5.4E-03
				MANGANESE	8.83E+02	(mg/kg)	6.74E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.57E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.1E-03
			Exp. Route Total								**8.8E-08**					**1.1E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.28E+01	(mg/kg)	3.10E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.7E-08	7.24E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.4E-03
				IRON	2.11E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	8.83E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**4.7E-08**					**2.4E-03**
		Exposure Point Total									**1.3E-07**					**1.3E-02**
	Exposure Medium Total										**1.3E-07**					**1.3E-02**
	Air	DU5	Inhalation	**Inorganics**												
				ARSENIC	1.06E-08	(mg/m^3)	2.15E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	9.3E-11	5.02E-10	(mg/m^3)	1.50E-05	(mg/m^3)	3.3E-05
				IRON	1.74E-05	(mg/m^3)	3.55E-05	(ug/m^3)	NA	per (ug/m^3)	--	8.28E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	7.30E-07	(mg/m^3)	1.49E-06	(ug/m^3)	NA	per (ug/m^3)	--	3.47E-08	(mg/m^3)	5.00E-05	(mg/m^3)	6.9E-04
			Exp. Route Total								**9.3E-11**					**7.3E-04**
		Exposure Point Total									**9.3E-11**					**7.3E-04**
	Exposure Medium Total										**9.3E-11**					**7.3E-04**
Soil Total											**1.3E-07**					**1.4E-02**
										Total of Receptor Risks Across All Media	**1.3E-07**			Total of Receptor Hazards Across All Media		**1.4E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 74
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU5

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU5	Ingestion	**Inorganics**												
				ARSENIC	1.28E+01	(mg/kg)	3.41E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.1E-07	2.39E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.0E-02
				IRON	2.11E+04	(mg/kg)	9.37E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	6.56E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	9.4E-02
				MANGANESE	8.83E+02	(mg/kg)	3.92E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.74E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.0E-02
			Exp. Route Total								**5.1E-07**					**1.9E-01**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.28E+01	(mg/kg)	5.47E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.2E-08	3.83E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-02
				IRON	2.11E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	8.83E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**8.2E-08**					**1.3E-02**
		Exposure Point Total									**5.9E-07**					**2.1E-01**
	Exposure Medium Total										**5.9E-07**					**2.1E-01**
	Air	DU5	Inhalation	**Inorganics**												
				ARSENIC	6.21E-07	(mg/m^3)	3.20E-06	(ug/m^3)	4.3E-03	per (ug/m^3)	1.4E-08	2.24E-07	(mg/m^3)	1.50E-05	(mg/m^3)	1.5E-02
				IRON	1.02E-03	(mg/m^3)	5.28E-03	(ug/m^3)	NA	per (ug/m^3)	--	3.70E-04	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	4.29E-05	(mg/m^3)	2.21E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.55E-05	(mg/m^3)	5.00E-05	(mg/m^3)	3.1E-01
			Exp. Route Total								**1.4E-08**					**3.2E-01**
		Exposure Point Total									**1.4E-08**					**3.2E-01**
	Exposure Medium Total										**1.4E-08**					**3.2E-01**
Soil Total											**6.1E-07**					**5.3E-01**
										Total of Receptor Risks Across All Media	**6.1E-07**			Total of Receptor Hazards Across All Media		**5.3E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 75
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU5

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU5	Ingestion	**Inorganics**												
				ARSENIC	1.28E+01	(mg/kg)	2.33E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.5E-07	8.15E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.7E-03
				IRON	2.11E+04	(mg/kg)	6.40E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.24E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	3.2E-03
				MANGANESE	8.83E+02	(mg/kg)	2.68E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	9.37E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	6.7E-04
			Exp. Route Total								**3.5E-07**					**6.6E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.28E+01	(mg/kg)	4.92E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.4E-08	1.72E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.7E-04
				IRON	2.11E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	8.83E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**7.4E-08**					**5.7E-04**
		Exposure Point Total									**4.2E-07**					**7.2E-03**
	Exposure Medium Total										**4.2E-07**					**7.2E-03**
	Air	DU5	Inhalation	**Inorganics**												
				ARSENIC	1.06E-08	(mg/m^3)	4.28E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.8E-10	1.50E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.0E-05
				IRON	1.74E-05	(mg/m^3)	7.05E-05	(ug/m^3)	NA	per (ug/m^3)	--	2.47E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	7.30E-07	(mg/m^3)	2.95E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.03E-08	(mg/m^3)	5.00E-05	(mg/m^3)	2.1E-04
			Exp. Route Total								**1.8E-10**					**2.2E-04**
		Exposure Point Total									**1.8E-10**					**2.2E-04**
	Exposure Medium Total										**1.8E-10**					**2.2E-04**
Soil Total											**4.2E-07**					**7.4E-03**
										Total of Receptor Risks Across All Media	**4.2E-07**			Total of Receptor Hazards Across All Media		**7.4E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 76
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU5

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU5	Ingestion	**Inorganics**												
				ARSENIC	1.28E+01	(mg/kg)	3.28E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.9E-07	3.83E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-02
				IRON	2.11E+04	(mg/kg)	9.01E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	1.05E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.5E-02
				MANGANESE	8.83E+02	(mg/kg)	3.77E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	4.40E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.1E-03
			Exp. Route Total								**4.9E-07**					**3.1E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.28E+01	(mg/kg)	7.62E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.1E-07	8.89E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.0E-03
				IRON	2.11E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	8.83E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**1.1E-07**					**3.0E-03**
		Exposure Point Total									**6.1E-07**					**3.4E-02**
	Exposure Medium Total										**6.1E-07**					**3.4E-02**
	Air	DU5	Inhalation	**Inorganics**												
				ARSENIC	1.06E-08	(mg/m^3)	2.14E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	9.2E-11	2.50E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.7E-05
				IRON	1.74E-05	(mg/m^3)	3.53E-05	(ug/m^3)	NA	per (ug/m^3)	--	4.11E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	7.30E-07	(mg/m^3)	1.48E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.72E-08	(mg/m^3)	5.00E-05	(mg/m^3)	3.4E-04
			Exp. Route Total								**9.2E-11**					**3.6E-04**
		Exposure Point Total									**9.2E-11**					**3.6E-04**
	Exposure Medium Total										**9.2E-11**					**3.6E-04**
Soil Total											**6.1E-07**					**3.4E-02**
										Total of Receptor Risks Across All Media	**6.1E-07**			Total of Receptor Hazards Across All Media		**3.4E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 77
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU5

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	CSF/Unit Risk Value	CSF/Unit Risk Units	Cancer Risk	Non-Cancer Hazard Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	RfD/RfC Value	RfD/RfC Units	Hazard Quotient
Soil	Surface Soil	DU5	Ingestion	**Inorganics**												
				ARSENIC	1.28E+01	(mg/kg)	4.66E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.0E-07	8.15E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.7E-02
				IRON	2.11E+04	(mg/kg)	1.28E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	2.24E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	3.2E-02
				MANGANESE	8.83E+02	(mg/kg)	5.36E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	9.37E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	6.7E-03
			Exp. Route Total								**7.0E-07**					**6.6E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.28E+01	(mg/kg)	4.91E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.4E-08	8.59E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.9E-03
				IRON	2.11E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	8.83E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**7.4E-08**					**2.9E-03**
		Exposure Point Total									**7.7E-07**					**6.9E-02**
	Exposure Medium Total										**7.7E-07**					**6.9E-02**
	Air	DU5	Inhalation	**Inorganics**												
				ARSENIC	1.06E-08	(mg/m^3)	8.56E-09	(ug/m^3)	4.30E-03	per (ug/m^3)	3.7E-11	1.50E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.0E-05
				IRON	1.74E-05	(mg/m^3)	1.41E-05	(ug/m^3)	NA	per (ug/m^3)	--	2.47E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	7.30E-07	(mg/m^3)	5.90E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.03E-08	(mg/m^3)	5.00E-05	(mg/m^3)	2.1E-04
			Exp. Route Total								**3.7E-11**					**2.2E-04**
		Exposure Point Total									**3.7E-11**					**2.2E-04**
	Exposure Medium Total										**3.7E-11**					**2.2E-04**
Soil Total											**7.7E-07**					**6.9E-02**
										Total of Receptor Risks Across All Media	**7.7E-07**				Total of Receptor Hazards Across All Media	**6.9E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 78
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU5

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU5	Ingestion	**Inorganics**												
				ARSENIC	1.28E+01	(mg/kg)	5.06E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.6E-08	5.91E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.0E-03
				IRON	2.11E+04	(mg/kg)	1.39E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	1.62E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	2.3E-03
				MANGANESE	8.83E+02	(mg/kg)	5.82E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	6.79E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.9E-04
			Exp. Route Total								**7.6E-08**					**4.8E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.28E+01	(mg/kg)	2.35E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.5E-08	2.74E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.1E-04
				IRON	2.11E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	8.83E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**3.5E-08**					**9.1E-04**
		Exposure Point Total									**1.1E-07**					**5.7E-03**
	Exposure Medium Total										**1.1E-07**					**5.7E-03**
	Air	DU5	Inhalation	**Inorganics**												
				ARSENIC	1.06E-08	(mg/m^3)	6.62E-09	(ug/m^3)	4.30E-03	per (ug/m^3)	2.8E-11	7.73E-11	(mg/m^3)	1.50E-05	(mg/m^3)	5.2E-06
				IRON	1.74E-05	(mg/m^3)	1.09E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.27E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	7.30E-07	(mg/m^3)	4.57E-07	(ug/m^3)	NA	per (ug/m^3)	--	5.33E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.1E-04
			Exp. Route Total								**2.8E-11**					**1.1E-04**
		Exposure Point Total									**2.8E-11**					**1.1E-04**
	Exposure Medium Total										**2.8E-11**					**1.1E-04**
Soil Total											**1.1E-07**					**5.8E-03**
										Total of Receptor Risks Across All Media	**1.1E-07**				Total of Receptor Hazards Across All Media	**5.8E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 79
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU5

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU5	Ingestion	**Inorganics**												
				ARSENIC	1.28E+01	(mg/kg)	3.47E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.2E-07	1.87E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.2E-03
				IRON	2.11E+04	(mg/kg)	9.54E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	5.14E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	7.3E-03
				MANGANESE	8.83E+02	(mg/kg)	3.99E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.15E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.5E-03
			Exp. Route Total								**5.2E-07**					**1.5E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.28E+01	(mg/kg)	6.85E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.0E-07	3.69E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.2E-03
				IRON	2.11E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	8.83E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**1.0E-07**					**1.2E-03**
		Exposure Point Total									**6.2E-07**					**1.6E-02**
	Exposure Medium Total										**6.2E-07**					**1.6E-02**
	Air	DU5	Inhalation	**Inorganics**												
				ARSENIC	1.06E-08	(mg/m^3)	1.08E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	4.6E-10	5.80E-10	(mg/m^3)	1.50E-05	(mg/m^3)	3.9E-05
				IRON	1.74E-05	(mg/m^3)	1.77E-04	(ug/m^3)	NA	per (ug/m^3)	--	9.56E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	7.30E-07	(mg/m^3)	7.43E-06	(ug/m^3)	NA	per (ug/m^3)	--	4.00E-08	(mg/m^3)	5.00E-05	(mg/m^3)	8.0E-04
			Exp. Route Total								**4.6E-10**					**8.4E-04**
		Exposure Point Total									**4.6E-10**					**8.4E-04**
	Exposure Medium Total										**4.6E-10**					**8.4E-04**
Soil Total											**6.2E-07**					**1.7E-02**
										Total of Receptor Risks Across All Media	**6.2E-07**				Total of Receptor Hazards Across All Media	**1.7E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 80
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU5

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	2.3E-06	4.8E-07	2.4E-09	2.7E-06	ARSENIC	Skin, Cardiovascular	1.4E-02	3.0E-03	1.0E-04	1.7E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.7E-02	--	--	1.7E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.5E-03	--	2.1E-03	5.6E-03
			(Total)	2.3E-06	4.8E-07	2.4E-09	2.7E-06		(Total)	3.4E-02	3.0E-03	2.2E-03	3.9E-02
Total Risk Across Surface Soil							**2.7E-06**	**Total Hazard Index Across Surface Soil**					**3.9E-02**
Total Risk Across All Media and All Exposure Routes							**3E-06**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.04**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 81
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU5

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	8.8E-08	4.7E-08	9.3E-11	1.3E-07	ARSENIC	Skin, Cardiovascular	4.6E-03	2.4E-03	3.3E-05	7.0E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	5.4E-03	--	--	5.4E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.1E-03	--	6.9E-04	1.8E-03
			(Total)	8.8E-08	4.7E-08	9.3E-11	1.3E-07		(Total)	1.1E-02	2.4E-03	7.3E-04	1.4E-02
Total Risk Across Surface Soil							**1.3E-07**	**Total Hazard Index Across Surface Soil**					**1.4E-02**
Total Risk Across All Media and All Exposure Routes							**1E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.01**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 82
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU5

Location: Iona Island
Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	5.1E-07	8.2E-08	1.4E-08	6.1E-07	ARSENIC	Skin, Cardiovascular	8.0E-02	1.3E-02	1.5E-02	1.1E-01
			IRON	--	--	--	NA	IRON	Gastrointestinal System	9.4E-02	--	--	9.4E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.0E-02	--	3.1E-01	3.3E-01
			(Total)	5.1E-07	8.2E-08	1.4E-08	6.1E-07		(Total)	1.9E-01	1.3E-02	3.2E-01	5.3E-01
Total Risk Across Surface Soil							**6.1E-07**	**Total Hazard Index Across Surface Soil**					**5.3E-01**
Total Risk Across All Media and All Exposure Routes							**6E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.5**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 83
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU5

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	3.5E-07	7.4E-08	1.8E-10	4.2E-07	ARSENIC	Skin, Cardiovascular	2.7E-03	5.7E-04	1.0E-05	3.3E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	3.2E-03	--	--	3.2E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	6.7E-04	--	2.1E-04	8.8E-04
			(Total)	3.5E-07	7.4E-08	1.8E-10	4.2E-07		(Total)	6.6E-03	5.7E-04	2.2E-04	7.4E-03
			Total Risk Across Surface Soil				**4.2E-07**		**Total Hazard Index Across Surface Soil**				**7.4E-03**
			Total Risk Across All Media and All Exposure Routes				**4E-07**		**Total Hazard Index Across All Media and All Exposure Routes**				**0.007**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 84
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU5

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	4.9E-07	1.1E-07	9.2E-11	6.1E-07	ARSENIC	Skin, Cardiovascular	1.3E-02	3.0E-03	1.7E-05	1.6E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.5E-02	--	--	1.5E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.1E-03	--	3.4E-04	3.5E-03
			(Total)	4.9E-07	1.1E-07	9.2E-11	6.1E-07		(Total)	3.1E-02	3.0E-03	3.6E-04	3.4E-02
							Total Risk Across Surface Soil	**6.1E-07**					**Total Hazard Index Across Surface Soil**	**3.4E-02**
							Total Risk Across All Media and All Exposure Routes	**6E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.03**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 85
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU5

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	7.0E-07	7.4E-08	3.7E-11	7.7E-07	ARSENIC	Skin, Cardiovascular	2.7E-02	2.9E-03	1.0E-05	3.0E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	3.2E-02	--	--	3.2E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	6.7E-03	--	2.1E-04	6.9E-03
			(Total)	7.0E-07	7.4E-08	3.7E-11	7.7E-07		(Total)	6.6E-02	2.9E-03	2.2E-04	6.9E-02
Total Risk Across Surface Soil							**7.7E-07**	**Total Hazard Index Across Surface Soil**					**6.9E-02**
Total Risk Across All Media and All Exposure Routes							**8E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.07**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 86
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU5

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	7.6E-08	3.5E-08	2.8E-11	1.1E-07	ARSENIC	Skin, Cardiovascular	2.0E-03	9.1E-04	5.2E-06	2.9E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	2.3E-03	--	--	2.3E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.9E-04	--	1.1E-04	5.9E-04
			(Total)	7.6E-08	3.5E-08	2.8E-11	1.1E-07		(Total)	4.8E-03	9.1E-04	1.1E-04	5.8E-03
Total Risk Across Surface Soil							**1.1E-07**	**Total Hazard Index Across Surface Soil**					**5.8E-03**
Total Risk Across All Media and All Exposure Routes							**1E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.006**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 87
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU5

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	5.2E-07	1.0E-07	4.6E-10	6.2E-07	ARSENIC	Skin, Cardiovascular	6.2E-03	1.2E-03	3.9E-05	7.5E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	7.3E-03	--	--	7.3E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.5E-03	--	8.0E-04	2.3E-03
			(Total)	5.2E-07	1.0E-07	4.6E-10	6.2E-07		(Total)	1.5E-02	1.2E-03	8.4E-04	1.7E-02
Total Risk Across Surface Soil							**6.2E-07**	**Total Hazard Index Across Surface Soil**					**1.7E-02**
Total Risk Across All Media and All Exposure Routes							**6E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 88
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU6

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU6	Ingestion	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	1.59E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.4E-06	4.44E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				COBALT	9.33E+00	(mg/kg)	1.83E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	5.11E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.7E-02
				MANGANESE	1.13E+03	(mg/kg)	2.21E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	6.19E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.4E-03
			Exp. Route Total								**2.4E-06**					**3.6E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	3.35E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.0E-07	9.39E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.1E-03
				COBALT	9.33E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.13E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**5.0E-07**					**3.1E-03**
		Exposure Point Total									**2.9E-06**					**3.9E-02**
	Exposure Medium Total										**2.9E-06**					**3.9E-02**
	Air	DU6	Inhalation	**Inorganics**												
				ARSENIC	1.12E-08	(mg/m^3)	5.82E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	2.5E-09	1.63E-09	(mg/m^3)	1.50E-05	(mg/m^3)	1.1E-04
				COBALT	7.71E-09	(mg/m^3)	4.02E-07	(ug/m^3)	9.00E-03	per (ug/m^3)	3.6E-09	1.13E-09	(mg/m^3)	6.00E-06	(mg/m^3)	1.9E-04
				MANGANESE	9.34E-07	(mg/m^3)	4.87E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.36E-07	(mg/m^3)	5.00E-05	(mg/m^3)	2.7E-03
			Exp. Route Total								**6.1E-09**					**3.0E-03**
		Exposure Point Total									**6.1E-09**					**3.0E-03**
	Exposure Medium Total										**6.1E-09**					**3.0E-03**
Soil Total											**2.9E-06**					**4.2E-02**
										Total of Receptor Risks Across All Media	**2.9E-06**			Total of Receptor Hazards Across All Media		**4.2E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 89
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU6

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU6	Ingestion	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	6.18E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.3E-08	1.44E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.8E-03
				COBALT	9.33E+00	(mg/kg)	7.12E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.66E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.5E-03
				MANGANESE	1.13E+03	(mg/kg)	8.62E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	2.01E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.4E-03
			Exp. Route Total								**9.3E-08**					**1.2E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	3.27E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.9E-08	7.63E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.5E-03
				COBALT	9.33E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.13E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**4.9E-08**					**2.5E-03**
		Exposure Point Total									**1.4E-07**					**1.4E-02**
	Exposure Medium Total										**1.4E-07**					**1.4E-02**
	Air	DU6	Inhalation	**Inorganics**												
				ARSENIC	1.12E-08	(mg/m^3)	2.27E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	9.8E-11	5.30E-10	(mg/m^3)	1.50E-05	(mg/m^3)	3.5E-05
				COBALT	7.71E-09	(mg/m^3)	1.57E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.4E-10	3.66E-10	(mg/m^3)	6.00E-06	(mg/m^3)	6.1E-05
				MANGANESE	9.34E-07	(mg/m^3)	1.90E-06	(ug/m^3)	NA	per (ug/m^3)	--	4.43E-08	(mg/m^3)	5.00E-05	(mg/m^3)	8.9E-04
			Exp. Route Total								**2.4E-10**					**9.8E-04**
		Exposure Point Total									**2.4E-10**					**9.8E-04**
	Exposure Medium Total										**2.4E-10**					**9.8E-04**
Soil Total											**1.4E-07**					**1.5E-02**
										Total of Receptor Risks Across All Media	**1.4E-07**				Total of Receptor Hazards Across All Media	**1.5E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 90
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU6

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU6	Ingestion	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	3.60E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.4E-07	2.52E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.4E-02
				COBALT	9.33E+00	(mg/kg)	4.14E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.90E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.7E-02
				MANGANESE	1.13E+03	(mg/kg)	5.02E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.51E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.5E-02
			Exp. Route Total								**5.4E-07**					**2.1E-01**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	5.77E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.6E-08	4.04E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-02
				COBALT	9.33E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.13E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**8.6E-08**					**1.3E-02**
		Exposure Point Total									**6.3E-07**					**2.2E-01**
	Exposure Medium Total										**6.3E-07**					**2.2E-01**
	Air	DU6	Inhalation	**Inorganics**												
				ARSENIC	6.55E-07	(mg/m^3)	3.38E-06	(ug/m^3)	4.3E-03	per (ug/m^3)	1.5E-08	2.37E-07	(mg/m^3)	1.50E-05	(mg/m^3)	1.6E-02
				COBALT	4.53E-07	(mg/m^3)	2.34E-06	(ug/m^3)	9.0E-03	per (ug/m^3)	2.1E-08	1.64E-07	(mg/m^3)	6.00E-06	(mg/m^3)	2.7E-02
				MANGANESE	5.49E-05	(mg/m^3)	2.83E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.98E-05	(mg/m^3)	5.00E-05	(mg/m^3)	4.0E-01
			Exp. Route Total								**3.6E-08**					**4.4E-01**
		Exposure Point Total									**3.6E-08**					**4.4E-01**
	Exposure Medium Total										**3.6E-08**					**4.4E-01**
Soil Total											**6.6E-07**					**6.6E-01**
										Total of Receptor Risks Across All Media	**6.6E-07**			Total of Receptor Hazards Across All Media		**6.6E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 91
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU6

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU6	Ingestion	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	2.46E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.7E-07	8.60E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.9E-03
				COBALT	9.33E+00	(mg/kg)	2.83E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	9.91E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.3E-03
				MANGANESE	1.13E+03	(mg/kg)	3.43E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.20E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	8.6E-04
			Exp. Route Total								**3.7E-07**					**7.0E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	5.19E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.8E-08	1.82E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.1E-04
				COBALT	9.33E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.13E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**7.8E-08**					**6.1E-04**
		Exposure Point Total									**4.5E-07**					**7.6E-03**
	Exposure Medium Total										**4.5E-07**					**7.6E-03**
	Air	DU6	Inhalation	**Inorganics**												
				ARSENIC	1.12E-08	(mg/m^3)	4.51E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.9E-10	1.58E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.1E-05
				COBALT	7.71E-09	(mg/m^3)	3.12E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	2.8E-10	1.09E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.8E-05
				MANGANESE	9.34E-07	(mg/m^3)	3.78E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.32E-08	(mg/m^3)	5.00E-05	(mg/m^3)	2.6E-04
			Exp. Route Total								**4.7E-10**					**2.9E-04**
		Exposure Point Total									**4.7E-10**					**2.9E-04**
	Exposure Medium Total										**4.7E-10**					**2.9E-04**
Soil Total											**4.5E-07**					**7.9E-03**
										Total of Receptor Risks Across All Media	**4.5E-07**			Total of Receptor Hazards Across All Media		**7.9E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 92
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU6

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU6	Ingestion	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	3.46E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.2E-07	4.04E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-02
				COBALT	9.33E+00	(mg/kg)	3.99E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	4.65E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.6E-02
				MANGANESE	1.13E+03	(mg/kg)	4.83E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	5.63E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.0E-03
			Exp. Route Total								**5.2E-07**					**3.3E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	8.04E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.2E-07	9.38E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.1E-03
				COBALT	9.33E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.13E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**1.2E-07**					**3.1E-03**
		Exposure Point Total									**6.4E-07**					**3.6E-02**
	Exposure Medium Total										**6.4E-07**					**3.6E-02**
	Air	DU6	Inhalation	**Inorganics**												
				ARSENIC	1.12E-08	(mg/m^3)	2.26E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	9.7E-11	2.63E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.8E-05
				COBALT	7.71E-09	(mg/m^3)	1.56E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.4E-10	1.82E-10	(mg/m^3)	6.00E-06	(mg/m^3)	3.0E-05
				MANGANESE	9.34E-07	(mg/m^3)	1.89E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.20E-08	(mg/m^3)	5.00E-05	(mg/m^3)	4.4E-04
			Exp. Route Total								**2.4E-10**					**4.9E-04**
		Exposure Point Total									**2.4E-10**					**4.9E-04**
	Exposure Medium Total										**2.4E-10**					**4.9E-04**
Soil Total											**6.4E-07**					**3.7E-02**
										Total of Receptor Risks Across All Media	**6.4E-07**			Total of Receptor Hazards Across All Media		**3.7E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 93
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU6

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU6	Ingestion	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	4.91E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.4E-07	8.60E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.9E-02
				COBALT	9.33E+00	(mg/kg)	5.66E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	9.91E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.3E-02
				MANGANESE	1.13E+03	(mg/kg)	6.86E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.20E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	8.6E-03
			Exp. Route Total								**7.4E-07**					**7.0E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	5.18E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.8E-08	9.06E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.0E-03
				COBALT	9.33E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.13E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**7.8E-08**					**3.0E-03**
		Exposure Point Total									**8.1E-07**					**7.3E-02**
	Exposure Medium Total										**8.1E-07**					**7.3E-02**
	Air	DU6	Inhalation	**Inorganics**												
				ARSENIC	1.12E-08	(mg/m^3)	9.02E-09	(ug/m^3)	4.30E-03	per (ug/m^3)	3.9E-11	1.58E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.1E-05
				COBALT	7.71E-09	(mg/m^3)	6.24E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	5.6E-11	1.09E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.8E-05
				MANGANESE	9.34E-07	(mg/m^3)	7.55E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.32E-08	(mg/m^3)	5.00E-05	(mg/m^3)	2.6E-04
			Exp. Route Total								**9.5E-11**					**2.9E-04**
		Exposure Point Total									**9.5E-11**					**2.9E-04**
	Exposure Medium Total										**9.5E-11**					**2.9E-04**
Soil Total											**8.1E-07**					**7.4E-02**
										Total of Receptor Risks Across All Media	**8.1E-07**				Total of Receptor Hazards Across All Media	**7.4E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 94
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU6

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU6	Ingestion	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	5.34E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.0E-08	6.23E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.1E-03
				COBALT	9.33E+00	(mg/kg)	6.15E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	7.18E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.4E-03
				MANGANESE	1.13E+03	(mg/kg)	7.45E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	8.69E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	6.2E-04
			Exp. Route Total								**8.0E-08**					**5.1E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	2.48E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.7E-08	2.89E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.6E-04
				COBALT	9.33E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.13E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**3.7E-08**					**9.6E-04**
		Exposure Point Total									**1.2E-07**					**6.1E-03**
	Exposure Medium Total										**1.2E-07**					**6.1E-03**
	Air	DU6	Inhalation	**Inorganics**												
				ARSENIC	1.12E-08	(mg/m^3)	6.99E-09	(ug/m^3)	4.30E-03	per (ug/m^3)	3.0E-11	8.15E-11	(mg/m^3)	1.50E-05	(mg/m^3)	5.4E-06
				COBALT	7.71E-09	(mg/m^3)	4.83E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	4.3E-11	5.63E-11	(mg/m^3)	6.00E-06	(mg/m^3)	9.4E-06
				MANGANESE	9.34E-07	(mg/m^3)	5.85E-07	(ug/m^3)	NA	per (ug/m^3)	--	6.82E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.4E-04
			Exp. Route Total								**7.4E-11**					**1.5E-04**
		Exposure Point Total									**7.4E-11**					**1.5E-04**
	Exposure Medium Total										**7.4E-11**					**1.5E-04**
Soil Total											**1.2E-07**					**6.2E-03**
										Total of Receptor Risks Across All Media	**1.2E-07**				Total of Receptor Hazards Across All Media	**6.2E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 95
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU6

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU6	Ingestion	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	3.66E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.5E-07	1.97E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.6E-03
				COBALT	9.33E+00	(mg/kg)	4.22E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.27E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.6E-03
				MANGANESE	1.13E+03	(mg/kg)	5.11E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.75E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.0E-03
			Exp. Route Total								**5.5E-07**					**1.6E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.35E+01	(mg/kg)	7.23E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.1E-07	3.89E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-03
				COBALT	9.33E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.13E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**1.1E-07**					**1.3E-03**
		Exposure Point Total									**6.6E-07**					**1.7E-02**
	Exposure Medium Total										**6.6E-07**					**1.7E-02**
	Air	DU6	Inhalation	**Inorganics**												
				ARSENIC	1.12E-08	(mg/m^3)	1.14E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	4.9E-10	6.11E-10	(mg/m^3)	1.50E-05	(mg/m^3)	4.1E-05
				COBALT	7.71E-09	(mg/m^3)	7.85E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	7.1E-10	4.23E-10	(mg/m^3)	6.00E-06	(mg/m^3)	7.0E-05
				MANGANESE	9.34E-07	(mg/m^3)	9.50E-06	(ug/m^3)	NA	per (ug/m^3)	--	5.12E-08	(mg/m^3)	5.00E-05	(mg/m^3)	1.0E-03
			Exp. Route Total								**1.2E-09**					**1.1E-03**
		Exposure Point Total									**1.2E-09**					**1.1E-03**
	Exposure Medium Total										**1.2E-09**					**1.1E-03**
Soil Total											**6.6E-07**					**1.9E-02**
											Total of Receptor Risks Across All Media **6.6E-07**					Total of Receptor Hazards Across All Media **1.9E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 96
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU6

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	2.4E-06	5.0E-07	2.5E-09	2.9E-06	ARSENIC	Skin, Cardiovascular	1.5E-02	3.1E-03	1.1E-04	1.8E-02
			COBALT	--	--	3.6E-09	3.6E-09	COBALT	Thyroid	1.7E-02	--	1.9E-04	1.7E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.4E-03	--	2.7E-03	7.2E-03
			(Total)	2.4E-06	5.0E-07	6.1E-09	2.9E-06		(Total)	3.6E-02	3.1E-03	3.0E-03	4.2E-02
Total Risk Across Surface Soil							**2.9E-06**	**Total Hazard Index Across Surface Soil**					**4.2E-02**
Total Risk Across All Media and All Exposure Routes							**3E-06**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.04**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 97
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU6

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	9.3E-08	4.9E-08	9.8E-11	1.4E-07	ARSENIC	Skin, Cardiovascular	4.8E-03	2.5E-03	3.5E-05	7.4E-03
			COBALT	--	--	1.4E-10	1.4E-10	COBALT	Thyroid	5.5E-03	--	6.1E-05	5.6E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.4E-03	--	8.9E-04	2.3E-03
			(Total)	9.3E-08	4.9E-08	2.4E-10	1.4E-07		(Total)	1.2E-02	2.5E-03	9.8E-04	1.5E-02
Total Risk Across Surface Soil							**1.4E-07**	**Total Hazard Index Across Surface Soil**					**1.5E-02**
Total Risk Across All Media and All Exposure Routes							**1E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 98
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU6

Location: Iona Island
Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	5.4E-07	8.6E-08	1.5E-08	6.4E-07	ARSENIC	Skin, Cardiovascular	8.4E-02	1.3E-02	1.6E-02	1.1E-01
			COBALT	--	--	2.1E-08	2.1E-08	COBALT	Thyroid	9.7E-02	--	2.7E-02	1.2E-01
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.5E-02	--	4.0E-01	4.2E-01
			(Total)	5.4E-07	8.6E-08	3.6E-08	6.6E-07		(Total)	2.1E-01	1.3E-02	4.4E-01	6.6E-01
							Total Risk Across Surface Soil	**6.6E-07**					**Total Hazard Index Across Surface Soil**	**6.6E-01**
							Total Risk Across All Media and All Exposure Routes	**7E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.7**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 99
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU6

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	3.7E-07	7.8E-08	1.9E-10	4.5E-07	ARSENIC	Skin, Cardiovascular	2.9E-03	6.1E-04	1.1E-05	3.5E-03
			COBALT	--	--	2.8E-10	2.8E-10	COBALT	Thyroid	3.3E-03	--	1.8E-05	3.3E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	8.6E-04	--	2.6E-04	1.1E-03
			(Total)	3.7E-07	7.8E-08	4.7E-10	4.5E-07		(Total)	7.0E-03	6.1E-04	2.9E-04	7.9E-03
Total Risk Across Surface Soil							**4.5E-07**	**Total Hazard Index Across Surface Soil**					**7.9E-03**
Total Risk Across All Media and All Exposure Routes							**4E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.008**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 100
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU6

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	5.2E-07	1.2E-07	9.7E-11	6.4E-07	ARSENIC	Skin, Cardiovascular	1.3E-02	3.1E-03	1.8E-05	1.7E-02
			COBALT	--	--	1.4E-10	1.4E-10	COBALT	Thyroid	1.6E-02	--	3.0E-05	1.6E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.0E-03	--	4.4E-04	4.5E-03
			(Total)	5.2E-07	1.2E-07	2.4E-10	6.4E-07		(Total)	3.3E-02	3.1E-03	4.9E-04	3.7E-02
Total Risk Across Surface Soil							**6.4E-07**	**Total Hazard Index Across Surface Soil**					**3.7E-02**
Total Risk Across All Media and All Exposure Routes							**6E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.04**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 101
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU6

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	7.4E-07	7.8E-08	3.9E-11	8.1E-07	ARSENIC	Skin, Cardiovascular	2.9E-02	3.0E-03	1.1E-05	3.2E-02
			COBALT	--	--	5.6E-11	5.6E-11	COBALT	Thyroid	3.3E-02	--	1.8E-05	3.3E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	8.6E-03	--	2.6E-04	8.8E-03
			(Total)	7.4E-07	7.8E-08	9.5E-11	8.1E-07		(Total)	7.0E-02	3.0E-03	2.9E-04	7.4E-02
Total Risk Across Surface Soil							**8.1E-07**	**Total Hazard Index Across Surface Soil**					**7.4E-02**
Total Risk Across All Media and All Exposure Routes							**8E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.07**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 102
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU6

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	8.0E-08	3.7E-08	3.0E-11	1.2E-07	ARSENIC	Skin, Cardiovascular	2.1E-03	9.6E-04	5.4E-06	3.0E-03
			COBALT	--	--	4.3E-11	4.3E-11	COBALT	Thyroid	2.4E-03	--	9.4E-06	2.4E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	6.2E-04	--	1.4E-04	7.6E-04
			(Total)	8.0E-08	3.7E-08	7.4E-11	1.2E-07		(Total)	5.1E-03	9.6E-04	1.5E-04	6.2E-03
Total Risk Across Surface Soil							**1.2E-07**	**Total Hazard Index Across Surface Soil**					**6.2E-03**
Total Risk Across All Media and All Exposure Routes							**1E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.006**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 103
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU6

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	5.5E-07	1.1E-07	4.9E-10	6.6E-07	ARSENIC	Skin, Cardiovascular	6.6E-03	1.3E-03	4.1E-05	7.9E-03
			COBALT	--	--	7.1E-10	7.1E-10	COBALT	Thyroid	7.6E-03	--	7.0E-05	7.6E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.0E-03	--	1.0E-03	3.0E-03
			(Total)	5.5E-07	1.1E-07	1.2E-09	6.6E-07		(Total)	1.6E-02	1.3E-03	1.1E-03	1.9E-02
Total Risk Across Surface Soil							**6.6E-07**	**Total Hazard Index Across Surface Soil**					**1.9E-02**
Total Risk Across All Media and All Exposure Routes							**7E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 104
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU7

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU7	Ingestion	**Inorganics**												
				ARSENIC	1.88E+01	(mg/kg)	2.21E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.3E-06	6.18E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.1E-02
				MANGANESE	7.57E+02	(mg/kg)	1.48E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	4.15E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.0E-03
				THALLIUM	2.32E-01	(mg/kg)	4.54E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.27E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	1.3E-02
			Exp. Route Total								**3.3E-06**					**3.6E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.88E+01	(mg/kg)	4.67E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.0E-07	1.31E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.4E-03
				MANGANESE	7.57E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	2.32E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
			Exp. Route Total								**7.0E-07**					**4.4E-03**
		Exposure Point Total									**4.0E-06**					**4.1E-02**
	Exposure Medium Total										**4.0E-06**					**4.1E-02**
	Air	DU7	Inhalation	**Inorganics**												
				ARSENIC	1.55E-08	(mg/m^3)	8.11E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	3.5E-09	2.27E-09	(mg/m^3)	1.50E-05	(mg/m^3)	1.5E-04
				MANGANESE	6.26E-07	(mg/m^3)	3.26E-05	(ug/m^3)	NA	per (ug/m^3)	--	9.14E-08	(mg/m^3)	5.00E-05	(mg/m^3)	1.8E-03
				THALLIUM	1.92E-10	(mg/m^3)	1.00E-08	(ug/m^3)	NA	per (ug/m^3)	--	2.80E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**3.5E-09**					**2.0E-03**
		Exposure Point Total									**3.5E-09**					**2.0E-03**
	Exposure Medium Total										**3.5E-09**					**2.0E-03**
Soil Total											**4.0E-06**					**4.3E-02**
										Total of Receptor Risks Across All Media	**4.0E-06**			Total of Receptor Hazards Across All Media		**4.3E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 105
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU7

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	CSF/Unit Risk Value	CSF/Unit Risk Units	Cancer Risk	Non-Cancer Hazard Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	RfD/RfC Value	RfD/RfC Units	Hazard Quotient
Soil	Surface Soil	DU7	Ingestion	**Inorganics**												
				ARSENIC	1.88E+01	(mg/kg)	8.61E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.3E-07	2.01E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.7E-03
				MANGANESE	7.57E+02	(mg/kg)	5.78E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.35E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	9.6E-04
				THALLIUM	2.32E-01	(mg/kg)	1.77E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	4.13E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	4.1E-03
			Exp. Route Total								**1.3E-07**					**1.2E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.88E+01	(mg/kg)	4.55E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	6.8E-08	1.06E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.5E-03
				MANGANESE	7.57E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	2.32E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
			Exp. Route Total								**6.8E-08**					**3.5E-03**
		Exposure Point Total									**2.0E-07**					**1.5E-02**
	Exposure Medium Total										**2.0E-07**					**1.5E-02**
	Air	DU7	Inhalation	**Inorganics**												
				ARSENIC	1.55E-08	(mg/m^3)	3.16E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.4E-10	7.38E-10	(mg/m^3)	1.50E-05	(mg/m^3)	4.9E-05
				MANGANESE	6.26E-07	(mg/m^3)	1.27E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.97E-08	(mg/m^3)	5.00E-05	(mg/m^3)	5.9E-04
				THALLIUM	1.92E-10	(mg/m^3)	3.90E-10	(ug/m^3)	NA	per (ug/m^3)	--	9.11E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.4E-10**					**6.4E-04**
		Exposure Point Total									**1.4E-10**					**6.4E-04**
	Exposure Medium Total										**1.4E-10**					**6.4E-04**
Soil Total											**2.0E-07**					**1.6E-02**
										Total of Receptor Risks Across All Media	**2.0E-07**			Total of Receptor Hazards Across All Media		**1.6E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 106
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU7

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU7	Ingestion	**Inorganics**												
				ARSENIC	1.88E+01	(mg/kg)	5.01E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.5E-07	3.51E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.2E-01
				MANGANESE	7.57E+02	(mg/kg)	3.36E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.35E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.7E-02
				THALLIUM	2.32E-01	(mg/kg)	1.03E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	3.87E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	3.9E-02
			Exp. Route Total								**7.5E-07**					**1.7E-01**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.88E+01	(mg/kg)	8.03E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.2E-07	5.62E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.9E-02
				MANGANESE	7.57E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	2.32E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
			Exp. Route Total								**1.2E-07**					**1.9E-02**
		Exposure Point Total									**8.7E-07**					**1.9E-01**
	Exposure Medium Total										**8.7E-07**					**1.9E-01**
	Air	DU7	Inhalation	**Inorganics**												
				ARSENIC	9.13E-07	(mg/m^3)	4.71E-06	(ug/m^3)	4.3E-03	per (ug/m^3)	2.0E-08	3.29E-07	(mg/m^3)	1.50E-05	(mg/m^3)	2.2E-02
				MANGANESE	3.67E-05	(mg/m^3)	1.90E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.33E-05	(mg/m^3)	5.00E-05	(mg/m^3)	2.7E-01
				THALLIUM	1.92E-10	(mg/m^3)	9.89E-10	(ug/m^3)	NA	per (ug/m^3)	--	6.92E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**2.0E-08**					**2.9E-01**
		Exposure Point Total									**2.0E-08**					**2.9E-01**
	Exposure Medium Total										**2.0E-08**					**2.9E-01**
Soil Total											**8.9E-07**					**4.8E-01**
										Total of Receptor Risks Across All Media	**8.9E-07**			Total of Receptor Hazards Across All Media		**4.8E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 107
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU7

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU7	Ingestion	**Inorganics**												
				ARSENIC	1.88E+01	(mg/kg)	3.42E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.1E-07	1.20E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.0E-03
				MANGANESE	7.57E+02	(mg/kg)	2.30E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	8.04E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	5.7E-04
				THALLIUM	2.32E-01	(mg/kg)	7.04E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	2.46E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	2.5E-03
			Exp. Route Total								**5.1E-07**					**7.0E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.88E+01	(mg/kg)	7.22E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.1E-07	2.53E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.4E-04
				MANGANESE	7.57E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	2.32E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
			Exp. Route Total								**1.1E-07**					**8.4E-04**
		Exposure Point Total									**6.2E-07**					**7.9E-03**
	Exposure Medium Total										**6.2E-07**					**7.9E-03**
	Air	DU7	Inhalation	**Inorganics**												
				ARSENIC	1.55E-08	(mg/m^3)	6.28E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	2.7E-10	2.20E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.5E-05
				MANGANESE	6.26E-07	(mg/m^3)	2.53E-06	(ug/m^3)	NA	per (ug/m^3)	--	8.86E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.8E-04
				THALLIUM	1.92E-10	(mg/m^3)	7.75E-10	(ug/m^3)	NA	per (ug/m^3)	--	2.71E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**2.7E-10**					**1.9E-04**
		Exposure Point Total									**2.7E-10**					**1.9E-04**
	Exposure Medium Total										**2.7E-10**					**1.9E-04**
Soil Total											**6.2E-07**					**8.1E-03**
										Total of Receptor Risks Across All Media	**6.2E-07**				Total of Receptor Hazards Across All Media	**8.1E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 108
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU7

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	CSF/Unit Risk Value	CSF/Unit Risk Units	Cancer Risk	Non-Cancer Hazard Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	RfD/RfC Value	RfD/RfC Units	Hazard Quotient
Soil	Surface Soil	DU7	Ingestion	**Inorganics**												
				ARSENIC	1.88E+01	(mg/kg)	4.82E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.2E-07	5.62E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.9E-02
				MANGANESE	7.57E+02	(mg/kg)	3.23E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.77E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.7E-03
				THALLIUM	2.32E-01	(mg/kg)	9.91E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	1.16E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	1.2E-02
			Exp. Route Total								**7.2E-07**					**3.3E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.88E+01	(mg/kg)	1.12E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.7E-07	1.31E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.4E-03
				MANGANESE	7.57E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	2.32E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
			Exp. Route Total								**1.7E-07**					**4.4E-03**
		Exposure Point Total									**8.9E-07**					**3.7E-02**
	Exposure Medium Total										**8.9E-07**					**3.7E-02**
	Air	DU7	Inhalation	**Inorganics**												
				ARSENIC	1.55E-08	(mg/m^3)	3.14E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.4E-10	3.67E-10	(mg/m^3)	1.50E-05	(mg/m^3)	2.4E-05
				MANGANESE	6.26E-07	(mg/m^3)	1.27E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.48E-08	(mg/m^3)	5.00E-05	(mg/m^3)	3.0E-04
				THALLIUM	1.92E-10	(mg/m^3)	3.88E-10	(ug/m^3)	NA	per (ug/m^3)	--	4.52E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.4E-10**					**3.2E-04**
		Exposure Point Total									**1.4E-10**					**3.2E-04**
	Exposure Medium Total										**1.4E-10**					**3.2E-04**
Soil Total											**8.9E-07**					**3.8E-02**
										Total of Receptor Risks Across All Media	**8.9E-07**				Total of Receptor Hazards Across All Media	**3.8E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 109
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU7

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU7	Ingestion	**Inorganics**												
				ARSENIC	1.88E+01	(mg/kg)	6.84E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.0E-06	1.20E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.0E-02
				MANGANESE	7.57E+02	(mg/kg)	4.59E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	8.04E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	5.7E-03
				THALLIUM	2.32E-01	(mg/kg)	1.41E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	2.46E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	2.5E-02
			Exp. Route Total								**1.0E-06**					**7.0E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.88E+01	(mg/kg)	7.21E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.1E-07	1.26E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.2E-03
				MANGANESE	7.57E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	2.32E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
			Exp. Route Total								**1.1E-07**					**4.2E-03**
		Exposure Point Total									**1.1E-06**					**7.4E-02**
	Exposure Medium Total										**1.1E-06**					**7.4E-02**
	Air	DU7	Inhalation	**Inorganics**												
				ARSENIC	1.55E-08	(mg/m^3)	1.26E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	5.4E-11	2.20E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.5E-05
				MANGANESE	6.26E-07	(mg/m^3)	5.06E-07	(ug/m^3)	NA	per (ug/m^3)	--	8.86E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.8E-04
				THALLIUM	1.92E-10	(mg/m^3)	1.55E-10	(ug/m^3)	NA	per (ug/m^3)	--	2.71E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**5.4E-11**					**1.9E-04**
		Exposure Point Total									**5.4E-11**					**1.9E-04**
	Exposure Medium Total										**5.4E-11**					**1.9E-04**
Soil Total											**1.1E-06**					**7.5E-02**
										Total of Receptor Risks Across All Media	**1.1E-06**			Total of Receptor Hazards Across All Media		**7.5E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 110
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU7

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	CSF/Unit Risk Value	CSF/Unit Risk Units	Cancer Risk	Non-Cancer Hazard Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	RfD/RfC Value	RfD/RfC Units	Hazard Quotient
Soil	Surface Soil	DU7	Ingestion	**Inorganics**												
				ARSENIC	1.88E+01	(mg/kg)	7.44E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.1E-07	8.67E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.9E-03
				MANGANESE	7.57E+02	(mg/kg)	4.99E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	5.82E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.2E-04
				THALLIUM	2.32E-01	(mg/kg)	1.53E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	1.78E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	1.8E-03
			Exp. Route Total								**1.1E-07**					**5.1E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.88E+01	(mg/kg)	3.45E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.2E-08	4.03E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-03
				MANGANESE	7.57E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	2.32E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
			Exp. Route Total								**5.2E-08**					**1.3E-03**
		Exposure Point Total									**1.6E-07**					**6.4E-03**
	Exposure Medium Total										**1.6E-07**					**6.4E-03**
Soil	Air	DU7	Inhalation	**Inorganics**												
				ARSENIC	1.55E-08	(mg/m^3)	9.73E-09	(ug/m^3)	4.30E-03	per (ug/m^3)	4.2E-11	1.14E-10	(mg/m^3)	1.50E-05	(mg/m^3)	7.6E-06
				MANGANESE	6.26E-07	(mg/m^3)	3.92E-07	(ug/m^3)	NA	per (ug/m^3)	--	4.57E-09	(mg/m^3)	5.00E-05	(mg/m^3)	9.1E-05
				THALLIUM	1.92E-10	(mg/m^3)	1.20E-10	(ug/m^3)	NA	per (ug/m^3)	--	1.40E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**4.2E-11**					**9.9E-05**
		Exposure Point Total									**4.2E-11**					**9.9E-05**
	Exposure Medium Total										**4.2E-11**					**9.9E-05**
Soil Total											**1.6E-07**					**6.5E-03**
										Total of Receptor Risks Across All Media	**1.6E-07**				Total of Receptor Hazards Across All Media	**6.5E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 111
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU7

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU7	Ingestion	**Inorganics**												
				ARSENIC	1.88E+01	(mg/kg)	5.10E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.7E-07	2.75E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.2E-03
				MANGANESE	7.57E+02	(mg/kg)	3.42E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.84E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.3E-03
				THALLIUM	2.32E-01	(mg/kg)	1.05E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	5.65E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	5.6E-03
			Exp. Route Total								**7.7E-07**					**1.6E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.88E+01	(mg/kg)	1.01E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.5E-07	5.42E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.8E-03
				MANGANESE	7.57E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	2.32E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
			Exp. Route Total								**1.5E-07**					**1.8E-03**
		Exposure Point Total									**9.2E-07**					**1.8E-02**
	Exposure Medium Total										**9.2E-07**					**1.8E-02**
	Air	DU7	Inhalation	**Inorganics**												
				ARSENIC	1.55E-08	(mg/m^3)	1.58E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	6.8E-10	8.51E-10	(mg/m^3)	1.50E-05	(mg/m^3)	5.7E-05
				MANGANESE	6.26E-07	(mg/m^3)	6.37E-06	(ug/m^3)	NA	per (ug/m^3)	--	3.43E-08	(mg/m^3)	5.00E-05	(mg/m^3)	6.9E-04
				THALLIUM	1.92E-10	(mg/m^3)	1.95E-09	(ug/m^3)	NA	per (ug/m^3)	--	1.05E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**6.8E-10**					**7.4E-04**
		Exposure Point Total									**6.8E-10**					**7.4E-04**
	Exposure Medium Total										**6.8E-10**					**7.4E-04**
Soil Total											**9.2E-07**					**1.9E-02**
										Total of Receptor Risks Across All Media	**9.2E-07**				Total of Receptor Hazards Across All Media	**1.9E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 112
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU7

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	3.3E-06	7.0E-07	3.5E-09	4.0E-06	ARSENIC	Skin, Cardiovascular	2.1E-02	4.4E-03	1.5E-04	2.5E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.0E-03	--	1.8E-03	4.8E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	1.3E-02	--	--	1.3E-02
			(Total)	3.3E-06	7.0E-07	3.5E-09	4.0E-06		(Total)	3.6E-02	4.4E-03	2.0E-03	4.3E-02
Total Risk Across Surface Soil							**4.0E-06**	**Total Hazard Index Across Surface Soil**					**4.3E-02**
Total Risk Across All Media and All Exposure Routes							**4E-06**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.04**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 113
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU7

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	1.3E-07	6.8E-08	1.4E-10	2.0E-07	ARSENIC	Skin, Cardiovascular	6.7E-03	3.5E-03	4.9E-05	1.0E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	9.6E-04	--	5.9E-04	1.6E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	4.1E-03	--	--	4.1E-03
			(Total)	1.3E-07	6.8E-08	1.4E-10	2.0E-07		(Total)	1.2E-02	3.5E-03	6.4E-04	1.6E-02
Total Risk Across Surface Soil							**2.0E-07**	**Total Hazard Index Across Surface Soil**					**1.6E-02**
Total Risk Across All Media and All Exposure Routes							**2E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 114
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU7

Location: Iona Island
Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	7.5E-07	1.2E-07	2.0E-08	8.9E-07	ARSENIC	Skin, Cardiovascular	1.2E-01	1.9E-02	2.2E-02	1.6E-01
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.7E-02	--	2.7E-01	2.8E-01
			THALLIUM	--	--	--	NA	THALLIUM	Hair	3.9E-02	--	--	3.9E-02
			(Total)	7.5E-07	1.2E-07	2.0E-08	8.9E-07		(Total)	1.7E-01	1.9E-02	2.9E-01	4.8E-01
							Total Risk Across Surface Soil	**8.9E-07**					**Total Hazard Index Across Surface Soil**	**4.8E-01**
							Total Risk Across All Media and All Exposure Routes	**9E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.5**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 115
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU7

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	5.1E-07	1.1E-07	2.7E-10	6.2E-07	ARSENIC	Skin, Cardiovascular	4.0E-03	8.4E-04	1.5E-05	4.8E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	5.7E-04	--	1.8E-04	7.5E-04
			THALLIUM	--	--	--	NA	THALLIUM	Hair	2.5E-03	--	--	2.5E-03
			(Total)	5.1E-07	1.1E-07	2.7E-10	6.2E-07		(Total)	7.0E-03	8.4E-04	1.9E-04	8.1E-03
Total Risk Across Surface Soil							**6.2E-07**	**Total Hazard Index Across Surface Soil**					**8.1E-03**
Total Risk Across All Media and All Exposure Routes							**6E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.008**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 116
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU7

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	7.2E-07	1.7E-07	1.4E-10	8.9E-07	ARSENIC	Skin, Cardiovascular	1.9E-02	4.4E-03	2.4E-05	2.3E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.7E-03	--	3.0E-04	3.0E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	1.2E-02	--	--	1.2E-02
			(Total)	7.2E-07	1.7E-07	1.4E-10	8.9E-07		(Total)	3.3E-02	4.4E-03	3.2E-04	3.8E-02
							Total Risk Across Surface Soil	**8.9E-07**					**Total Hazard Index Across Surface Soil**	**3.8E-02**
							Total Risk Across All Media and All Exposure Routes	**9E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.04**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 117
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU7

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	1.0E-06	1.1E-07	5.4E-11	1.1E-06	ARSENIC	Skin, Cardiovascular	4.0E-02	4.2E-03	1.5E-05	4.4E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	5.7E-03	--	1.8E-04	5.9E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	2.5E-02	--	--	2.5E-02
			(Total)	1.0E-06	1.1E-07	5.4E-11	1.1E-06		(Total)	7.0E-02	4.2E-03	1.9E-04	7.5E-02
Total Risk Across Surface Soil							**1.1E-06**	**Total Hazard Index Across Surface Soil**					**7.5E-02**
Total Risk Across All Media and All Exposure Routes							**1E-06**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.07**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 118
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU7

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	1.1E-07	5.2E-08	4.2E-11	1.6E-07	ARSENIC	Skin, Cardiovascular	2.9E-03	1.3E-03	7.6E-06	4.2E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.2E-04	--	9.1E-05	5.1E-04
			THALLIUM	--	--	--	NA	THALLIUM	Hair	1.8E-03	--	--	1.8E-03
			(Total)	1.1E-07	5.2E-08	4.2E-11	1.6E-07		(Total)	5.1E-03	1.3E-03	9.9E-05	6.5E-03
Total Risk Across Surface Soil							**1.6E-07**	**Total Hazard Index Across Surface Soil**					**6.5E-03**
Total Risk Across All Media and All Exposure Routes							**2E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.007**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 119
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU7

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	7.7E-07	1.5E-07	6.8E-10	9.2E-07	ARSENIC	Skin, Cardiovascular	9.2E-03	1.8E-03	5.7E-05	1.1E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.3E-03	--	6.9E-04	2.0E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	5.6E-03	--	--	5.6E-03
			(Total)	7.7E-07	1.5E-07	6.8E-10	9.2E-07		(Total)	1.6E-02	1.8E-03	7.4E-04	1.9E-02
							Total Risk Across Surface Soil	**9.2E-07**					**Total Hazard Index Across Surface Soil**	**1.9E-02**
							Total Risk Across All Media and All Exposure Routes	**9E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 120
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU9

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU9	Ingestion	**Inorganics**												
				COBALT	7.82E+00	(mg/kg)	1.53E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.28E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-02
				MANGANESE	5.46E+02	(mg/kg)	1.07E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.99E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.1E-03
			Exp. Route Total								**0.0E+00**					**1.6E-02**
			Dermal[1]	**Inorganics**												
				COBALT	7.82E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.46E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**1.6E-02**
	Exposure Medium Total										**0.0E+00**					**1.6E-02**
	Air	DU9	Inhalation	**Inorganics**												
				COBALT	6.46E-09	(mg/m^3)	3.37E-07	(ug/m^3)	9.00E-03	per (ug/m^3)	3.0E-09	9.44E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.6E-04
				MANGANESE	4.51E-07	(mg/m^3)	2.35E-05	(ug/m^3)	NA	per (ug/m^3)	--	6.59E-08	(mg/m^3)	5.00E-05	(mg/m^3)	1.3E-03
			Exp. Route Total								**3.0E-09**					**1.5E-03**
		Exposure Point Total									**3.0E-09**					**1.5E-03**
	Exposure Medium Total										**3.0E-09**					**1.5E-03**
Soil Total											**3.0E-09**					**1.8E-02**
										Total of Receptor Risks Across All Media	**3.0E-09**				Total of Receptor Hazards Across All Media	**1.8E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 121
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU9

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU9	Ingestion	**Inorganics**												
				COBALT	7.82E+00	(mg/kg)	5.97E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.39E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.6E-03
				MANGANESE	5.46E+02	(mg/kg)	4.17E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	9.72E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	6.9E-04
			Exp. Route Total								**0.0E+00**					**5.3E-03**
			Dermal[1]	**Inorganics**												
				COBALT	7.82E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.46E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**5.3E-03**
	Exposure Medium Total										**0.0E+00**					**5.3E-03**
	Air	DU9	Inhalation	**Inorganics**												
				COBALT	6.46E-09	(mg/m^3)	1.32E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.2E-10	3.07E-10	(mg/m^3)	6.00E-06	(mg/m^3)	5.1E-05
				MANGANESE	4.51E-07	(mg/m^3)	9.18E-07	(ug/m^3)	NA	per (ug/m^3)	--	2.14E-08	(mg/m^3)	5.00E-05	(mg/m^3)	4.3E-04
			Exp. Route Total								**1.2E-10**					**4.8E-04**
		Exposure Point Total									**1.2E-10**					**4.8E-04**
	Exposure Medium Total										**1.2E-10**					**4.8E-04**
Soil Total											**1.2E-10**					**5.8E-03**
										Total of Receptor Risks Across All Media	**1.2E-10**				Total of Receptor Hazards Across All Media	**5.8E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 122
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU9

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU9	Ingestion	**Inorganics**												
				COBALT	7.82E+00	(mg/kg)	3.47E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.43E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.1E-02
				MANGANESE	5.46E+02	(mg/kg)	2.42E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.70E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.2E-02
			Exp. Route Total								**0.0E+00**					**9.3E-02**
			Dermal[1]	**Inorganics**												
				COBALT	7.82E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.46E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**9.3E-02**
	Exposure Medium Total										**0.0E+00**					**9.3E-02**
	Air	DU9	Inhalation	**Inorganics**												
				COBALT	3.80E-07	(mg/m^3)	1.96E-06	(ug/m^3)	9.0E-03	per (ug/m^3)	1.8E-08	1.37E-07	(mg/m^3)	6.00E-06	(mg/m^3)	2.3E-02
				MANGANESE	2.65E-05	(mg/m^3)	1.37E-04	(ug/m^3)	NA	per (ug/m^3)	--	9.57E-06	(mg/m^3)	5.00E-05	(mg/m^3)	1.9E-01
			Exp. Route Total								**1.8E-08**					**2.1E-01**
		Exposure Point Total									**1.8E-08**					**2.1E-01**
	Exposure Medium Total										**1.8E-08**					**2.1E-01**
Soil Total											**1.8E-08**					**3.1E-01**
											Total of Receptor Risks Across All Media **1.8E-08**					Total of Receptor Hazards Across All Media **3.1E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 123
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU9

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU9	Ingestion	**Inorganics**												
				COBALT	7.82E+00	(mg/kg)	2.37E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	8.30E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.8E-03
				MANGANESE	5.46E+02	(mg/kg)	1.66E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	5.80E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.1E-04
			Exp. Route Total								**0.0E+00**					**3.2E-03**
			Dermal[1]	**Inorganics**												
				COBALT	7.82E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.46E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**3.2E-03**
	Exposure Medium Total										**0.0E+00**					**3.2E-03**
	Air	DU9	Inhalation	**Inorganics**												
				COBALT	6.46E-09	(mg/m^3)	2.61E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	2.4E-10	9.15E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.5E-05
				MANGANESE	4.51E-07	(mg/m^3)	1.82E-06	(ug/m^3)	NA	per (ug/m^3)	--	6.39E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.3E-04
			Exp. Route Total								**2.4E-10**					**1.4E-04**
		Exposure Point Total									**2.4E-10**					**1.4E-04**
	Exposure Medium Total										**2.4E-10**					**1.4E-04**
Soil Total											**2.4E-10**					**3.3E-03**
										Total of Receptor Risks Across All Media	**2.4E-10**			Total of Receptor Hazards Across All Media		**3.3E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 124
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU9

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU9	Ingestion	**Inorganics**												
				COBALT	7.82E+00	(mg/kg)	3.34E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	3.90E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-02
				MANGANESE	5.46E+02	(mg/kg)	2.33E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.72E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.9E-03
			Exp. Route Total								**0.0E+00**					**1.5E-02**
			Dermal[1]	**Inorganics**												
				COBALT	7.82E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.46E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**1.5E-02**
	Exposure Medium Total										**0.0E+00**					**1.5E-02**
	Air	DU9	Inhalation	**Inorganics**												
				COBALT	6.46E-09	(mg/m^3)	1.31E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.2E-10	1.52E-10	(mg/m^3)	6.00E-06	(mg/m^3)	2.5E-05
				MANGANESE	4.51E-07	(mg/m^3)	9.12E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.06E-08	(mg/m^3)	5.00E-05	(mg/m^3)	2.1E-04
			Exp. Route Total								**1.2E-10**					**2.4E-04**
		Exposure Point Total									**1.2E-10**					**2.4E-04**
	Exposure Medium Total										**1.2E-10**					**2.4E-04**
Soil Total											**1.2E-10**					**1.5E-02**
										Total of Receptor Risks Across All Media	**1.2E-10**			Total of Receptor Hazards Across All Media		**1.5E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 125
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU9

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU9	Ingestion	**Inorganics**												
				COBALT	7.82E+00	(mg/kg)	4.74E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	8.30E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.8E-02
				MANGANESE	5.46E+02	(mg/kg)	3.31E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	5.80E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.1E-03
			Exp. Route Total								**0.0E+00**					**3.2E-02**
			Dermal[1]	**Inorganics**												
				COBALT	7.82E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.46E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**3.2E-02**
	Exposure Medium Total										**0.0E+00**					**3.2E-02**
	Air	DU9	Inhalation	**Inorganics**												
				COBALT	6.46E-09	(mg/m^3)	5.23E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	4.7E-11	9.15E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.5E-05
				MANGANESE	4.51E-07	(mg/m^3)	3.65E-07	(ug/m^3)	NA	per (ug/m^3)	--	6.39E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.3E-04
			Exp. Route Total								**4.7E-11**					**1.4E-04**
		Exposure Point Total									**4.7E-11**					**1.4E-04**
	Exposure Medium Total										**4.7E-11**					**1.4E-04**
Soil Total											**4.7E-11**					**3.2E-02**
										Total of Receptor Risks Across All Media	**4.7E-11**				Total of Receptor Hazards Across All Media	**3.2E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 126
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU9

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU9	Ingestion	**Inorganics**												
				COBALT	7.82E+00	(mg/kg)	5.15E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	6.01E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.0E-03
				MANGANESE	5.46E+02	(mg/kg)	3.60E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.20E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.0E-04
			Exp. Route Total								**0.0E+00**					**2.3E-03**
			Dermal[1]	**Inorganics**												
				COBALT	7.82E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.46E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**2.3E-03**
	Exposure Medium Total										**0.0E+00**					**2.3E-03**
	Air	DU9	Inhalation	**Inorganics**												
				COBALT	6.46E-09	(mg/m^3)	4.05E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	3.6E-11	4.72E-11	(mg/m^3)	6.00E-06	(mg/m^3)	7.9E-06
				MANGANESE	4.51E-07	(mg/m^3)	2.83E-07	(ug/m^3)	NA	per (ug/m^3)	--	3.30E-09	(mg/m^3)	5.00E-05	(mg/m^3)	6.6E-05
			Exp. Route Total								**3.6E-11**					**7.4E-05**
		Exposure Point Total									**3.6E-11**					**7.4E-05**
	Exposure Medium Total										**3.6E-11**					**7.4E-05**
Soil Total											**3.6E-11**					**2.4E-03**
										Total of Receptor Risks Across All Media	**3.6E-11**				Total of Receptor Hazards Across All Media	**2.4E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 128
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU9

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	3.0E-09	3.0E-09	COBALT	Thyroid	1.4E-02	--	1.6E-04	1.4E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.1E-03	--	1.3E-03	3.5E-03
			(Total)	---	---	3.0E-09	3.0E-09		(Total)	1.6E-02	---	1.5E-03	1.8E-02
Total Risk Across Surface Soil							**3.0E-09**	**Total Hazard Index Across Surface Soil**					**1.8E-02**
Total Risk Across All Media and All Exposure Routes							**3E-09**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 129
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU9

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	1.2E-10	1.2E-10	COBALT	Thyroid	4.6E-03	--	5.1E-05	4.7E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	6.9E-04	--	4.3E-04	1.1E-03
			(Total)	---	---	1.2E-10	1.2E-10		(Total)	5.3E-03	---	4.8E-04	5.8E-03
Total Risk Across Surface Soil							**1.2E-10**	**Total Hazard Index Across Surface Soil**					**5.8E-03**
Total Risk Across All Media and All Exposure Routes							**1E-10**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.006**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 130
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU9

Location: Iona Island
Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	1.8E-08	1.8E-08	COBALT	Thyroid	8.1E-02	--	2.3E-02	1.0E-01
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.2E-02	--	1.9E-01	2.0E-01
			(Total)	---	---	1.8E-08	1.8E-08		(Total)	9.3E-02	---	2.1E-01	3.1E-01
Total Risk Across Surface Soil							**1.8E-08**	**Total Hazard Index Across Surface Soil**					**3.1E-01**
Total Risk Across All Media and All Exposure Routes							**2E-08**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.3**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 131
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU9

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	2.4E-10	2.4E-10	COBALT	Thyroid	2.8E-03	--	1.5E-05	2.8E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.1E-04	--	1.3E-04	5.4E-04
			(Total)	---	---	2.4E-10	2.4E-10		(Total)	3.2E-03	---	1.4E-04	3.3E-03
Total Risk Across Surface Soil							**2.4E-10**	**Total Hazard Index Across Surface Soil**					**3.3E-03**
Total Risk Across All Media and All Exposure Routes							**2E-10**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.003**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 132
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU9

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	1.2E-10	1.2E-10	COBALT	Thyroid	1.3E-02	--	2.5E-05	1.3E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.9E-03	--	2.1E-04	2.2E-03
			(Total)	---	---	1.2E-10	1.2E-10		(Total)	1.5E-02	---	2.4E-04	1.5E-02
Total Risk Across Surface Soil							**1.2E-10**	**Total Hazard Index Across Surface Soil**					**1.5E-02**
Total Risk Across All Media and All Exposure Routes							**1E-10**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 133
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU9

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	4.7E-11	4.7E-11	COBALT	Thyroid	2.8E-02	--	1.5E-05	2.8E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.1E-03	--	1.3E-04	4.3E-03
			(Total)	---	---	4.7E-11	4.7E-11		(Total)	3.2E-02	---	1.4E-04	3.2E-02
Total Risk Across Surface Soil							**4.7E-11**	**Total Hazard Index Across Surface Soil**					**3.2E-02**
Total Risk Across All Media and All Exposure Routes							**5E-11**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.03**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 134
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU9

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	3.6E-11	3.6E-11	COBALT	Thyroid	2.0E-03	--	7.9E-06	2.0E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.0E-04	--	6.6E-05	3.7E-04
			(Total)	---	---	3.6E-11	3.6E-11		(Total)	2.3E-03	---	7.4E-05	2.4E-03
Total Risk Across Surface Soil							**3.6E-11**	**Total Hazard Index Across Surface Soil**					**2.4E-03**
Total Risk Across All Media and All Exposure Routes							**4E-11**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.002**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 135
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU9

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	5.9E-10	5.9E-10	COBALT	Thyroid	6.3E-03	--	5.9E-05	6.4E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	9.5E-04	--	4.9E-04	1.4E-03
			(Total)	---	---	5.9E-10	5.9E-10		(Total)	7.3E-03	---	5.5E-04	7.9E-03
Total Risk Across Surface Soil							**5.9E-10**	**Total Hazard Index Across Surface Soil**					**7.9E-03**
Total Risk Across All Media and All Exposure Routes							**6E-10**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.008**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 136
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU10

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU10	Ingestion	**Inorganics**												
				COBALT	8.47E+00	(mg/kg)	1.66E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.64E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				MANGANESE	6.10E+02	(mg/kg)	1.19E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	3.34E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.4E-03
			Exp. Route Total								**0.0E+00**					**1.8E-02**
			Dermal[1]	**Inorganics**												
				COBALT	8.47E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.10E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**1.8E-02**
	Exposure Medium Total										**0.0E+00**					**1.8E-02**
	Air	DU10	Inhalation	**Inorganics**												
				COBALT	7.00E-09	(mg/m^3)	3.65E-07	(ug/m^3)	9.00E-03	per (ug/m^3)	3.3E-09	1.02E-09	(mg/m^3)	6.00E-06	(mg/m^3)	1.7E-04
				MANGANESE	5.04E-07	(mg/m^3)	2.63E-05	(ug/m^3)	NA	per (ug/m^3)	--	7.37E-08	(mg/m^3)	5.00E-05	(mg/m^3)	1.5E-03
			Exp. Route Total								**3.3E-09**					**1.6E-03**
		Exposure Point Total									**3.3E-09**					**1.6E-03**
	Exposure Medium Total										**3.3E-09**					**1.6E-03**
Soil Total											**3.3E-09**					**2.0E-02**
										Total of Receptor Risks Across All Media	**3.3E-09**			Total of Receptor Hazards Across All Media		**2.0E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 137
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU10

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU10	Ingestion	**Inorganics**												
				COBALT	8.47E+00	(mg/kg)	6.46E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.51E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.0E-03
				MANGANESE	6.10E+02	(mg/kg)	4.66E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.09E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	7.8E-04
			Exp. Route Total								**0.0E+00**					**5.8E-03**
			Dermal[1]	**Inorganics**												
				COBALT	8.47E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.10E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**5.8E-03**
	Exposure Medium Total										**0.0E+00**					**5.8E-03**
	Air	DU10	Inhalation	**Inorganics**												
				COBALT	7.00E-09	(mg/m^3)	1.42E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.3E-10	3.32E-10	(mg/m^3)	6.00E-06	(mg/m^3)	5.5E-05
				MANGANESE	5.04E-07	(mg/m^3)	1.03E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.39E-08	(mg/m^3)	5.00E-05	(mg/m^3)	4.8E-04
			Exp. Route Total								**1.3E-10**					**5.3E-04**
		Exposure Point Total									**1.3E-10**					**5.3E-04**
	Exposure Medium Total										**1.3E-10**					**5.3E-04**
Soil Total											**1.3E-10**					**6.3E-03**
										Total of Receptor Risks Across All Media	**1.3E-10**			Total of Receptor Hazards Across All Media		**6.3E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 138
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU10

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU10	Ingestion	**Inorganics**												
				COBALT	8.47E+00	(mg/kg)	3.76E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.63E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.8E-02
				MANGANESE	6.10E+02	(mg/kg)	2.71E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.90E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.4E-02
			Exp. Route Total								**0.0E+00**					**1.0E-01**
			Dermal[1]	**Inorganics**												
				COBALT	8.47E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.10E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**1.0E-01**
	Exposure Medium Total										**0.0E+00**					**1.0E-01**
	Air	DU10	Inhalation	**Inorganics**												
				COBALT	4.11E-07	(mg/m^3)	2.12E-06	(ug/m^3)	9.0E-03	per (ug/m^3)	1.9E-08	1.48E-07	(mg/m^3)	6.00E-06	(mg/m^3)	2.5E-02
				MANGANESE	2.96E-05	(mg/m^3)	1.53E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.07E-05	(mg/m^3)	5.00E-05	(mg/m^3)	2.1E-01
			Exp. Route Total								**1.9E-08**					**2.4E-01**
		Exposure Point Total									**1.9E-08**					**2.4E-01**
	Exposure Medium Total										**1.9E-08**					**2.4E-01**
Soil Total											**1.9E-08**					**3.4E-01**
										Total of Receptor Risks Across All Media	**1.9E-08**				Total of Receptor Hazards Across All Media	**3.4E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 139
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU10

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU10	Ingestion	**Inorganics**												
				COBALT	8.47E+00	(mg/kg)	2.57E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	8.99E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.0E-03
				MANGANESE	6.10E+02	(mg/kg)	1.85E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	6.48E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.6E-04
			Exp. Route Total								**0.0E+00**					**3.5E-03**
			Dermal[1]	**Inorganics**												
				COBALT	8.47E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.10E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**3.5E-03**
	Exposure Medium Total										**0.0E+00**					**3.5E-03**
	Air	DU10	Inhalation	**Inorganics**												
				COBALT	7.00E-09	(mg/m^3)	2.83E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	2.5E-10	9.91E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.7E-05
				MANGANESE	5.04E-07	(mg/m^3)	2.04E-06	(ug/m^3)	NA	per (ug/m^3)	--	7.14E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.4E-04
			Exp. Route Total								**2.5E-10**					**1.6E-04**
		Exposure Point Total									**2.5E-10**					**1.6E-04**
	Exposure Medium Total										**2.5E-10**					**1.6E-04**
Soil Total											**2.5E-10**					**3.6E-03**
										Total of Receptor Risks Across All Media	**2.5E-10**			Total of Receptor Hazards Across All Media		**3.6E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 140
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU10

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU10	Ingestion	**Inorganics**												
				COBALT	8.47E+00	(mg/kg)	3.62E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	4.22E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-02
				MANGANESE	6.10E+02	(mg/kg)	2.61E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.04E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.2E-03
			Exp. Route Total								**0.0E+00**					**1.6E-02**
			Dermal[1]	**Inorganics**												
				COBALT	8.47E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.10E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**1.6E-02**
	Exposure Medium Total										**0.0E+00**					**1.6E-02**
	Air	DU10	Inhalation	**Inorganics**												
				COBALT	7.00E-09	(mg/m^3)	1.42E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.3E-10	1.65E-10	(mg/m^3)	6.00E-06	(mg/m^3)	2.8E-05
				MANGANESE	5.04E-07	(mg/m^3)	1.02E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.19E-08	(mg/m^3)	5.00E-05	(mg/m^3)	2.4E-04
			Exp. Route Total								**1.3E-10**					**2.7E-04**
		Exposure Point Total									**1.3E-10**					**2.7E-04**
	Exposure Medium Total										**1.3E-10**					**2.7E-04**
Soil Total											**1.3E-10**					**1.7E-02**
										Total of Receptor Risks Across All Media	**1.3E-10**			Total of Receptor Hazards Across All Media		**1.7E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 141
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU10

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU10	Ingestion	**Inorganics**												
				COBALT	8.47E+00	(mg/kg)	5.14E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	8.99E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.0E-02
				MANGANESE	6.10E+02	(mg/kg)	3.70E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	6.48E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.6E-03
			Exp. Route Total								**0.0E+00**					**3.5E-02**
			Dermal[1]	**Inorganics**												
				COBALT	8.47E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.10E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**3.5E-02**
	Exposure Medium Total										**0.0E+00**					**3.5E-02**
	Air	DU10	Inhalation	**Inorganics**												
				COBALT	7.00E-09	(mg/m^3)	5.66E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	5.1E-11	9.91E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.7E-05
				MANGANESE	5.04E-07	(mg/m^3)	4.08E-07	(ug/m^3)	NA	per (ug/m^3)	--	7.14E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.4E-04
			Exp. Route Total								**5.1E-11**					**1.6E-04**
		Exposure Point Total									**5.1E-11**					**1.6E-04**
	Exposure Medium Total										**5.1E-11**					**1.6E-04**
Soil Total											**5.1E-11**					**3.5E-02**
										Total of Receptor Risks Across All Media	**5.1E-11**				Total of Receptor Hazards Across All Media	**3.5E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 142
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU10

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU10	Ingestion	**Inorganics**												
				COBALT	8.47E+00	(mg/kg)	5.58E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	6.51E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.2E-03
				MANGANESE	6.10E+02	(mg/kg)	4.02E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.69E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.4E-04
			Exp. Route Total								**0.0E+00**					**2.5E-03**
			Dermal[1]	**Inorganics**												
				COBALT	8.47E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.10E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**2.5E-03**
	Exposure Medium Total										**0.0E+00**					**2.5E-03**
	Air	DU10	Inhalation	**Inorganics**												
				COBALT	7.00E-09	(mg/m^3)	4.38E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	3.9E-11	5.11E-11	(mg/m^3)	6.00E-06	(mg/m^3)	8.5E-06
				MANGANESE	5.04E-07	(mg/m^3)	3.16E-07	(ug/m^3)	NA	per (ug/m^3)	--	3.68E-09	(mg/m^3)	5.00E-05	(mg/m^3)	7.4E-05
			Exp. Route Total								**3.9E-11**					**8.2E-05**
		Exposure Point Total									**3.9E-11**					**8.2E-05**
	Exposure Medium Total										**3.9E-11**					**8.2E-05**
Soil Total											**3.9E-11**					**2.6E-03**
										Total of Receptor Risks Across All Media	**3.9E-11**				Total of Receptor Hazards Across All Media	**2.6E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 143
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU10

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU10	Ingestion	**Inorganics**												
				COBALT	8.47E+00	(mg/kg)	3.83E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.06E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.9E-03
				MANGANESE	6.10E+02	(mg/kg)	2.76E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.49E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.1E-03
			Exp. Route Total								**0.0E+00**					**7.9E-03**
			Dermal[1]	**Inorganics**												
				COBALT	8.47E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.10E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**7.9E-03**
	Exposure Medium Total										**0.0E+00**					**7.9E-03**
	Air	DU10	Inhalation	**Inorganics**												
				COBALT	7.00E-09	(mg/m^3)	7.12E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	6.4E-10	3.84E-10	(mg/m^3)	6.00E-06	(mg/m^3)	6.4E-05
				MANGANESE	5.04E-07	(mg/m^3)	5.13E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.76E-08	(mg/m^3)	5.00E-05	(mg/m^3)	5.5E-04
			Exp. Route Total								**6.4E-10**					**6.2E-04**
		Exposure Point Total									**6.4E-10**					**6.2E-04**
	Exposure Medium Total										**6.4E-10**					**6.2E-04**
Soil Total											**6.4E-10**					**8.6E-03**
										Total of Receptor Risks Across All Media	**6.4E-10**				Total of Receptor Hazards Across All Media	**8.6E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 144
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU10

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	3.3E-09	3.3E-09	COBALT	Thyroid	1.5E-02	--	1.7E-04	1.6E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.4E-03	--	1.5E-03	3.9E-03
			(Total)	---	---	3.3E-09	3.3E-09		(Total)	1.8E-02	---	1.6E-03	2.0E-02
Total Risk Across Surface Soil							**3.3E-09**	**Total Hazard Index Across Surface Soil**					**2.0E-02**
Total Risk Across All Media and All Exposure Routes							**3E-09**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 145
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU10

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	1.3E-10	1.3E-10	COBALT	Thyroid	5.0E-03	--	5.5E-05	5.1E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	7.8E-04	--	4.8E-04	1.3E-03
			(Total)	---	---	1.3E-10	1.3E-10		(Total)	5.8E-03	---	5.3E-04	6.3E-03
Total Risk Across Surface Soil							**1.3E-10**	**Total Hazard Index Across Surface Soil**					**6.3E-03**
Total Risk Across All Media and All Exposure Routes							**1E-10**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.006**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 146
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU10

Location: Iona Island
Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	1.9E-08	1.9E-08	COBALT	Thyroid	8.8E-02	--	2.5E-02	1.1E-01
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.4E-02	--	2.1E-01	2.3E-01
			(Total)	---	---	1.9E-08	1.9E-08		(Total)	1.0E-01	---	2.4E-01	3.4E-01
							Total Risk Across Surface Soil	**1.9E-08**					**Total Hazard Index Across Surface Soil**	**3.4E-01**
							Total Risk Across All Media and All Exposure Routes	**2E-08**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.3**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 147
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU10

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	2.5E-10	2.5E-10	COBALT	Thyroid	3.0E-03	--	1.7E-05	3.0E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.6E-04	--	1.4E-04	6.1E-04
			(Total)	---	---	2.5E-10	2.5E-10		(Total)	3.5E-03	---	1.6E-04	3.6E-03
Total Risk Across Surface Soil							**2.5E-10**	**Total Hazard Index Across Surface Soil**					**3.6E-03**
Total Risk Across All Media and All Exposure Routes							**3E-10**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.004**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 148
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU10

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	1.3E-10	1.3E-10	COBALT	Thyroid	1.4E-02	--	2.8E-05	1.4E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.2E-03	--	2.4E-04	2.4E-03
			(Total)	---	---	1.3E-10	1.3E-10		(Total)	1.6E-02	---	2.7E-04	1.7E-02
							Total Risk Across Surface Soil	**1.3E-10**					**Total Hazard Index Across Surface Soil**	**1.7E-02**
							Total Risk Across All Media and All Exposure Routes	**1E-10**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 149
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU10

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	5.1E-11	5.1E-11	COBALT	Thyroid	3.0E-02	--	1.7E-05	3.0E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.6E-03	--	1.4E-04	4.8E-03
			(Total)	---	---	5.1E-11	5.1E-11		(Total)	3.5E-02	---	1.6E-04	3.5E-02
Total Risk Across Surface Soil							**5.1E-11**	**Total Hazard Index Across Surface Soil**					**3.5E-02**
Total Risk Across All Media and All Exposure Routes							**5E-11**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.03**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 150
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU10

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	3.9E-11	3.9E-11	COBALT	Thyroid	2.2E-03	--	8.5E-06	2.2E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.4E-04	--	7.4E-05	4.1E-04
			(Total)	---	---	3.9E-11	3.9E-11		(Total)	2.5E-03	---	8.2E-05	2.6E-03
Total Risk Across Surface Soil							**3.9E-11**	**Total Hazard Index Across Surface Soil**					**2.6E-03**
Total Risk Across All Media and All Exposure Routes							**4E-11**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.003**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 151
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU10

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	6.4E-10	6.4E-10	COBALT	Thyroid	6.9E-03	--	6.4E-05	6.9E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.1E-03	--	5.5E-04	1.6E-03
			(Total)	---	---	6.4E-10	6.4E-10		(Total)	7.9E-03	---	6.2E-04	8.6E-03
Total Risk Across Surface Soil							**6.4E-10**	**Total Hazard Index Across Surface Soil**					**8.6E-03**
Total Risk Across All Media and All Exposure Routes							**6E-10**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.009**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 152
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU11

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU11	Ingestion	**Inorganics**												
				ARSENIC	4.74E+01	(mg/kg)	5.57E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.3E-06	1.56E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.2E-02
				COBALT	7.24E+00	(mg/kg)	1.42E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	3.97E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-02
				MANGANESE	6.00E+02	(mg/kg)	1.17E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	3.29E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.3E-03
				THALLIUM	2.54E-01	(mg/kg)	4.97E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.39E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	1.4E-02
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.30E+00	(mg/kg)	2.54E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.5E-08	7.12E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.97E+00	(mg/kg)	3.86E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.9E-08	1.08E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.53E+00	(mg/kg)	2.99E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.0E-07	8.38E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	2.8E-03
				DIBENZ(A,H)ANTHRACENE	2.81E-01	(mg/kg)	5.50E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	5.5E-08	1.54E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.37E+00	(mg/kg)	2.68E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.7E-08	7.51E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**8.8E-06**					**8.4E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	4.74E+01	(mg/kg)	1.18E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.8E-06	3.30E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.1E-02
				COBALT	7.24E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.00E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	2.54E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.30E+00	(mg/kg)	1.40E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.4E-08	3.92E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.97E+00	(mg/kg)	2.12E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.1E-08	5.94E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.53E+00	(mg/kg)	1.65E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.6E-07	4.61E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.5E-03
				DIBENZ(A,H)ANTHRACENE	2.81E-01	(mg/kg)	3.03E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.0E-08	8.47E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.37E+00	(mg/kg)	1.48E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.5E-08	4.13E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.0E-06**					**1.3E-02**
		Exposure Point Total									**1.1E-05**					**9.7E-02**
	Exposure Medium Total										**1.1E-05**					**9.7E-02**

TABLE 152
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU11

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU11	Inhalation	**Inorganics**												
				ARSENIC	3.92E-08	(mg/m^3)	2.04E-06	(ug/m^3)	4.30E-03	per (ug/m^3)	8.8E-09	5.72E-09	(mg/m^3)	1.50E-05	(mg/m^3)	3.8E-04
				COBALT	5.98E-09	(mg/m^3)	3.12E-07	(ug/m^3)	9.00E-03	per (ug/m^3)	2.8E-09	8.74E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.5E-04
				MANGANESE	4.96E-07	(mg/m^3)	2.59E-05	(ug/m^3)	NA	per (ug/m^3)	--	7.25E-08	(mg/m^3)	5.00E-05	(mg/m^3)	1.4E-03
				THALLIUM	2.10E-10	(mg/m^3)	1.10E-08	(ug/m^3)	NA	per (ug/m^3)	--	3.07E-11	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.07E-09	(mg/m^3)	5.61E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	3.4E-12	1.57E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.63E-09	(mg/m^3)	8.50E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	5.1E-12	2.38E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.26E-09	(mg/m^3)	6.60E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	4.0E-11	1.85E-10	(mg/m^3)	2.00E-06	(mg/m^3)	9.2E-05
				DIBENZ(A,H)ANTHRACENE	2.32E-10	(mg/m^3)	1.21E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	7.3E-12	3.39E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.13E-09	(mg/m^3)	5.91E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	3.5E-12	1.65E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.2E-08**					**2.1E-03**
		Exposure Point Total									**1.2E-08**					**2.1E-03**
	Exposure Medium Total										**1.2E-08**					**2.1E-03**
Soil Total											**1.1E-05**					**9.9E-02**
										Total of Receptor Risks Across All Media	**1.1E-05**				Total of Receptor Hazards Across All Media	**9.9E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 153
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU11

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU11	Ingestion	**Inorganics**												
				ARSENIC	4.74E+01	(mg/kg)	2.17E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.3E-07	5.06E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.7E-02
				COBALT	7.24E+00	(mg/kg)	5.53E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.29E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.3E-03
				MANGANESE	6.00E+02	(mg/kg)	4.58E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.07E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	7.6E-04
				THALLIUM	2.54E-01	(mg/kg)	1.94E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	4.52E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	4.5E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.30E+00	(mg/kg)	9.92E-09	(mg/kg-day)	1.0E-01	per (mg/kg-day)	9.9E-10	2.32E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.97E+00	(mg/kg)	1.50E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.5E-09	3.51E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.53E+00	(mg/kg)	1.17E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.2E-08	2.72E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	9.1E-04
				DIBENZ(A,H)ANTHRACENE	2.81E-01	(mg/kg)	2.14E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.1E-09	5.00E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.37E+00	(mg/kg)	1.05E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.0E-09	2.44E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.4E-07**					**2.7E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	4.74E+01	(mg/kg)	1.15E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.7E-07	2.68E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.9E-03
				COBALT	7.24E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.00E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	2.54E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.30E+00	(mg/kg)	1.36E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.4E-09	3.18E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.97E+00	(mg/kg)	2.07E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.1E-09	4.83E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.53E+00	(mg/kg)	1.61E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.6E-08	3.75E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.2E-03
				DIBENZ(A,H)ANTHRACENE	2.81E-01	(mg/kg)	2.95E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.9E-09	6.88E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.37E+00	(mg/kg)	1.44E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.4E-09	3.36E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.0E-07**					**1.0E-02**
		Exposure Point Total									**5.4E-07**					**3.8E-02**
	Exposure Medium Total										**5.4E-07**					**3.8E-02**

TABLE 153
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU11

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU11	Inhalation	**Inorganics**												
				ARSENIC	3.92E-08	(mg/m^3)	7.97E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	3.4E-10	1.86E-09	(mg/m^3)	1.50E-05	(mg/m^3)	1.2E-04
				COBALT	5.98E-09	(mg/m^3)	1.22E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.1E-10	2.84E-10	(mg/m^3)	6.00E-06	(mg/m^3)	4.7E-05
				MANGANESE	4.96E-07	(mg/m^3)	1.01E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.35E-08	(mg/m^3)	5.00E-05	(mg/m^3)	4.7E-04
				THALLIUM	2.10E-10	(mg/m^3)	4.27E-10	(ug/m^3)	NA	per (ug/m^3)	--	9.97E-12	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.07E-09	(mg/m^3)	2.19E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.3E-13	5.10E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.63E-09	(mg/m^3)	3.31E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.0E-13	7.73E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.26E-09	(mg/m^3)	2.57E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	1.5E-12	6.00E-11	(mg/m^3)	2.00E-06	(mg/m^3)	3.0E-05
				DIBENZ(A,H)ANTHRACENE	2.32E-10	(mg/m^3)	4.73E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	2.8E-13	1.10E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.13E-09	(mg/m^3)	2.30E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.4E-13	5.38E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**4.5E-10**					**6.7E-04**
		Exposure Point Total									**4.5E-10**					**6.7E-04**
	Exposure Medium Total										**4.5E-10**					**6.7E-04**
Soil Total											**5.4E-07**					**3.8E-02**
										Total of Receptor Risks Across All Media	**5.4E-07**				Total of Receptor Hazards Across All Media	**3.8E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 154
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU11

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU11	Ingestion	**Inorganics**												
				ARSENIC	4.74E+01	(mg/kg)	1.26E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.9E-06	8.84E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.9E-01
				COBALT	7.24E+00	(mg/kg)	3.21E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.25E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.5E-02
				MANGANESE	6.00E+02	(mg/kg)	2.66E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.86E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.3E-02
				THALLIUM	2.54E-01	(mg/kg)	1.13E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	4.23E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	4.2E-02
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.30E+00	(mg/kg)	5.77E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	5.8E-09	4.04E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.97E+00	(mg/kg)	8.75E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	8.7E-09	6.12E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.53E+00	(mg/kg)	6.79E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	6.8E-08	4.76E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.6E-02
				DIBENZ(A,H)ANTHRACENE	2.81E-01	(mg/kg)	1.25E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.2E-08	8.73E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.37E+00	(mg/kg)	6.08E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	6.1E-09	4.26E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.0E-06**					**4.4E-01**
			Dermal[1]	**Inorganics**												
				ARSENIC	4.74E+01	(mg/kg)	2.02E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.0E-07	1.42E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.7E-02
				COBALT	7.24E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.00E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	2.54E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.30E+00	(mg/kg)	2.41E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.4E-09	1.68E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.97E+00	(mg/kg)	3.65E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.6E-09	2.55E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.53E+00	(mg/kg)	2.83E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.8E-08	1.98E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.6E-03
				DIBENZ(A,H)ANTHRACENE	2.81E-01	(mg/kg)	5.20E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	5.2E-09	3.64E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.37E+00	(mg/kg)	2.54E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.5E-09	1.77E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.5E-07**					**5.4E-02**
		Exposure Point Total									**2.3E-06**					**4.9E-01**
	Exposure Medium Total										**2.3E-06**					**4.9E-01**

TABLE 154
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU11

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU11	Inhalation	**Inorganics**												
				ARSENIC	2.30E-06	(mg/m^3)	1.19E-05	(ug/m^3)	4.3E-03	per (ug/m^3)	5.1E-08	8.31E-07	(mg/m^3)	1.50E-05	(mg/m^3)	5.5E-02
				COBALT	3.51E-07	(mg/m^3)	1.81E-06	(ug/m^3)	9.0E-03	per (ug/m^3)	1.6E-08	1.27E-07	(mg/m^3)	6.00E-06	(mg/m^3)	2.1E-02
				MANGANESE	2.91E-05	(mg/m^3)	1.50E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.05E-05	(mg/m^3)	5.00E-05	(mg/m^3)	2.1E-01
				THALLIUM	2.10E-10	(mg/m^3)	1.08E-09	(ug/m^3)	NA	per (ug/m^3)	--	7.58E-11	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	6.31E-08	(mg/m^3)	3.25E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	2.0E-11	2.28E-08	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	9.56E-08	(mg/m^3)	4.93E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	3.0E-11	3.45E-08	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	7.43E-08	(mg/m^3)	3.83E-07	(ug/m^3)	6.0E-04	per (ug/m^3)	2.3E-10	2.68E-08	(mg/m^3)	2.00E-06	(mg/m^3)	1.3E-02
				DIBENZ(A,H)ANTHRACENE	1.36E-08	(mg/m^3)	7.04E-08	(ug/m^3)	6.0E-04	per (ug/m^3)	4.2E-11	4.92E-09	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	6.65E-08	(mg/m^3)	3.43E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	2.1E-11	2.40E-08	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**6.8E-08**					**3.0E-01**
		Exposure Point Total									**6.8E-08**					**3.0E-01**
	Exposure Medium Total										**6.8E-08**					**3.0E-01**
Soil Total											**2.4E-06**					**8.0E-01**
										Total of Receptor Risks Across All Media	**2.4E-06**				Total of Receptor Hazards Across All Media	**8.0E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 155
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU11

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU11	Ingestion	**Inorganics**												
				ARSENIC	4.74E+01	(mg/kg)	8.63E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.3E-06	3.02E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.0E-02
				COBALT	7.24E+00	(mg/kg)	2.20E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	7.69E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.6E-03
				MANGANESE	6.00E+02	(mg/kg)	1.82E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	6.37E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.5E-04
				THALLIUM	2.54E-01	(mg/kg)	7.70E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	2.70E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	2.7E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.30E+00	(mg/kg)	3.94E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.9E-09	1.38E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.97E+00	(mg/kg)	5.98E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	6.0E-09	2.09E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.53E+00	(mg/kg)	4.64E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.6E-08	1.62E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	5.4E-04
				DIBENZ(A,H)ANTHRACENE	2.81E-01	(mg/kg)	8.52E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	8.5E-09	2.98E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.37E+00	(mg/kg)	4.16E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.2E-09	1.45E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.4E-06**					**1.6E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	4.74E+01	(mg/kg)	1.82E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.7E-07	6.37E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.1E-03
				COBALT	7.24E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.00E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	2.54E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.30E+00	(mg/kg)	2.16E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.2E-09	7.58E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.97E+00	(mg/kg)	3.28E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.3E-09	1.15E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.53E+00	(mg/kg)	2.55E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.5E-08	8.92E-08	(mg/kg-day)	3.0E-04	(mg/kg-day)	3.0E-04
				DIBENZ(A,H)ANTHRACENE	2.81E-01	(mg/kg)	4.68E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.7E-09	1.64E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.37E+00	(mg/kg)	2.28E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.3E-09	7.98E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.1E-07**					**2.4E-03**
		Exposure Point Total									**1.7E-06**					**1.9E-02**
	Exposure Medium Total										**1.7E-06**					**1.9E-02**

TABLE 155
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU11

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU11	Inhalation	**Inorganics**												
				ARSENIC	3.92E-08	(mg/m^3)	1.58E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	6.8E-10	5.55E-10	(mg/m^3)	1.50E-05	(mg/m^3)	3.7E-05
				COBALT	5.98E-09	(mg/m^3)	2.42E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	2.2E-10	8.47E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.4E-05
				MANGANESE	4.96E-07	(mg/m^3)	2.01E-06	(ug/m^3)	NA	per (ug/m^3)	--	7.02E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.4E-04
				THALLIUM	2.10E-10	(mg/m^3)	8.49E-10	(ug/m^3)	NA	per (ug/m^3)	--	2.97E-12	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.07E-09	(mg/m^3)	4.35E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.6E-13	1.52E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.63E-09	(mg/m^3)	6.58E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	4.0E-13	2.30E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.26E-09	(mg/m^3)	5.11E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	3.1E-12	1.79E-11	(mg/m^3)	2.00E-06	(mg/m^3)	8.9E-06
				DIBENZ(A,H)ANTHRACENE	2.32E-10	(mg/m^3)	9.39E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	5.6E-13	3.29E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.13E-09	(mg/m^3)	4.58E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.7E-13	1.60E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**9.0E-10**					**2.0E-04**
		Exposure Point Total									**9.0E-10**					**2.0E-04**
	Exposure Medium Total										**9.0E-10**					**2.0E-04**
Soil Total											**1.7E-06**					**1.9E-02**
										Total of Receptor Risks Across All Media	**1.7E-06**				Total of Receptor Hazards Across All Media	**1.9E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 156
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU11

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU11	Ingestion	**Inorganics**												
				ARSENIC	4.74E+01	(mg/kg)	1.22E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.8E-06	1.42E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.7E-02
				COBALT	7.24E+00	(mg/kg)	3.09E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	3.61E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.2E-02
				MANGANESE	6.00E+02	(mg/kg)	2.56E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.99E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.1E-03
				THALLIUM	2.54E-01	(mg/kg)	1.09E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.27E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	1.3E-02
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.30E+00	(mg/kg)	1.67E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.7E-08	6.48E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.97E+00	(mg/kg)	2.52E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.5E-08	9.82E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.53E+00	(mg/kg)	1.96E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.0E-07	7.63E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.5E-03
				DIBENZ(A,H)ANTHRACENE	2.81E-01	(mg/kg)	3.60E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	3.6E-08	1.40E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.37E+00	(mg/kg)	1.76E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.8E-08	6.83E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.1E-06**					**7.7E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	4.74E+01	(mg/kg)	2.82E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.2E-07	3.29E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.1E-02
				COBALT	7.24E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.00E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	2.54E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.30E+00	(mg/kg)	1.01E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.0E-08	3.91E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.97E+00	(mg/kg)	1.52E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.5E-08	5.93E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.53E+00	(mg/kg)	1.18E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.2E-07	4.60E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-03
				DIBENZ(A,H)ANTHRACENE	2.81E-01	(mg/kg)	2.17E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.2E-08	8.46E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.37E+00	(mg/kg)	1.06E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.1E-08	4.12E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**6.0E-07**					**1.3E-02**
		Exposure Point Total									**2.7E-06**					**8.9E-02**
	Exposure Medium Total										**2.7E-06**					**8.9E-02**

TABLE 156
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU11

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU11	Inhalation	**Inorganics**												
				ARSENIC	3.92E-08	(mg/m^3)	7.92E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	3.4E-10	9.24E-10	(mg/m^3)	1.50E-05	(mg/m^3)	6.2E-05
				COBALT	5.98E-09	(mg/m^3)	1.21E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.1E-10	1.41E-10	(mg/m^3)	6.00E-06	(mg/m^3)	2.4E-05
				MANGANESE	4.96E-07	(mg/m^3)	1.00E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.17E-08	(mg/m^3)	5.00E-05	(mg/m^3)	2.3E-04
				THALLIUM	2.10E-10	(mg/m^3)	4.24E-10	(ug/m^3)	NA	per (ug/m^3)	--	4.95E-12	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.07E-09	(mg/m^3)	6.52E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	3.9E-13	2.53E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.63E-09	(mg/m^3)	9.88E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	5.9E-13	3.84E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.26E-09	(mg/m^3)	7.67E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	4.6E-12	2.98E-11	(mg/m^3)	2.00E-06	(mg/m^3)	1.5E-05
				DIBENZ(A,H)ANTHRACENE	2.32E-10	(mg/m^3)	1.41E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	8.5E-13	5.48E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.13E-09	(mg/m^3)	6.87E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	4.1E-13	2.67E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**4.6E-10**					**3.3E-04**
		Exposure Point Total									**4.6E-10**					**3.3E-04**
	Exposure Medium Total										**4.6E-10**					**3.3E-04**
Soil Total											**2.7E-06**					**8.9E-02**
										Total of Receptor Risks Across All Media	**2.7E-06**				Total of Receptor Hazards Across All Media	**8.9E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 157
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU11

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU11	Ingestion	**Inorganics**												
				ARSENIC	4.74E+01	(mg/kg)	1.73E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.6E-06	3.02E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.0E-01
				COBALT	7.24E+00	(mg/kg)	4.39E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	7.69E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.6E-02
				MANGANESE	6.00E+02	(mg/kg)	3.64E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	6.37E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.5E-03
				THALLIUM	2.54E-01	(mg/kg)	1.54E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	2.70E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	2.7E-02
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.30E+00	(mg/kg)	2.37E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.4E-08	1.38E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.97E+00	(mg/kg)	3.59E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.6E-08	2.09E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.53E+00	(mg/kg)	2.78E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.8E-07	1.62E-06	(mg/kg-day)	3.0E-04	(mg/kg-day)	5.4E-03
				DIBENZ(A,H)ANTHRACENE	2.81E-01	(mg/kg)	5.11E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	5.1E-08	2.98E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.37E+00	(mg/kg)	2.49E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.5E-08	1.45E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				Exp. Route Total							**3.0E-06**					**1.6E-01**
			Dermal[1]	**Inorganics**												
				ARSENIC	4.74E+01	(mg/kg)	1.82E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.7E-07	3.18E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.1E-02
				COBALT	7.24E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.00E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	2.54E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.30E+00	(mg/kg)	6.48E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	6.5E-09	3.78E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.97E+00	(mg/kg)	9.82E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	9.8E-09	5.73E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.53E+00	(mg/kg)	7.63E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	7.6E-08	4.45E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.5E-03
				DIBENZ(A,H)ANTHRACENE	2.81E-01	(mg/kg)	1.40E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.4E-08	8.17E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.37E+00	(mg/kg)	6.83E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	6.8E-09	3.98E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				Exp. Route Total							**3.9E-07**					**1.2E-02**
		Exposure Point Total									**3.4E-06**					**1.8E-01**
	Exposure Medium Total										**3.4E-06**					**1.8E-01**

TABLE 157
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU11

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU11	Inhalation	**Inorganics**												
				ARSENIC	3.92E-08	(mg/m^3)	3.17E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.4E-10	5.55E-10	(mg/m^3)	1.50E-05	(mg/m^3)	3.7E-05
				COBALT	5.98E-09	(mg/m^3)	4.84E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	4.4E-11	8.47E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.4E-05
				MANGANESE	4.96E-07	(mg/m^3)	4.01E-07	(ug/m^3)	NA	per (ug/m^3)	--	7.02E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.4E-04
				THALLIUM	2.10E-10	(mg/m^3)	1.70E-10	(ug/m^3)	NA	per (ug/m^3)	--	2.97E-12	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.07E-09	(mg/m^3)	2.61E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.6E-13	1.52E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.63E-09	(mg/m^3)	3.95E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.4E-13	2.30E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.26E-09	(mg/m^3)	3.07E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	1.8E-12	1.79E-11	(mg/m^3)	2.00E-06	(mg/m^3)	8.9E-06
				DIBENZ(A,H)ANTHRACENE	2.32E-10	(mg/m^3)	5.64E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	3.4E-13	3.29E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.13E-09	(mg/m^3)	2.75E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.6E-13	1.60E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.8E-10**					**2.0E-04**
		Exposure Point Total									**1.8E-10**					**2.0E-04**
	Exposure Medium Total										**1.8E-10**					**2.0E-04**
Soil Total											**3.4E-06**					**1.8E-01**
										Total of Receptor Risks Across All Media	**3.4E-06**				Total of Receptor Hazards Across All Media	**1.8E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 158
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU11

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU11	Ingestion	**Inorganics**												
				ARSENIC	4.74E+01	(mg/kg)	1.87E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.8E-07	2.19E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.3E-03
				COBALT	7.24E+00	(mg/kg)	4.77E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	5.57E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.9E-03
				MANGANESE	6.00E+02	(mg/kg)	3.96E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.61E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.3E-04
				THALLIUM	2.54E-01	(mg/kg)	1.67E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	1.95E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	2.0E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.30E+00	(mg/kg)	2.57E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.6E-09	1.00E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.97E+00	(mg/kg)	3.90E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.9E-09	1.52E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.53E+00	(mg/kg)	3.03E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	3.0E-08	1.18E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.9E-04
				DIBENZ(A,H)ANTHRACENE	2.81E-01	(mg/kg)	5.56E-09	(mg/kg-day)	1.00E+00	per (mg/kg-day)	5.6E-09	2.16E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.37E+00	(mg/kg)	2.71E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.7E-09	1.05E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.3E-07**					**1.2E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	4.74E+01	(mg/kg)	8.71E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.3E-07	1.02E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.4E-03
				COBALT	7.24E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.00E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	2.54E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.30E+00	(mg/kg)	3.10E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.1E-09	1.21E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.97E+00	(mg/kg)	4.70E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	4.7E-09	1.83E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.53E+00	(mg/kg)	3.65E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	3.7E-08	1.42E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.7E-04
				DIBENZ(A,H)ANTHRACENE	2.81E-01	(mg/kg)	6.71E-09	(mg/kg-day)	1.00E+00	per (mg/kg-day)	6.7E-09	2.61E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.37E+00	(mg/kg)	3.27E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.3E-09	1.27E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.8E-07**					**3.9E-03**
		Exposure Point Total									**5.1E-07**					**1.6E-02**
	Exposure Medium Total										**5.1E-07**					**1.6E-02**

TABLE 158
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU11

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Air	DU11	Inhalation	**Inorganics**												
				ARSENIC	3.92E-08	(mg/m^3)	2.45E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.1E-10	2.86E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.9E-05
				COBALT	5.98E-09	(mg/m^3)	3.75E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	3.4E-11	4.37E-11	(mg/m^3)	6.00E-06	(mg/m^3)	7.3E-06
				MANGANESE	4.96E-07	(mg/m^3)	3.11E-07	(ug/m^3)	NA	per (ug/m^3)	--	3.62E-09	(mg/m^3)	5.00E-05	(mg/m^3)	7.2E-05
				THALLIUM	2.10E-10	(mg/m^3)	1.31E-10	(ug/m^3)	NA	per (ug/m^3)	--	1.53E-12	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.07E-09	(mg/m^3)	2.02E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.2E-13	7.85E-12	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.63E-09	(mg/m^3)	3.06E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.8E-13	1.19E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.26E-09	(mg/m^3)	2.38E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	1.4E-12	9.24E-12	(mg/m^3)	2.00E-06	(mg/m^3)	4.6E-06
				DIBENZ(A,H)ANTHRACENE	2.32E-10	(mg/m^3)	4.36E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	2.6E-13	1.70E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.13E-09	(mg/m^3)	2.13E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.3E-13	8.27E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.4E-10**					**1.0E-04**
		Exposure Point Total									**1.4E-10**					**1.0E-04**
	Exposure Medium Total										**1.4E-10**					**1.0E-04**
Soil Total											**5.1E-07**					**1.6E-02**
										Total of Receptor Risks Across All Media	**5.1E-07**				Total of Receptor Hazards Across All Media	**1.6E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 159
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU11

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU11	Ingestion	**Inorganics**												
				ARSENIC	4.74E+01	(mg/kg)	1.29E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.9E-06	6.93E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.3E-02
				COBALT	7.24E+00	(mg/kg)	3.27E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.76E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.9E-03
				MANGANESE	6.00E+02	(mg/kg)	2.71E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.46E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.0E-03
				THALLIUM	2.54E-01	(mg/kg)	1.15E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	6.19E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	6.2E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.30E+00	(mg/kg)	1.76E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.8E-08	3.17E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.97E+00	(mg/kg)	2.67E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.7E-08	4.80E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.53E+00	(mg/kg)	2.08E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.1E-07	3.73E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.2E-03
				DIBENZ(A,H)ANTHRACENE	2.81E-01	(mg/kg)	3.81E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	3.8E-08	6.84E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.37E+00	(mg/kg)	1.86E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.9E-08	3.34E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.2E-06**					**3.7E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	4.74E+01	(mg/kg)	2.54E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.8E-07	1.37E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.6E-03
				COBALT	7.24E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	6.00E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	2.54E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.30E+00	(mg/kg)	9.05E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	9.1E-09	1.62E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.97E+00	(mg/kg)	1.37E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.4E-08	2.46E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.53E+00	(mg/kg)	1.07E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.1E-07	1.91E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.4E-04
				DIBENZ(A,H)ANTHRACENE	2.81E-01	(mg/kg)	1.96E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.0E-08	3.51E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.37E+00	(mg/kg)	9.54E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	9.5E-09	1.71E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**5.4E-07**					**5.2E-03**
		Exposure Point Total									**2.8E-06**					**4.3E-02**
	Exposure Medium Total										**2.8E-06**					**4.3E-02**

TABLE 159
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU11

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU11	Inhalation	**Inorganics**												
				ARSENIC	3.92E-08	(mg/m^3)	3.99E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	1.7E-09	2.15E-09	(mg/m^3)	1.50E-05	(mg/m^3)	1.4E-04
				COBALT	5.98E-09	(mg/m^3)	6.09E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	5.5E-10	3.28E-10	(mg/m^3)	6.00E-06	(mg/m^3)	5.5E-05
				MANGANESE	4.96E-07	(mg/m^3)	5.05E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.72E-08	(mg/m^3)	5.00E-05	(mg/m^3)	5.4E-04
				THALLIUM	2.10E-10	(mg/m^3)	2.14E-09	(ug/m^3)	NA	per (ug/m^3)	--	1.15E-11	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.07E-09	(mg/m^3)	3.28E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	2.0E-12	5.89E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.63E-09	(mg/m^3)	4.97E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	3.0E-12	8.92E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.26E-09	(mg/m^3)	3.86E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	2.3E-11	6.93E-11	(mg/m^3)	2.00E-06	(mg/m^3)	3.5E-05
				DIBENZ(A,H)ANTHRACENE	2.32E-10	(mg/m^3)	7.09E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	4.3E-12	1.27E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.13E-09	(mg/m^3)	3.46E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	2.1E-12	6.20E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**2.3E-09**					**7.8E-04**
		Exposure Point Total									**2.3E-09**					**7.8E-04**
	Exposure Medium Total										**2.3E-09**					**7.8E-04**
Soil Total											**2.8E-06**					**4.3E-02**
										Total of Receptor Risks Across All Media	**2.8E-06**				Total of Receptor Hazards Across All Media	**4.3E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 160
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU11

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	8.3E-06	1.8E-06	8.8E-09	1.0E-05	ARSENIC	Skin, Cardiovascular	5.2E-02	1.1E-02	3.8E-04	6.3E-02
			COBALT	--	--	2.8E-09	2.8E-09	COBALT	Thyroid	1.3E-02	--	1.5E-04	1.3E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.3E-03	--	1.4E-03	3.8E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	1.4E-02	--	--	1.4E-02
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	2.5E-08	1.4E-08	3.4E-12	3.9E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	3.9E-08	2.1E-08	5.1E-12	6.0E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	3.0E-07	1.6E-07	4.0E-11	4.6E-07	BENZO(A)PYRENE	Developmental System	2.8E-03	1.5E-03	9.2E-05	4.4E-03
			DIBENZ(A,H)ANTHRACENE	5.5E-08	3.0E-08	7.3E-12	8.5E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.7E-08	1.5E-08	3.5E-12	4.2E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	8.8E-06	2.0E-06	1.2E-08	1.1E-05		(Total)	8.4E-02	1.3E-02	2.1E-03	9.9E-02
			Total Risk Across Surface Soil				**1.1E-05**		**Total Hazard Index Across Surface Soil**				**9.9E-02**
			Total Risk Across All Media and All Exposure Routes				**1E-05**		**Total Hazard Index Across All Media and All Exposure Routes**				**0.1**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 161
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU11

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	3.3E-07	1.7E-07	3.4E-10	5.0E-07	ARSENIC	Skin, Cardiovascular	1.7E-02	8.9E-03	1.2E-04	2.6E-02
			COBALT	--	--	1.1E-10	1.1E-10	COBALT	Thyroid	4.3E-03	--	4.7E-05	4.3E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	7.6E-04	--	4.7E-04	1.2E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	4.5E-03	--	--	4.5E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	9.9E-10	1.4E-09	1.3E-13	2.4E-09	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.5E-09	2.1E-09	2.0E-13	3.6E-09	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.2E-08	1.6E-08	1.5E-12	2.8E-08	BENZO(A)PYRENE	Developmental System	9.1E-04	1.2E-03	3.0E-05	2.2E-03
			DIBENZ(A,H)ANTHRACENE	2.1E-09	2.9E-09	2.8E-13	5.1E-09	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	1.0E-09	1.4E-09	1.4E-13	2.5E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	3.4E-07	2.0E-07	4.5E-10	5.4E-07		(Total)	2.7E-02	1.0E-02	6.7E-04	3.8E-02
							Total Risk Across Surface Soil	**5.4E-07**					**Total Hazard Index Across Surface Soil**	**3.8E-02**
							Total Risk Across All Media and All Exposure Routes	**5E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.04**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 162
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU11

Location: Iona Island
Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	1.9E-06	3.0E-07	5.1E-08	2.2E-06	ARSENIC	Skin, Cardiovascular	2.9E-01	4.7E-02	5.5E-02	4.0E-01
			COBALT	--	--	1.6E-08	1.6E-08	COBALT	Thyroid	7.5E-02	--	2.1E-02	9.6E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.3E-02	--	2.1E-01	2.2E-01
			THALLIUM	--	--	--	NA	THALLIUM	Hair	4.2E-02	--	--	4.2E-02
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	5.8E-09	2.4E-09	2.0E-11	8.2E-09	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	8.7E-09	3.6E-09	3.0E-11	1.2E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	6.8E-08	2.8E-08	2.3E-10	9.6E-08	BENZO(A)PYRENE	Developmental System	1.6E-02	6.6E-03	1.3E-02	3.6E-02
			DIBENZ(A,H)ANTHRACENE	1.2E-08	5.2E-09	4.2E-11	1.8E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	6.1E-09	2.5E-09	2.1E-11	8.6E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	2.0E-06	3.5E-07	6.8E-08	2.4E-06		(Total)	4.4E-01	5.4E-02	3.0E-01	8.0E-01
						Total Risk Across Surface Soil	**2.4E-06**					**Total Hazard Index Across Surface Soil**	**8.0E-01**
						Total Risk Across All Media and All Exposure Routes	**2E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.8**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 163
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU11

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	1.3E-06	2.7E-07	6.8E-10	1.6E-06	ARSENIC	Skin, Cardiovascular	1.0E-02	2.1E-03	3.7E-05	1.2E-02
			COBALT	--	--	2.2E-10	2.2E-10	COBALT	Thyroid	2.6E-03	--	1.4E-05	2.6E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.5E-04	--	1.4E-04	6.0E-04
			THALLIUM	--	--	--	NA	THALLIUM	Hair	2.7E-03	--	--	2.7E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	3.9E-09	2.2E-09	2.6E-13	6.1E-09	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	6.0E-09	3.3E-09	4.0E-13	9.3E-09	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	4.6E-08	2.5E-08	3.1E-12	7.2E-08	BENZO(A)PYRENE	Developmental System	5.4E-04	3.0E-04	8.9E-06	8.5E-04
			DIBENZ(A,H)ANTHRACENE	8.5E-09	4.7E-09	5.6E-13	1.3E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	4.2E-09	2.3E-09	2.7E-13	6.4E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	1.4E-06	3.1E-07	9.0E-10	1.7E-06		(Total)	1.6E-02	2.4E-03	2.0E-04	1.9E-02
							Total Risk Across Surface Soil	**1.7E-06**					**Total Hazard Index Across Surface Soil**	**1.9E-02**
							Total Risk Across All Media and All Exposure Routes	**2E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 164
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU11

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	1.8E-06	4.2E-07	3.4E-10	2.2E-06	ARSENIC	Skin, Cardiovascular	4.7E-02	1.1E-02	6.2E-05	5.8E-02
			COBALT	--	--	1.1E-10	1.1E-10	COBALT	Thyroid	1.2E-02	--	2.4E-05	1.2E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.1E-03	--	2.3E-04	2.4E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	1.3E-02	--	--	1.3E-02
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	1.7E-08	1.0E-08	3.9E-13	2.7E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	2.5E-08	1.5E-08	5.9E-13	4.0E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	2.0E-07	1.2E-07	4.6E-12	3.1E-07	BENZO(A)PYRENE	Developmental System	2.5E-03	1.5E-03	1.5E-05	4.1E-03
			DIBENZ(A,H)ANTHRACENE	3.6E-08	2.2E-08	8.5E-13	5.8E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	1.8E-08	1.1E-08	4.1E-13	2.8E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	2.1E-06	6.0E-07	4.6E-10	2.7E-06		(Total)	7.7E-02	1.3E-02	3.3E-04	8.9E-02
						Total Risk Across Surface Soil	**2.7E-06**					**Total Hazard Index Across Surface Soil**	**8.9E-02**
						Total Risk Across All Media and All Exposure Routes	**3E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.09**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 165
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU11

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	2.6E-06	2.7E-07	1.4E-10	2.9E-06	ARSENIC	Skin, Cardiovascular	1.0E-01	1.1E-02	3.7E-05	1.1E-01
			COBALT	--	--	4.4E-11	4.4E-11	COBALT	Thyroid	2.6E-02	--	1.4E-05	2.6E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.5E-03	--	1.4E-04	4.7E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	2.7E-02	--	--	2.7E-02
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	2.4E-08	6.5E-09	1.6E-13	3.0E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	3.6E-08	9.8E-09	2.4E-13	4.6E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	2.8E-07	7.6E-08	1.8E-12	3.5E-07	BENZO(A)PYRENE	Developmental System	5.4E-03	1.5E-03	8.9E-06	6.9E-03
			DIBENZ(A,H)ANTHRACENE	5.1E-08	1.4E-08	3.4E-13	6.5E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.5E-08	6.8E-09	1.6E-13	3.2E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	3.0E-06	3.9E-07	1.8E-10	3.4E-06		(Total)	1.6E-01	1.2E-02	2.0E-04	1.8E-01
						Total Risk Across Surface Soil	**3.4E-06**					**Total Hazard Index Across Surface Soil**	**1.8E-01**
						Total Risk Across All Media and All Exposure Routes	**3E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.2**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 166
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU11

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	2.8E-07	1.3E-07	1.1E-10	4.1E-07	ARSENIC	Skin, Cardiovascular	7.3E-03	3.4E-03	1.9E-05	1.1E-02
			COBALT	--	--	3.4E-11	3.4E-11	COBALT	Thyroid	1.9E-03	--	7.3E-06	1.9E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.3E-04	--	7.2E-05	4.0E-04
			THALLIUM	--	--	--	NA	THALLIUM	Hair	2.0E-03	--	--	2.0E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	2.6E-09	3.1E-09	1.2E-13	5.7E-09	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	3.9E-09	4.7E-09	1.8E-13	8.6E-09	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	3.0E-08	3.7E-08	1.4E-12	6.7E-08	BENZO(A)PYRENE	Developmental System	3.9E-04	4.7E-04	4.6E-06	8.7E-04
			DIBENZ(A,H)ANTHRACENE	5.6E-09	6.7E-09	2.6E-13	1.2E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.7E-09	3.3E-09	1.3E-13	6.0E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	3.3E-07	1.8E-07	1.4E-10	5.1E-07		(Total)	1.2E-02	3.9E-03	1.0E-04	1.6E-02
							Total Risk Across Surface Soil	**5.1E-07**					**Total Hazard Index Across Surface Soil**	**1.6E-02**
							Total Risk Across All Media and All Exposure Routes	**5E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 167
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU11

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	1.9E-06	3.8E-07	1.7E-09	2.3E-06	ARSENIC	Skin, Cardiovascular	2.3E-02	4.6E-03	1.4E-04	2.8E-02
			COBALT	--	--	5.5E-10	5.5E-10	COBALT	Thyroid	5.9E-03	--	5.5E-05	5.9E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.0E-03	--	5.4E-04	1.6E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	6.2E-03	--	--	6.2E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	1.8E-08	9.1E-09	2.0E-12	2.7E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	2.7E-08	1.4E-08	3.0E-12	4.0E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	2.1E-07	1.1E-07	2.3E-11	3.1E-07	BENZO(A)PYRENE	Developmental System	1.2E-03	6.4E-04	3.5E-05	1.9E-03
			DIBENZ(A,H)ANTHRACENE	3.8E-08	2.0E-08	4.3E-12	5.8E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	1.9E-08	9.5E-09	2.1E-12	2.8E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	2.2E-06	5.4E-07	2.3E-09	2.8E-06		(Total)	3.7E-02	5.2E-03	7.8E-04	4.3E-02
							Total Risk Across Surface Soil	**2.8E-06**					**Total Hazard Index Across Surface Soil**	**4.3E-02**
							Total Risk Across All Media and All Exposure Routes	**3E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.04**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 168
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU12

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU12	Ingestion	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	1.77E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.7E-06	4.96E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.7E-02
				COBALT	8.19E+00	(mg/kg)	1.60E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.49E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				MANGANESE	1.05E+03	(mg/kg)	2.05E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	5.75E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.1E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.89E+00	(mg/kg)	5.66E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	5.7E-08	1.58E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.95E+00	(mg/kg)	7.73E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	7.7E-08	2.16E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.47E+00	(mg/kg)	4.83E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.8E-07	1.35E-06	(mg/kg-day)	3.0E-04	(mg/kg-day)	4.5E-03
				DIBENZ(A,H)ANTHRACENE	5.71E-01	(mg/kg)	1.12E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.1E-07	3.13E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.23E+00	(mg/kg)	4.36E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.4E-08	1.22E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.4E-06**					**4.0E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	3.75E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.6E-07	1.05E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.5E-03
				COBALT	8.19E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.05E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.89E+00	(mg/kg)	3.11E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.1E-08	8.71E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.95E+00	(mg/kg)	4.25E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.3E-08	1.19E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.47E+00	(mg/kg)	2.66E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.7E-07	7.45E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	2.5E-03
				DIBENZ(A,H)ANTHRACENE	5.71E-01	(mg/kg)	6.15E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	6.1E-08	1.72E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.23E+00	(mg/kg)	2.40E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.4E-08	6.72E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**9.9E-07**					**6.0E-03**
		Exposure Point Total									**4.4E-06**					**4.6E-02**
	Exposure Medium Total										**4.4E-06**					**4.6E-02**

TABLE 168
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU12

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU12	Inhalation	**Inorganics**												
				ARSENIC	1.25E-08	(mg/m^3)	6.51E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	2.8E-09	1.82E-09	(mg/m^3)	1.50E-05	(mg/m^3)	1.2E-04
				COBALT	6.77E-09	(mg/m^3)	3.53E-07	(ug/m^3)	9.00E-03	per (ug/m^3)	3.2E-09	9.89E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.6E-04
				MANGANESE	8.68E-07	(mg/m^3)	4.53E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.27E-07	(mg/m^3)	5.00E-05	(mg/m^3)	2.5E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.39E-09	(mg/m^3)	1.25E-07	(ug/m^3)	6.00E-05	per (ug/m^3)	7.5E-12	3.49E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	3.26E-09	(mg/m^3)	1.70E-07	(ug/m^3)	6.00E-05	per (ug/m^3)	1.0E-11	4.77E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	2.04E-09	(mg/m^3)	1.07E-07	(ug/m^3)	6.00E-04	per (ug/m^3)	6.4E-11	2.98E-10	(mg/m^3)	2.00E-06	(mg/m^3)	1.5E-04
				DIBENZ(A,H)ANTHRACENE	4.72E-10	(mg/m^3)	2.46E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	1.5E-11	6.90E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.84E-09	(mg/m^3)	9.62E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	5.8E-12	2.69E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**6.1E-09**					**3.0E-03**
		Exposure Point Total									**6.1E-09**					**3.0E-03**
	Exposure Medium Total										**6.1E-09**					**3.0E-03**
Soil Total											**4.4E-06**					**4.9E-02**
										Total of Receptor Risks Across All Media	**4.4E-06**				Total of Receptor Hazards Across All Media	**4.9E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 169
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU12

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU12	Ingestion	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	6.91E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.0E-07	1.61E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.4E-03
				COBALT	8.19E+00	(mg/kg)	6.25E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.46E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.9E-03
				MANGANESE	1.05E+03	(mg/kg)	8.01E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.87E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.3E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.89E+00	(mg/kg)	2.21E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.2E-09	5.15E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.95E+00	(mg/kg)	3.01E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.0E-09	7.03E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.47E+00	(mg/kg)	1.89E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.9E-08	4.40E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.5E-03
				DIBENZ(A,H)ANTHRACENE	5.71E-01	(mg/kg)	4.36E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.4E-09	1.02E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.23E+00	(mg/kg)	1.70E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.7E-09	3.97E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.3E-07**					**1.3E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	3.66E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.5E-08	8.54E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.8E-03
				COBALT	8.19E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.05E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.89E+00	(mg/kg)	3.03E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.0E-09	7.08E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.95E+00	(mg/kg)	4.15E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.1E-09	9.68E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.47E+00	(mg/kg)	2.59E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.6E-08	6.05E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	2.0E-03
				DIBENZ(A,H)ANTHRACENE	5.71E-01	(mg/kg)	5.99E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	6.0E-09	1.40E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.23E+00	(mg/kg)	2.34E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.3E-09	5.46E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**9.6E-08**					**4.9E-03**
		Exposure Point Total									**2.3E-07**					**1.8E-02**
	Exposure Medium Total										**2.3E-07**					**1.8E-02**

TABLE 169
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU12

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Air	DU12	Inhalation	**Inorganics**												
				ARSENIC	1.25E-08	(mg/m^3)	2.54E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.1E-10	5.93E-10	(mg/m^3)	1.50E-05	(mg/m^3)	4.0E-05
				COBALT	6.77E-09	(mg/m^3)	1.38E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.2E-10	3.21E-10	(mg/m^3)	6.00E-06	(mg/m^3)	5.4E-05
				MANGANESE	8.68E-07	(mg/m^3)	1.77E-06	(ug/m^3)	NA	per (ug/m^3)	--	4.12E-08	(mg/m^3)	5.00E-05	(mg/m^3)	8.2E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.39E-09	(mg/m^3)	4.86E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.9E-13	1.13E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	3.26E-09	(mg/m^3)	6.64E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	4.0E-13	1.55E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	2.04E-09	(mg/m^3)	4.15E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	2.5E-12	9.69E-11	(mg/m^3)	2.00E-06	(mg/m^3)	4.8E-05
				DIBENZ(A,H)ANTHRACENE	4.72E-10	(mg/m^3)	9.60E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	5.8E-13	2.24E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.84E-09	(mg/m^3)	3.75E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.3E-13	8.75E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**2.4E-10**					**9.7E-04**
		Exposure Point Total									**2.4E-10**					**9.7E-04**
	Exposure Medium Total										**2.4E-10**					**9.7E-04**
Soil Total											**2.3E-07**					**1.9E-02**
										Total of Receptor Risks Across All Media	**2.3E-07**				Total of Receptor Hazards Across All Media	**1.9E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 170
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU12

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU12	Ingestion	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	4.02E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	6.0E-07	2.82E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.4E-02
				COBALT	8.19E+00	(mg/kg)	3.64E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.55E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.5E-02
				MANGANESE	1.05E+03	(mg/kg)	4.66E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.26E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.3E-02
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.89E+00	(mg/kg)	1.28E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.3E-08	8.98E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.95E+00	(mg/kg)	1.75E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.8E-08	1.23E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.47E+00	(mg/kg)	1.10E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.1E-07	7.68E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.6E-02
				DIBENZ(A,H)ANTHRACENE	5.71E-01	(mg/kg)	2.54E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.5E-08	1.77E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.23E+00	(mg/kg)	9.90E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	9.9E-09	6.93E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**7.8E-07**					**2.3E-01**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	6.45E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.7E-08	4.51E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				COBALT	8.19E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.05E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.89E+00	(mg/kg)	5.35E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	5.3E-09	3.74E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.95E+00	(mg/kg)	7.31E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	7.3E-09	5.12E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.47E+00	(mg/kg)	4.57E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.6E-08	3.20E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.1E-02
				DIBENZ(A,H)ANTHRACENE	5.71E-01	(mg/kg)	1.06E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.1E-08	7.40E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.23E+00	(mg/kg)	4.13E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.1E-09	2.89E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.7E-07**					**2.6E-02**
		Exposure Point Total									**9.5E-07**					**2.5E-01**
	Exposure Medium Total										**9.5E-07**					**2.5E-01**

TABLE 170
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU12

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU12	Inhalation	**Inorganics**												
				ARSENIC	7.33E-07	(mg/m^3)	3.78E-06	(ug/m^3)	4.3E-03	per (ug/m^3)	1.6E-08	2.65E-07	(mg/m^3)	1.50E-05	(mg/m^3)	1.8E-02
				COBALT	3.98E-07	(mg/m^3)	2.05E-06	(ug/m^3)	9.0E-03	per (ug/m^3)	1.8E-08	1.44E-07	(mg/m^3)	6.00E-06	(mg/m^3)	2.4E-02
				MANGANESE	5.10E-05	(mg/m^3)	2.63E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.84E-05	(mg/m^3)	5.00E-05	(mg/m^3)	3.7E-01
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.40E-07	(mg/m^3)	7.24E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	4.3E-11	5.06E-08	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.92E-07	(mg/m^3)	9.89E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	5.9E-11	6.92E-08	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.20E-07	(mg/m^3)	6.18E-07	(ug/m^3)	6.0E-04	per (ug/m^3)	3.7E-10	4.33E-08	(mg/m^3)	2.00E-06	(mg/m^3)	2.2E-02
				DIBENZ(A,H)ANTHRACENE	2.77E-08	(mg/m^3)	1.43E-07	(ug/m^3)	6.0E-04	per (ug/m^3)	8.6E-11	1.00E-08	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.08E-07	(mg/m^3)	5.58E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	3.3E-11	3.91E-08	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**3.5E-08**					**4.3E-01**
		Exposure Point Total									**3.5E-08**					**4.3E-01**
	Exposure Medium Total										**3.5E-08**					**4.3E-01**
Soil Total											**9.8E-07**					**6.8E-01**
										Total of Receptor Risks Across All Media	**9.8E-07**			Total of Receptor Hazards Across All Media		**6.8E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 171
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU12

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU12	Ingestion	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	2.75E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.1E-07	9.62E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.2E-03
				COBALT	8.19E+00	(mg/kg)	2.48E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	8.69E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.9E-03
				MANGANESE	1.05E+03	(mg/kg)	3.18E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.11E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	8.0E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.89E+00	(mg/kg)	8.77E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	8.8E-09	3.07E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.95E+00	(mg/kg)	1.20E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.2E-08	4.19E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.47E+00	(mg/kg)	7.49E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	7.5E-08	2.62E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	8.7E-04
				DIBENZ(A,H)ANTHRACENE	5.71E-01	(mg/kg)	1.73E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.7E-08	6.06E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.23E+00	(mg/kg)	6.76E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	6.8E-09	2.37E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**5.3E-07**					**7.8E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	5.80E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.7E-08	2.03E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.8E-04
				COBALT	8.19E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.05E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.89E+00	(mg/kg)	4.81E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.8E-09	1.68E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.95E+00	(mg/kg)	6.58E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	6.6E-09	2.30E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.47E+00	(mg/kg)	4.11E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.1E-08	1.44E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	4.8E-04
				DIBENZ(A,H)ANTHRACENE	5.71E-01	(mg/kg)	9.51E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	9.5E-09	3.33E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.23E+00	(mg/kg)	3.71E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.7E-09	1.30E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.5E-07**					**1.2E-03**
		Exposure Point Total									**6.8E-07**					**8.9E-03**
	Exposure Medium Total										**6.8E-07**					**8.9E-03**

TABLE 171
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU12

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU12	Inhalation	**Inorganics**												
				ARSENIC	1.25E-08	(mg/m^3)	5.05E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	2.2E-10	1.77E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.2E-05
				COBALT	6.77E-09	(mg/m^3)	2.74E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	2.5E-10	9.58E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.6E-05
				MANGANESE	8.68E-07	(mg/m^3)	3.51E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.23E-08	(mg/m^3)	5.00E-05	(mg/m^3)	2.5E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.39E-09	(mg/m^3)	9.66E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	5.8E-13	3.38E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	3.26E-09	(mg/m^3)	1.32E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	7.9E-13	4.62E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	2.04E-09	(mg/m^3)	8.26E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	5.0E-12	2.89E-11	(mg/m^3)	2.00E-06	(mg/m^3)	1.4E-05
				DIBENZ(A,H)ANTHRACENE	4.72E-10	(mg/m^3)	1.91E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	1.1E-12	6.68E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.84E-09	(mg/m^3)	7.45E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	4.5E-13	2.61E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**4.7E-10**					**2.9E-04**
		Exposure Point Total									**4.7E-10**					**2.9E-04**
	Exposure Medium Total										**4.7E-10**					**2.9E-04**
Soil Total											**6.9E-07**					**9.2E-03**
										Total of Receptor Risks Across All Media	**6.9E-07**				Total of Receptor Hazards Across All Media	**9.2E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 172
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU12

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU12	Ingestion	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	3.87E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.8E-07	4.52E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				COBALT	8.19E+00	(mg/kg)	3.50E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	4.08E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-02
				MANGANESE	1.05E+03	(mg/kg)	4.49E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	5.23E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.7E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.89E+00	(mg/kg)	3.70E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.7E-08	1.44E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.95E+00	(mg/kg)	5.06E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	5.1E-08	1.97E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.47E+00	(mg/kg)	3.17E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	3.2E-07	1.23E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.1E-03
				DIBENZ(A,H)ANTHRACENE	5.71E-01	(mg/kg)	7.32E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	7.3E-08	2.85E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.23E+00	(mg/kg)	2.86E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.9E-08	1.11E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.1E-06**					**3.7E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	8.99E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.3E-07	1.05E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.5E-03
				COBALT	8.19E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.05E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.89E+00	(mg/kg)	2.24E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.2E-08	8.70E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.95E+00	(mg/kg)	3.06E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.1E-08	1.19E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.47E+00	(mg/kg)	1.91E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.9E-07	7.43E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.5E-03
				DIBENZ(A,H)ANTHRACENE	5.71E-01	(mg/kg)	4.42E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	4.4E-08	1.72E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.23E+00	(mg/kg)	1.73E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.7E-08	6.71E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**4.4E-07**					**6.0E-03**
		Exposure Point Total									**1.5E-06**					**4.2E-02**
	Exposure Medium Total										**1.5E-06**					**4.2E-02**

TABLE 172
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU12

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU12	Inhalation	**Inorganics**												
				ARSENIC	1.25E-08	(mg/m^3)	2.52E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.1E-10	2.94E-10	(mg/m^3)	1.50E-05	(mg/m^3)	2.0E-05
				COBALT	6.77E-09	(mg/m^3)	1.37E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.2E-10	1.60E-10	(mg/m^3)	6.00E-06	(mg/m^3)	2.7E-05
				MANGANESE	8.68E-07	(mg/m^3)	1.75E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.05E-08	(mg/m^3)	5.00E-05	(mg/m^3)	4.1E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.39E-09	(mg/m^3)	1.45E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	8.7E-13	5.63E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	3.26E-09	(mg/m^3)	1.98E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	1.2E-12	7.70E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	2.04E-09	(mg/m^3)	1.24E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	7.4E-12	4.82E-11	(mg/m^3)	2.00E-06	(mg/m^3)	2.4E-05
				DIBENZ(A,H)ANTHRACENE	4.72E-10	(mg/m^3)	2.86E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	1.7E-12	1.11E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.84E-09	(mg/m^3)	1.12E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	6.7E-13	4.35E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**2.4E-10**					**4.8E-04**
		Exposure Point Total									**2.4E-10**					**4.8E-04**
	Exposure Medium Total										**2.4E-10**					**4.8E-04**
Soil Total											**1.5E-06**					**4.3E-02**
										Total of Receptor Risks Across All Media	**1.5E-06**				Total of Receptor Hazards Across All Media	**4.3E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 173
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU12

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU12	Ingestion	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	5.50E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.2E-07	9.62E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.2E-02
				COBALT	8.19E+00	(mg/kg)	4.97E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	8.69E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.9E-02
				MANGANESE	1.05E+03	(mg/kg)	6.37E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.11E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	8.0E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.89E+00	(mg/kg)	5.26E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	5.3E-08	3.07E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.95E+00	(mg/kg)	7.19E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	7.2E-08	4.19E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.47E+00	(mg/kg)	4.50E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.5E-07	2.62E-06	(mg/kg-day)	3.0E-04	(mg/kg-day)	8.7E-03
				DIBENZ(A,H)ANTHRACENE	5.71E-01	(mg/kg)	1.04E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.0E-07	6.06E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.23E+00	(mg/kg)	4.06E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.1E-08	2.37E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.5E-06**					**7.8E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	5.79E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.7E-08	1.01E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.4E-03
				COBALT	8.19E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.05E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.89E+00	(mg/kg)	1.44E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.4E-08	8.40E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.95E+00	(mg/kg)	1.97E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.0E-08	1.15E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.47E+00	(mg/kg)	1.23E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.2E-07	7.18E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	2.4E-03
				DIBENZ(A,H)ANTHRACENE	5.71E-01	(mg/kg)	2.85E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.8E-08	1.66E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.23E+00	(mg/kg)	1.11E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.1E-08	6.48E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.8E-07**					**5.8E-03**
		Exposure Point Total									**1.8E-06**					**8.4E-02**
	Exposure Medium Total										**1.8E-06**					**8.4E-02**

TABLE 173
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU12

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU12	Inhalation	**Inorganics**												
				ARSENIC	1.25E-08	(mg/m^3)	1.01E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	4.3E-11	1.77E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.2E-05
				COBALT	6.77E-09	(mg/m^3)	5.47E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	4.9E-11	9.58E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.6E-05
				MANGANESE	8.68E-07	(mg/m^3)	7.02E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.23E-08	(mg/m^3)	5.00E-05	(mg/m^3)	2.5E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.39E-09	(mg/m^3)	5.80E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	3.5E-13	3.38E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	3.26E-09	(mg/m^3)	7.92E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	4.8E-13	4.62E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	2.04E-09	(mg/m^3)	4.95E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	3.0E-12	2.89E-11	(mg/m^3)	2.00E-06	(mg/m^3)	1.4E-05
				DIBENZ(A,H)ANTHRACENE	4.72E-10	(mg/m^3)	1.15E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	6.9E-13	6.68E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.84E-09	(mg/m^3)	4.47E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.7E-13	2.61E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**9.7E-11**					**2.9E-04**
		Exposure Point Total									**9.7E-11**					**2.9E-04**
	Exposure Medium Total										**9.7E-11**					**2.9E-04**
Soil Total											**1.8E-06**					**8.4E-02**
										Total of Receptor Risks Across All Media	**1.8E-06**				Total of Receptor Hazards Across All Media	**8.4E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 174
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU12

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU12	Ingestion	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	5.97E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.0E-08	6.97E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.3E-03
				COBALT	8.19E+00	(mg/kg)	5.40E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	6.30E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.1E-03
				MANGANESE	1.05E+03	(mg/kg)	6.92E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	8.07E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	5.8E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.89E+00	(mg/kg)	5.72E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	5.7E-09	2.22E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.95E+00	(mg/kg)	7.81E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	7.8E-09	3.04E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.47E+00	(mg/kg)	4.88E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	4.9E-08	1.90E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.3E-04
				DIBENZ(A,H)ANTHRACENE	5.71E-01	(mg/kg)	1.13E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.1E-08	4.39E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.23E+00	(mg/kg)	4.41E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	4.4E-09	1.71E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.7E-07**					**5.6E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	2.77E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.2E-08	3.24E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.1E-03
				COBALT	8.19E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.05E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.89E+00	(mg/kg)	6.90E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	6.9E-09	2.68E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.95E+00	(mg/kg)	9.43E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	9.4E-09	3.67E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.47E+00	(mg/kg)	5.90E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	5.9E-08	2.29E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.6E-04
				DIBENZ(A,H)ANTHRACENE	5.71E-01	(mg/kg)	1.36E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.4E-08	5.30E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.23E+00	(mg/kg)	5.33E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	5.3E-09	2.07E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.4E-07**					**1.8E-03**
		Exposure Point Total									**3.0E-07**					**7.5E-03**
	Exposure Medium Total										**3.0E-07**					**7.5E-03**

TABLE 174
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU12

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU12	Inhalation	**Inorganics**												
				ARSENIC	1.25E-08	(mg/m^3)	7.81E-09	(ug/m^3)	4.30E-03	per (ug/m^3)	3.4E-11	9.12E-11	(mg/m^3)	1.50E-05	(mg/m^3)	6.1E-06
				COBALT	6.77E-09	(mg/m^3)	4.24E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	3.8E-11	4.95E-11	(mg/m^3)	6.00E-06	(mg/m^3)	8.2E-06
				MANGANESE	8.68E-07	(mg/m^3)	5.43E-07	(ug/m^3)	NA	per (ug/m^3)	--	6.34E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.3E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.39E-09	(mg/m^3)	4.49E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.7E-13	1.74E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	3.26E-09	(mg/m^3)	6.13E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	3.7E-13	2.38E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	2.04E-09	(mg/m^3)	3.83E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	2.3E-12	1.49E-11	(mg/m^3)	2.00E-06	(mg/m^3)	7.5E-06
				DIBENZ(A,H)ANTHRACENE	4.72E-10	(mg/m^3)	8.87E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	5.3E-13	3.45E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.84E-09	(mg/m^3)	3.46E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.1E-13	1.35E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**7.5E-11**					**1.5E-04**
		Exposure Point Total									**7.5E-11**					**1.5E-04**
	Exposure Medium Total										**7.5E-11**					**1.5E-04**
Soil Total											**3.0E-07**					**7.6E-03**
										Total of Receptor Risks Across All Media	**3.0E-07**				Total of Receptor Hazards Across All Media	**7.6E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 175
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU12

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU12	Ingestion	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	4.10E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	6.1E-07	2.21E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.4E-03
				COBALT	8.19E+00	(mg/kg)	3.70E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.99E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.6E-03
				MANGANESE	1.05E+03	(mg/kg)	4.75E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.56E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.8E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.89E+00	(mg/kg)	3.92E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.9E-08	7.04E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.95E+00	(mg/kg)	5.36E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	5.4E-08	9.62E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.47E+00	(mg/kg)	3.35E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	3.4E-07	6.02E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.0E-03
				DIBENZ(A,H)ANTHRACENE	5.71E-01	(mg/kg)	7.75E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	7.7E-08	1.39E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.23E+00	(mg/kg)	3.03E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.0E-08	5.43E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.2E-06**					**1.8E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.51E+01	(mg/kg)	8.09E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.2E-07	4.35E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-03
				COBALT	8.19E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	1.05E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.89E+00	(mg/kg)	2.01E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.0E-08	3.61E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.95E+00	(mg/kg)	2.75E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.7E-08	4.94E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.47E+00	(mg/kg)	1.72E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.7E-07	3.09E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.0E-03
				DIBENZ(A,H)ANTHRACENE	5.71E-01	(mg/kg)	3.98E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	4.0E-08	7.14E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	2.23E+00	(mg/kg)	1.55E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.6E-08	2.79E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**4.0E-07**					**2.5E-03**
		Exposure Point Total									**1.5E-06**					**2.0E-02**
	Exposure Medium Total										**1.5E-06**					**2.0E-02**

TABLE 175
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU12

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU12	Inhalation	**Inorganics**												
				ARSENIC	1.25E-08	(mg/m^3)	1.27E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	5.5E-10	6.84E-10	(mg/m^3)	1.50E-05	(mg/m^3)	4.6E-05
				COBALT	6.77E-09	(mg/m^3)	6.89E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	6.2E-10	3.71E-10	(mg/m^3)	6.00E-06	(mg/m^3)	6.2E-05
				MANGANESE	8.68E-07	(mg/m^3)	8.83E-06	(ug/m^3)	NA	per (ug/m^3)	--	4.75E-08	(mg/m^3)	5.00E-05	(mg/m^3)	9.5E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.39E-09	(mg/m^3)	7.29E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	4.4E-12	1.31E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	3.26E-09	(mg/m^3)	9.97E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	6.0E-12	1.79E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	2.04E-09	(mg/m^3)	6.23E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	3.7E-11	1.12E-10	(mg/m^3)	2.00E-06	(mg/m^3)	5.6E-05
				DIBENZ(A,H)ANTHRACENE	4.72E-10	(mg/m^3)	1.44E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	8.6E-12	2.59E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.84E-09	(mg/m^3)	5.63E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	3.4E-12	1.01E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.2E-09**					**1.1E-03**
		Exposure Point Total									**1.2E-09**					**1.1E-03**
	Exposure Medium Total										**1.2E-09**					**1.1E-03**
Soil Total											**1.5E-06**					**2.1E-02**
										Total of Receptor Risks Across All Media	**1.5E-06**				Total of Receptor Hazards Across All Media	**2.1E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 176
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU12

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	2.7E-06	5.6E-07	2.8E-09	3.2E-06	ARSENIC	Skin, Cardiovascular	1.7E-02	3.5E-03	1.2E-04	2.0E-02
			COBALT	--	--	3.2E-09	3.2E-09	COBALT	Thyroid	1.5E-02	--	1.6E-04	1.5E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.1E-03	--	2.5E-03	6.6E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	5.7E-08	3.1E-08	7.5E-12	8.8E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	7.7E-08	4.3E-08	1.0E-11	1.2E-07	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	4.8E-07	2.7E-07	6.4E-11	7.5E-07	BENZO(A)PYRENE	Developmental System	4.5E-03	2.5E-03	1.5E-04	7.1E-03
			DIBENZ(A,H)ANTHRACENE	1.1E-07	6.1E-08	1.5E-11	1.7E-07	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	4.4E-08	2.4E-08	5.8E-12	6.8E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	3.4E-06	9.9E-07	6.1E-09	4.4E-06		(Total)	4.0E-02	6.0E-03	3.0E-03	4.9E-02
							Total Risk Across Surface Soil	**4.4E-06**					**Total Hazard Index Across Surface Soil**	**4.9E-02**
							Total Risk Across All Media and All Exposure Routes	**4E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.05**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 177
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU12

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	1.0E-07	5.5E-08	1.1E-10	1.6E-07	ARSENIC	Skin, Cardiovascular	5.4E-03	2.8E-03	4.0E-05	8.3E-03
			COBALT	--	--	1.2E-10	1.2E-10	COBALT	Thyroid	4.9E-03	--	5.4E-05	4.9E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.3E-03	--	8.2E-04	2.2E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	2.2E-09	3.0E-09	2.9E-13	5.2E-09	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	3.0E-09	4.1E-09	4.0E-13	7.2E-09	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.9E-08	2.6E-08	2.5E-12	4.5E-08	BENZO(A)PYRENE	Developmental System	1.5E-03	2.0E-03	4.8E-05	3.5E-03
			DIBENZ(A,H)ANTHRACENE	4.4E-09	6.0E-09	5.8E-13	1.0E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	1.7E-09	2.3E-09	2.3E-13	4.0E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	1.3E-07	9.6E-08	2.4E-10	2.3E-07		(Total)	1.3E-02	4.9E-03	9.7E-04	1.9E-02
							Total Risk Across Surface Soil	**2.3E-07**					**Total Hazard Index Across Surface Soil**	**1.9E-02**
							Total Risk Across All Media and All Exposure Routes	**2E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 178
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU12

Location: Iona Island
Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	6.0E-07	9.7E-08	1.6E-08	7.2E-07	ARSENIC	Skin, Cardiovascular	9.4E-02	1.5E-02	1.8E-02	1.3E-01
			COBALT	--	--	1.8E-08	1.8E-08	COBALT	Thyroid	8.5E-02	--	2.4E-02	1.1E-01
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.3E-02	--	3.7E-01	3.9E-01
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	1.3E-08	5.3E-09	4.3E-11	1.8E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.8E-08	7.3E-09	5.9E-11	2.5E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.1E-07	4.6E-08	3.7E-10	1.6E-07	BENZO(A)PYRENE	Developmental System	2.6E-02	1.1E-02	2.2E-02	5.8E-02
			DIBENZ(A,H)ANTHRACENE	2.5E-08	1.1E-08	8.6E-11	3.6E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	9.9E-09	4.1E-09	3.3E-11	1.4E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	7.8E-07	1.7E-07	3.5E-08	9.8E-07		(Total)	2.3E-01	2.6E-02	4.3E-01	6.8E-01
							Total Risk Across Surface Soil	**9.8E-07**					**Total Hazard Index Across Surface Soil**	**6.8E-01**
							Total Risk Across All Media and All Exposure Routes	**1E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.7**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 179
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU12

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	4.1E-07	8.7E-08	2.2E-10	5.0E-07	ARSENIC	Skin, Cardiovascular	3.2E-03	6.8E-04	1.2E-05	3.9E-03
			COBALT	--	--	2.5E-10	2.5E-10	COBALT	Thyroid	2.9E-03	--	1.6E-05	2.9E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	8.0E-04	--	2.5E-04	1.0E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	8.8E-09	4.8E-09	5.8E-13	1.4E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.2E-08	6.6E-09	7.9E-13	1.9E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	7.5E-08	4.1E-08	5.0E-12	1.2E-07	BENZO(A)PYRENE	Developmental System	8.7E-04	4.8E-04	1.4E-05	1.4E-03
			DIBENZ(A,H)ANTHRACENE	1.7E-08	9.5E-09	1.1E-12	2.7E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	6.8E-09	3.7E-09	4.5E-13	1.0E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	5.3E-07	1.5E-07	4.7E-10	6.9E-07		(Total)	7.8E-03	1.2E-03	2.9E-04	9.2E-03
							Total Risk Across Surface Soil	**6.9E-07**					**Total Hazard Index Across Surface Soil**	**9.2E-03**
							Total Risk Across All Media and All Exposure Routes	**7E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.01**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 180
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU12

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	5.8E-07	1.3E-07	1.1E-10	7.2E-07	ARSENIC	Skin, Cardiovascular	1.5E-02	3.5E-03	2.0E-05	1.9E-02
			COBALT	--	--	1.2E-10	1.2E-10	COBALT	Thyroid	1.4E-02	--	2.7E-05	1.4E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.7E-03	--	4.1E-04	4.1E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	3.7E-08	2.2E-08	8.7E-13	5.9E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	5.1E-08	3.1E-08	1.2E-12	8.1E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	3.2E-07	1.9E-07	7.4E-12	5.1E-07	BENZO(A)PYRENE	Developmental System	4.1E-03	2.5E-03	2.4E-05	6.6E-03
			DIBENZ(A,H)ANTHRACENE	7.3E-08	4.4E-08	1.7E-12	1.2E-07	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.9E-08	1.7E-08	6.7E-13	4.6E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	1.1E-06	4.4E-07	2.4E-10	1.5E-06		(Total)	3.7E-02	6.0E-03	4.8E-04	4.3E-02
							Total Risk Across Surface Soil	**1.5E-06**					**Total Hazard Index Across Surface Soil**	**4.3E-02**
							Total Risk Across All Media and All Exposure Routes	**2E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.04**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 181
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU12

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	8.2E-07	8.7E-08	4.3E-11	9.1E-07	ARSENIC	Skin, Cardiovascular	3.2E-02	3.4E-03	1.2E-05	3.5E-02
			COBALT	--	--	4.9E-11	4.9E-11	COBALT	Thyroid	2.9E-02	--	1.6E-05	2.9E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	8.0E-03	--	2.5E-04	8.2E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	5.3E-08	1.4E-08	3.5E-13	6.7E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	7.2E-08	2.0E-08	4.8E-13	9.2E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	4.5E-07	1.2E-07	3.0E-12	5.7E-07	BENZO(A)PYRENE	Developmental System	8.7E-03	2.4E-03	1.4E-05	1.1E-02
			DIBENZ(A,H)ANTHRACENE	1.0E-07	2.8E-08	6.9E-13	1.3E-07	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	4.1E-08	1.1E-08	2.7E-13	5.2E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	1.5E-06	2.8E-07	9.7E-11	1.8E-06		(Total)	7.8E-02	5.8E-03	2.9E-04	8.4E-02
							Total Risk Across Surface Soil	**1.8E-06**					**Total Hazard Index Across Surface Soil**	**8.4E-02**
							Total Risk Across All Media and All Exposure Routes	**2E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.08**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 182
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU12

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	9.0E-08	4.2E-08	3.4E-11	1.3E-07	ARSENIC	Skin, Cardiovascular	2.3E-03	1.1E-03	6.1E-06	3.4E-03
			COBALT	--	--	3.8E-11	3.8E-11	COBALT	Thyroid	2.1E-03	--	8.2E-06	2.1E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	5.8E-04	--	1.3E-04	7.0E-04
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	5.7E-09	6.9E-09	2.7E-13	1.3E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	7.8E-09	9.4E-09	3.7E-13	1.7E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	4.9E-08	5.9E-08	2.3E-12	1.1E-07	BENZO(A)PYRENE	Developmental System	6.3E-04	7.6E-04	7.5E-06	1.4E-03
			DIBENZ(A,H)ANTHRACENE	1.1E-08	1.4E-08	5.3E-13	2.5E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	4.4E-09	5.3E-09	2.1E-13	9.7E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	1.7E-07	1.4E-07	7.5E-11	3.0E-07		(Total)	5.6E-03	1.8E-03	1.5E-04	7.6E-03
							Total Risk Across Surface Soil	**3.0E-07**					**Total Hazard Index Across Surface Soil**	**7.6E-03**
							Total Risk Across All Media and All Exposure Routes	**3E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.008**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 183
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU12

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	6.1E-07	1.2E-07	5.5E-10	7.4E-07	ARSENIC	Skin, Cardiovascular	7.4E-03	1.5E-03	4.6E-05	8.9E-03
			COBALT	--	--	6.2E-10	6.2E-10	COBALT	Thyroid	6.6E-03	--	6.2E-05	6.7E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.8E-03	--	9.5E-04	2.8E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	3.9E-08	2.0E-08	4.4E-12	5.9E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	5.4E-08	2.7E-08	6.0E-12	8.1E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	3.4E-07	1.7E-07	3.7E-11	5.1E-07	BENZO(A)PYRENE	Developmental System	2.0E-03	1.0E-03	5.6E-05	3.1E-03
			DIBENZ(A,H)ANTHRACENE	7.7E-08	4.0E-08	8.6E-12	1.2E-07	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	3.0E-08	1.6E-08	3.4E-12	4.6E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	1.2E-06	4.0E-07	1.2E-09	1.5E-06		(Total)	1.8E-02	2.5E-03	1.1E-03	2.1E-02
							Total Risk Across Surface Soil	**1.5E-06**					**Total Hazard Index Across Surface Soil**	**2.1E-02**
							Total Risk Across All Media and All Exposure Routes	**2E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 184
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU13

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU13	Ingestion	**Inorganics**												
				ANTIMONY	3.46E+00	(mg/kg)	6.77E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.90E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	4.7E-03
				ARSENIC	1.25E+01	(mg/kg)	1.47E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.2E-06	4.11E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-02
				COBALT	8.96E+00	(mg/kg)	1.75E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.91E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.6E-02
				COPPER	8.85E+02	(mg/kg)	1.73E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	4.85E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	1.2E-02
				IRON	1.98E+04	(mg/kg)	3.87E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.08E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.5E-02
				MANGANESE	1.32E+03	(mg/kg)	2.58E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	7.23E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	5.2E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.45E+01	(mg/kg)	4.79E-06	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.8E-07	1.34E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.52E+01	(mg/kg)	4.93E-06	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.9E-07	1.38E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.86E+01	(mg/kg)	3.64E-06	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.6E-06	1.02E-05	(mg/kg-day)	3.0E-04	(mg/kg-day)	3.4E-02
				DIBENZ(A,H)ANTHRACENE	3.64E+00	(mg/kg)	7.12E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	7.1E-07	1.99E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.29E+01	(mg/kg)	2.52E-06	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.5E-07	7.07E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**7.8E-06**					**1.0E-01**
			Dermal[1]	**Inorganics**												
				ANTIMONY	3.46E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.25E+01	(mg/kg)	3.11E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.7E-07	8.70E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.9E-03
				COBALT	8.96E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	8.85E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.98E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	1.32E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.45E+01	(mg/kg)	2.64E-06	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.6E-07	7.39E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.52E+01	(mg/kg)	2.71E-06	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.7E-07	7.60E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.86E+01	(mg/kg)	2.00E-06	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.0E-06	5.61E-06	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.9E-02
				DIBENZ(A,H)ANTHRACENE	3.64E+00	(mg/kg)	3.92E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.9E-07	1.10E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.29E+01	(mg/kg)	1.39E-06	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.4E-07	3.89E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.5E-06**					**2.2E-02**
		Exposure Point Total									**1.1E-05**					**1.2E-01**
	Exposure Medium Total										**1.1E-05**					**1.2E-01**

TABLE 184
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU13

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU13	Inhalation	**Inorganics**												
				ANTIMONY	2.86E-09	(mg/m^3)	1.49E-07	(ug/m^3)	NA	per (ug/m^3)	--	4.18E-10	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.03E-08	(mg/m^3)	5.39E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	2.3E-09	1.51E-09	(mg/m^3)	1.50E-05	(mg/m^3)	1.0E-04
				COBALT	7.40E-09	(mg/m^3)	3.86E-07	(ug/m^3)	9.00E-03	per (ug/m^3)	3.5E-09	1.08E-09	(mg/m^3)	6.00E-06	(mg/m^3)	1.8E-04
				COPPER	7.31E-07	(mg/m^3)	3.82E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.07E-07	(mg/m^3)	NA	(mg/m^3)	--
				IRON	1.64E-05	(mg/m^3)	8.54E-04	(ug/m^3)	NA	per (ug/m^3)	--	2.39E-06	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	1.09E-06	(mg/m^3)	5.69E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.59E-07	(mg/m^3)	5.00E-05	(mg/m^3)	3.2E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.02E-08	(mg/m^3)	1.06E-06	(ug/m^3)	6.00E-05	per (ug/m^3)	6.3E-11	2.96E-09	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.08E-08	(mg/m^3)	1.09E-06	(ug/m^3)	6.00E-05	per (ug/m^3)	6.5E-11	3.04E-09	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.54E-08	(mg/m^3)	8.02E-07	(ug/m^3)	6.00E-04	per (ug/m^3)	4.8E-10	2.25E-09	(mg/m^3)	2.00E-06	(mg/m^3)	1.1E-03
				DIBENZ(A,H)ANTHRACENE	3.01E-09	(mg/m^3)	1.57E-07	(ug/m^3)	6.00E-04	per (ug/m^3)	9.4E-11	4.40E-10	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.07E-08	(mg/m^3)	5.56E-07	(ug/m^3)	6.00E-05	per (ug/m^3)	3.3E-11	1.56E-09	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**6.5E-09**					**4.6E-03**
		Exposure Point Total									**6.5E-09**					**4.6E-03**
	Exposure Medium Total										**6.5E-09**					**4.6E-03**
Soil Total											**1.1E-05**					**1.3E-01**
										Total of Receptor Risks Across All Media	**1.1E-05**				Total of Receptor Hazards Across All Media	**1.3E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 185
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU13

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU13	Ingestion	**Inorganics**												
				ANTIMONY	3.46E+00	(mg/kg)	2.64E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	6.16E-07	(mg/kg-day)	4.00E-04	(mg/kg-day)	1.5E-03
				ARSENIC	1.25E+01	(mg/kg)	5.72E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.6E-08	1.34E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.5E-03
				COBALT	8.96E+00	(mg/kg)	6.84E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.60E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.3E-03
				COPPER	8.85E+02	(mg/kg)	6.75E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.58E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	3.9E-03
				IRON	1.98E+04	(mg/kg)	1.51E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	3.53E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	5.0E-03
				MANGANESE	1.32E+03	(mg/kg)	1.01E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.35E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.7E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.45E+01	(mg/kg)	1.87E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.9E-08	4.36E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.52E+01	(mg/kg)	1.92E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.9E-08	4.49E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.86E+01	(mg/kg)	1.42E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.4E-07	3.31E-06	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.1E-02
				DIBENZ(A,H)ANTHRACENE	3.64E+00	(mg/kg)	2.78E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.8E-08	6.48E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.29E+01	(mg/kg)	9.85E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	9.8E-09	2.30E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.0E-07**					**3.3E-02**
			Dermal[1]	**Inorganics**												
				ANTIMONY	3.46E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.25E+01	(mg/kg)	3.03E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.5E-08	7.07E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.4E-03
				COBALT	8.96E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	8.85E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.98E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	1.32E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.45E+01	(mg/kg)	2.57E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.6E-08	6.00E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.52E+01	(mg/kg)	2.65E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.6E-08	6.17E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.86E+01	(mg/kg)	1.95E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.0E-07	4.56E-06	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.5E-02
				DIBENZ(A,H)ANTHRACENE	3.64E+00	(mg/kg)	3.82E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.8E-08	8.92E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.29E+01	(mg/kg)	1.35E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.4E-08	3.16E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.4E-07**					**1.8E-02**
		Exposure Point Total									**6.5E-07**					**5.1E-02**
	Exposure Medium Total										**6.5E-07**					**5.1E-02**

TABLE 185
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU13

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU13	Inhalation	**Inorganics**												
				ANTIMONY	2.86E-09	(mg/m^3)	5.82E-09	(ug/m^3)	NA	per (ug/m^3)	--	1.36E-10	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.03E-08	(mg/m^3)	2.10E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	9.0E-11	4.91E-10	(mg/m^3)	1.50E-05	(mg/m^3)	3.3E-05
				COBALT	7.40E-09	(mg/m^3)	1.51E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.4E-10	3.52E-10	(mg/m^3)	6.00E-06	(mg/m^3)	5.9E-05
				COPPER	7.31E-07	(mg/m^3)	1.49E-06	(ug/m^3)	NA	per (ug/m^3)	--	3.47E-08	(mg/m^3)	NA	(mg/m^3)	--
				IRON	1.64E-05	(mg/m^3)	3.33E-05	(ug/m^3)	NA	per (ug/m^3)	--	7.77E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	1.09E-06	(mg/m^3)	2.22E-06	(ug/m^3)	NA	per (ug/m^3)	--	5.18E-08	(mg/m^3)	5.00E-05	(mg/m^3)	1.0E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.02E-08	(mg/m^3)	4.12E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	2.5E-12	9.62E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.08E-08	(mg/m^3)	4.24E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	2.5E-12	9.89E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.54E-08	(mg/m^3)	3.13E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	1.9E-11	7.30E-10	(mg/m^3)	2.00E-06	(mg/m^3)	3.6E-04
				DIBENZ(A,H)ANTHRACENE	3.01E-09	(mg/m^3)	6.12E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	3.7E-12	1.43E-10	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.07E-08	(mg/m^3)	2.17E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	1.3E-12	5.06E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**2.5E-10**					**1.5E-03**
		Exposure Point Total									**2.5E-10**					**1.5E-03**
	Exposure Medium Total										**2.5E-10**					**1.5E-03**
Soil Total											**6.5E-07**					**5.2E-02**
										Total of Receptor Risks Across All Media	**6.5E-07**				Total of Receptor Hazards Across All Media	**5.2E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 186
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU13

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU13	Ingestion	**Inorganics**												
				ANTIMONY	3.46E+00	(mg/kg)	6.77E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.90E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	4.7E-03
				ARSENIC	1.25E+01	(mg/kg)	3.33E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.0E-07	2.33E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.8E-02
				COBALT	8.96E+00	(mg/kg)	3.98E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.78E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.3E-02
				COPPER	8.85E+02	(mg/kg)	3.93E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.75E-03	(mg/kg-day)	4.00E-02	(mg/kg-day)	6.9E-02
				IRON	1.98E+04	(mg/kg)	8.79E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	6.15E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	8.8E-02
				MANGANESE	1.32E+03	(mg/kg)	5.86E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	4.10E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.9E-02
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.45E+01	(mg/kg)	1.09E-06	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.1E-07	7.61E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.52E+01	(mg/kg)	1.12E-06	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.1E-07	7.83E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.86E+01	(mg/kg)	8.26E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	8.3E-07	5.78E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.9E-01
				DIBENZ(A,H)ANTHRACENE	3.64E+00	(mg/kg)	1.62E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.6E-07	1.13E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.29E+01	(mg/kg)	5.73E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	5.7E-08	4.01E-05	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.8E-06**					**5.5E-01**
			Dermal[1]	**Inorganics**												
				ANTIMONY	3.46E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.25E+01	(mg/kg)	5.34E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.0E-08	3.74E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.2E-02
				COBALT	8.96E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	8.85E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.98E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	1.32E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.45E+01	(mg/kg)	4.53E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.5E-08	3.17E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.52E+01	(mg/kg)	4.66E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.7E-08	3.26E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.86E+01	(mg/kg)	3.44E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.4E-07	2.41E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.0E-02
				DIBENZ(A,H)ANTHRACENE	3.64E+00	(mg/kg)	6.74E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	6.7E-08	4.72E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.29E+01	(mg/kg)	2.39E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.4E-08	1.67E-05	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**6.1E-07**					**9.3E-02**
		Exposure Point Total									**2.4E-06**					**6.5E-01**
	Exposure Medium Total										**2.4E-06**					**6.5E-01**

TABLE 186
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU13

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Air	DU13	Inhalation	**Inorganics**												
				ANTIMONY	2.86E-09	(mg/m^3)	1.47E-08	(ug/m^3)	NA	per (ug/m^3)	--	1.03E-09	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	6.07E-07	(mg/m^3)	3.13E-06	(ug/m^3)	4.3E-03	per (ug/m^3)	1.3E-08	2.19E-07	(mg/m^3)	1.50E-05	(mg/m^3)	1.5E-02
				COBALT	4.35E-07	(mg/m^3)	2.24E-06	(ug/m^3)	9.0E-03	per (ug/m^3)	2.0E-08	1.57E-07	(mg/m^3)	6.00E-06	(mg/m^3)	2.6E-02
				COPPER	4.30E-05	(mg/m^3)	2.22E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.55E-05	(mg/m^3)	NA	(mg/m^3)	--
				IRON	9.61E-04	(mg/m^3)	4.96E-03	(ug/m^3)	NA	per (ug/m^3)	--	3.47E-04	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	6.41E-05	(mg/m^3)	3.30E-04	(ug/m^3)	NA	per (ug/m^3)	--	2.31E-05	(mg/m^3)	5.00E-05	(mg/m^3)	4.6E-01
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.19E-06	(mg/m^3)	6.13E-06	(ug/m^3)	6.0E-05	per (ug/m^3)	3.7E-10	4.29E-07	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.22E-06	(mg/m^3)	6.31E-06	(ug/m^3)	6.0E-05	per (ug/m^3)	3.8E-10	4.42E-07	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	9.03E-07	(mg/m^3)	4.66E-06	(ug/m^3)	6.0E-04	per (ug/m^3)	2.8E-09	3.26E-07	(mg/m^3)	2.00E-06	(mg/m^3)	1.6E-01
				DIBENZ(A,H)ANTHRACENE	1.77E-07	(mg/m^3)	9.11E-07	(ug/m^3)	6.0E-04	per (ug/m^3)	5.5E-10	6.38E-08	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	6.26E-07	(mg/m^3)	3.23E-06	(ug/m^3)	6.0E-05	per (ug/m^3)	1.9E-10	2.26E-07	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**3.8E-08**					**6.7E-01**
		Exposure Point Total									**3.8E-08**					**6.7E-01**
	Exposure Medium Total										**3.8E-08**					**6.7E-01**
Soil Total											**2.4E-06**					**1.3E+00**
										Total of Receptor Risks Across All Media	**2.4E-06**				Total of Receptor Hazards Across All Media	**1.3E+00**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 187
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU13

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU13	Ingestion	**Inorganics**												
				ANTIMONY	3.46E+00	(mg/kg)	1.05E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	3.67E-07	(mg/kg-day)	4.00E-04	(mg/kg-day)	9.2E-04
				ARSENIC	1.25E+01	(mg/kg)	2.27E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.4E-07	7.96E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.7E-03
				COBALT	8.96E+00	(mg/kg)	2.72E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	9.51E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.2E-03
				COPPER	8.85E+02	(mg/kg)	2.68E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	9.40E-05	(mg/kg-day)	4.00E-02	(mg/kg-day)	2.3E-03
				IRON	1.98E+04	(mg/kg)	6.01E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.10E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	3.0E-03
				MANGANESE	1.32E+03	(mg/kg)	4.00E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.40E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.0E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.45E+01	(mg/kg)	7.43E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	7.4E-08	2.60E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.52E+01	(mg/kg)	7.64E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	7.6E-08	2.68E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.86E+01	(mg/kg)	5.64E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	5.6E-07	1.97E-06	(mg/kg-day)	3.0E-04	(mg/kg-day)	6.6E-03
				DIBENZ(A,H)ANTHRACENE	3.64E+00	(mg/kg)	1.10E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.1E-07	3.86E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.29E+01	(mg/kg)	3.91E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.9E-08	1.37E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.2E-06**					**2.0E-02**
			Dermal[1]	**Inorganics**												
				ANTIMONY	3.46E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.25E+01	(mg/kg)	4.80E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.2E-08	1.68E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.6E-04
				COBALT	8.96E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	8.85E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.98E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	1.32E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.45E+01	(mg/kg)	4.08E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.1E-08	1.43E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.52E+01	(mg/kg)	4.20E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.2E-08	1.47E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.86E+01	(mg/kg)	3.10E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.1E-07	1.08E-06	(mg/kg-day)	3.0E-04	(mg/kg-day)	3.6E-03
				DIBENZ(A,H)ANTHRACENE	3.64E+00	(mg/kg)	6.06E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	6.1E-08	2.12E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.29E+01	(mg/kg)	2.15E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.1E-08	7.52E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**5.5E-07**					**4.2E-03**
		Exposure Point Total									**1.8E-06**					**2.4E-02**
	Exposure Medium Total										**1.8E-06**					**2.4E-02**

TABLE 187
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU13

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU13	Inhalation	**Inorganics**												
				ANTIMONY	2.86E-09	(mg/m^3)	1.16E-08	(ug/m^3)	NA	per (ug/m^3)	--	4.05E-11	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.03E-08	(mg/m^3)	4.18E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.8E-10	1.46E-10	(mg/m^3)	1.50E-05	(mg/m^3)	9.7E-06
				COBALT	7.40E-09	(mg/m^3)	2.99E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	2.7E-10	1.05E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.7E-05
				COPPER	7.31E-07	(mg/m^3)	2.96E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.04E-08	(mg/m^3)	NA	(mg/m^3)	--
				IRON	1.64E-05	(mg/m^3)	6.62E-05	(ug/m^3)	NA	per (ug/m^3)	--	2.32E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	1.09E-06	(mg/m^3)	4.41E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.54E-08	(mg/m^3)	5.00E-05	(mg/m^3)	3.1E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.02E-08	(mg/m^3)	8.19E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	4.9E-12	2.87E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.08E-08	(mg/m^3)	8.42E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	5.1E-12	2.95E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.54E-08	(mg/m^3)	6.22E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	3.7E-11	2.18E-10	(mg/m^3)	2.00E-06	(mg/m^3)	1.1E-04
				DIBENZ(A,H)ANTHRACENE	3.01E-09	(mg/m^3)	1.22E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	7.3E-12	4.26E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.07E-08	(mg/m^3)	4.31E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	2.6E-12	1.51E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**5.1E-10**					**4.4E-04**
		Exposure Point Total									**5.1E-10**					**4.4E-04**
	Exposure Medium Total										**5.1E-10**					**4.4E-04**
Soil Total											**1.8E-06**					**2.4E-02**
										Total of Receptor Risks Across All Media	**1.8E-06**				Total of Receptor Hazards Across All Media	**2.4E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 188
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU13

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 10 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU13	Ingestion	**Inorganics**												
				ANTIMONY	3.46E+00	(mg/kg)	1.48E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.72E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	4.3E-03
				ARSENIC	1.25E+01	(mg/kg)	3.20E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.8E-07	3.74E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.2E-02
				COBALT	8.96E+00	(mg/kg)	3.83E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	4.47E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				COPPER	8.85E+02	(mg/kg)	3.78E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	4.41E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	1.1E-02
				IRON	1.98E+04	(mg/kg)	8.46E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	9.87E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.4E-02
				MANGANESE	1.32E+03	(mg/kg)	5.64E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	6.58E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.7E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.45E+01	(mg/kg)	3.14E-06	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.1E-07	1.22E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.52E+01	(mg/kg)	3.23E-06	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.2E-07	1.26E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.86E+01	(mg/kg)	2.38E-06	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.4E-06	9.27E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.1E-02
				DIBENZ(A,H)ANTHRACENE	3.64E+00	(mg/kg)	4.67E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	4.7E-07	1.81E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.29E+01	(mg/kg)	1.65E-06	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.7E-07	6.43E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**4.1E-06**					**9.2E-02**
			Dermal[1]	**Inorganics**												
				ANTIMONY	3.46E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.25E+01	(mg/kg)	7.44E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.1E-07	8.68E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.9E-03
				COBALT	8.96E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	8.85E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.98E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	1.32E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.45E+01	(mg/kg)	1.90E-06	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.9E-07	7.37E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.52E+01	(mg/kg)	1.95E-06	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.0E-07	7.58E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.86E+01	(mg/kg)	1.44E-06	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.4E-06	5.60E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.9E-02
				DIBENZ(A,H)ANTHRACENE	3.64E+00	(mg/kg)	2.82E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.8E-07	1.10E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.29E+01	(mg/kg)	9.98E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.0E-07	3.88E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.3E-06**					**2.2E-02**
		Exposure Point Total									**6.5E-06**					**1.1E-01**
	Exposure Medium Total										**6.5E-06**					**1.1E-01**

TABLE 188
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU13

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 10 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU13	Inhalation	**Inorganics**												
				ANTIMONY	2.86E-09	(mg/m^3)	5.78E-09	(ug/m^3)	NA	per (ug/m^3)	--	6.75E-11	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.03E-08	(mg/m^3)	2.09E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	9.0E-11	2.44E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.6E-05
				COBALT	7.40E-09	(mg/m^3)	1.50E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.3E-10	1.75E-10	(mg/m^3)	6.00E-06	(mg/m^3)	2.9E-05
				COPPER	7.31E-07	(mg/m^3)	1.48E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.73E-08	(mg/m^3)	NA	(mg/m^3)	--
				IRON	1.64E-05	(mg/m^3)	3.31E-05	(ug/m^3)	NA	per (ug/m^3)	--	3.86E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	1.09E-06	(mg/m^3)	2.21E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.57E-08	(mg/m^3)	5.00E-05	(mg/m^3)	5.1E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.02E-08	(mg/m^3)	1.23E-07	(ug/m^3)	6.00E-05	per (ug/m^3)	7.4E-12	4.78E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.08E-08	(mg/m^3)	1.26E-07	(ug/m^3)	6.00E-05	per (ug/m^3)	7.6E-12	4.91E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.54E-08	(mg/m^3)	9.33E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	5.6E-11	3.63E-10	(mg/m^3)	2.00E-06	(mg/m^3)	1.8E-04
				DIBENZ(A,H)ANTHRACENE	3.01E-09	(mg/m^3)	1.82E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	1.1E-11	7.10E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.07E-08	(mg/m^3)	6.47E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	3.9E-12	2.52E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**3.1E-10**					**7.4E-04**
		Exposure Point Total									**3.1E-10**					**7.4E-04**
	Exposure Medium Total										**3.1E-10**					**7.4E-04**
Soil Total											**6.5E-06**					**1.1E-01**
										Total of Receptor Risks Across All Media	**6.5E-06**				Total of Receptor Hazards Across All Media	**1.1E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 189
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU13

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU13	Ingestion	**Inorganics**												
				ANTIMONY	3.46E+00	(mg/kg)	2.10E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	3.67E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	9.2E-03
				ARSENIC	1.25E+01	(mg/kg)	4.55E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	6.8E-07	7.96E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.7E-02
				COBALT	8.96E+00	(mg/kg)	5.44E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	9.51E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.2E-02
				COPPER	8.85E+02	(mg/kg)	5.37E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	9.40E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	2.3E-02
				IRON	1.98E+04	(mg/kg)	1.20E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	2.10E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	3.0E-02
				MANGANESE	1.32E+03	(mg/kg)	8.01E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.40E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.0E-02
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.45E+01	(mg/kg)	4.46E-06	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.5E-07	2.60E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.52E+01	(mg/kg)	4.59E-06	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.6E-07	2.68E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.86E+01	(mg/kg)	3.39E-06	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.4E-06	1.97E-05	(mg/kg-day)	3.0E-04	(mg/kg-day)	6.6E-02
				DIBENZ(A,H)ANTHRACENE	3.64E+00	(mg/kg)	6.62E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	6.6E-07	3.86E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.29E+01	(mg/kg)	2.35E-06	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.3E-07	1.37E-05	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**5.9E-06**					**2.0E-01**
			Dermal[1]	**Inorganics**												
				ANTIMONY	3.46E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.25E+01	(mg/kg)	4.79E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.2E-08	8.39E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.8E-03
				COBALT	8.96E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	8.85E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.98E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	1.32E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.45E+01	(mg/kg)	1.22E-06	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.2E-07	7.12E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.52E+01	(mg/kg)	1.26E-06	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.3E-07	7.33E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.86E+01	(mg/kg)	9.27E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	9.3E-07	5.41E-06	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.8E-02
				DIBENZ(A,H)ANTHRACENE	3.64E+00	(mg/kg)	1.81E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.8E-07	1.06E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.29E+01	(mg/kg)	6.43E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	6.4E-08	3.75E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.5E-06**					**2.1E-02**
		Exposure Point Total									**7.4E-06**					**2.2E-01**
	Exposure Medium Total										**7.4E-06**					**2.2E-01**

TABLE 189
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU13

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Air	DU13	Inhalation	**Inorganics**												
				ANTIMONY	2.86E-09	(mg/m^3)	2.31E-09	(ug/m^3)	NA	per (ug/m^3)	--	4.05E-11	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.03E-08	(mg/m^3)	8.36E-09	(ug/m^3)	4.30E-03	per (ug/m^3)	3.6E-11	1.46E-10	(mg/m^3)	1.50E-05	(mg/m^3)	9.7E-06
				COBALT	7.40E-09	(mg/m^3)	5.99E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	5.4E-11	1.05E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.7E-05
				COPPER	7.31E-07	(mg/m^3)	5.92E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.04E-08	(mg/m^3)	NA	(mg/m^3)	--
				IRON	1.64E-05	(mg/m^3)	1.32E-05	(ug/m^3)	NA	per (ug/m^3)	--	2.32E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	1.09E-06	(mg/m^3)	8.82E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.54E-08	(mg/m^3)	5.00E-05	(mg/m^3)	3.1E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.02E-08	(mg/m^3)	4.91E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	2.9E-12	2.87E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.08E-08	(mg/m^3)	5.05E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	3.0E-12	2.95E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.54E-08	(mg/m^3)	3.73E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	2.2E-11	2.18E-10	(mg/m^3)	2.00E-06	(mg/m^3)	1.1E-04
				DIBENZ(A,H)ANTHRACENE	3.01E-09	(mg/m^3)	7.30E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	4.4E-12	4.26E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.07E-08	(mg/m^3)	2.59E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	1.6E-12	1.51E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.2E-10**					**4.4E-04**
		Exposure Point Total									**1.2E-10**					**4.4E-04**
	Exposure Medium Total										**1.2E-10**					**4.4E-04**
Soil Total											**7.4E-06**					**2.2E-01**
										Total of Receptor Risks Across All Media	**7.4E-06**				Total of Receptor Hazards Across All Media	**2.2E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 190
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU13

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU13	Ingestion	**Inorganics**												
				ANTIMONY	3.46E+00	(mg/kg)	2.28E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	2.66E-07	(mg/kg-day)	4.00E-04	(mg/kg-day)	6.7E-04
				ARSENIC	1.25E+01	(mg/kg)	4.94E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.4E-08	5.77E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.9E-03
				COBALT	8.96E+00	(mg/kg)	5.91E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	6.89E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.3E-03
				COPPER	8.85E+02	(mg/kg)	5.83E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	6.81E-05	(mg/kg-day)	4.00E-02	(mg/kg-day)	1.7E-03
				IRON	1.98E+04	(mg/kg)	1.31E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	1.52E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	2.2E-03
				MANGANESE	1.32E+03	(mg/kg)	8.70E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.02E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	7.3E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.45E+01	(mg/kg)	4.84E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	4.8E-08	1.88E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.52E+01	(mg/kg)	4.98E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	5.0E-08	1.94E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.86E+01	(mg/kg)	3.68E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	3.7E-07	1.43E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.8E-03
				DIBENZ(A,H)ANTHRACENE	3.64E+00	(mg/kg)	7.20E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	7.2E-08	2.80E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.29E+01	(mg/kg)	2.55E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.6E-08	9.92E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**6.4E-07**					**1.4E-02**
			Dermal[1]	**Inorganics**												
				ANTIMONY	3.46E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.25E+01	(mg/kg)	2.30E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.4E-08	2.68E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.9E-04
				COBALT	8.96E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	8.85E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.98E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	1.32E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.45E+01	(mg/kg)	5.85E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	5.9E-08	2.28E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.52E+01	(mg/kg)	6.02E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	6.0E-08	2.34E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.86E+01	(mg/kg)	4.44E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	4.4E-07	1.73E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.8E-03
				DIBENZ(A,H)ANTHRACENE	3.64E+00	(mg/kg)	8.69E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	8.7E-08	3.38E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.29E+01	(mg/kg)	3.08E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.1E-08	1.20E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**7.2E-07**					**6.7E-03**
		Exposure Point Total									**1.4E-06**					**2.1E-02**
	Exposure Medium Total										**1.4E-06**					**2.1E-02**

TABLE 190
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU13

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU13	Inhalation	**Inorganics**												
				ANTIMONY	2.86E-09	(mg/m^3)	1.79E-09	(ug/m^3)	NA	per (ug/m^3)	--	2.09E-11	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.03E-08	(mg/m^3)	6.47E-09	(ug/m^3)	4.30E-03	per (ug/m^3)	2.8E-11	7.55E-11	(mg/m^3)	1.50E-05	(mg/m^3)	5.0E-06
				COBALT	7.40E-09	(mg/m^3)	4.64E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	4.2E-11	5.41E-11	(mg/m^3)	6.00E-06	(mg/m^3)	9.0E-06
				COPPER	7.31E-07	(mg/m^3)	4.58E-07	(ug/m^3)	NA	per (ug/m^3)	--	5.34E-09	(mg/m^3)	NA	(mg/m^3)	--
				IRON	1.64E-05	(mg/m^3)	1.02E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.20E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	1.09E-06	(mg/m^3)	6.83E-07	(ug/m^3)	NA	per (ug/m^3)	--	7.97E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.6E-04
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.02E-08	(mg/m^3)	3.80E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	2.3E-12	1.48E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.08E-08	(mg/m^3)	3.91E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	2.3E-12	1.52E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.54E-08	(mg/m^3)	2.89E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	1.7E-11	1.12E-10	(mg/m^3)	2.00E-06	(mg/m^3)	5.6E-05
				DIBENZ(A,H)ANTHRACENE	3.01E-09	(mg/m^3)	5.65E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	3.4E-12	2.20E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.07E-08	(mg/m^3)	2.00E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	1.2E-12	7.79E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**9.6E-11**					**2.3E-04**
		Exposure Point Total									**9.6E-11**					**2.3E-04**
	Exposure Medium Total										**9.6E-11**					**2.3E-04**
Soil Total											**1.4E-06**					**2.1E-02**
										Total of Receptor Risks Across All Media	**1.4E-06**				Total of Receptor Hazards Across All Media	**2.1E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 191
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU13

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU13	Ingestion	**Inorganics**												
				ANTIMONY	3.46E+00	(mg/kg)	1.56E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	8.43E-07	(mg/kg-day)	4.00E-04	(mg/kg-day)	2.1E-03
				ARSENIC	1.25E+01	(mg/kg)	3.39E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.1E-07	1.83E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.1E-03
				COBALT	8.96E+00	(mg/kg)	4.05E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.18E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.3E-03
				COPPER	8.85E+02	(mg/kg)	4.00E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.16E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	5.4E-03
				IRON	1.98E+04	(mg/kg)	8.95E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	4.82E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	6.9E-03
				MANGANESE	1.32E+03	(mg/kg)	5.97E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.21E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.3E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.45E+01	(mg/kg)	3.32E-06	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.3E-07	5.97E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.52E+01	(mg/kg)	3.42E-06	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.4E-07	6.14E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.86E+01	(mg/kg)	2.52E-06	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.5E-06	4.53E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				DIBENZ(A,H)ANTHRACENE	3.64E+00	(mg/kg)	4.94E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	4.9E-07	8.86E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.29E+01	(mg/kg)	1.75E-06	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.8E-07	3.14E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**4.4E-06**					**4.5E-02**
			Dermal[1]	**Inorganics**												
				ANTIMONY	3.46E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.25E+01	(mg/kg)	6.69E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.0E-07	3.60E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.2E-03
				COBALT	8.96E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	8.85E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.98E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	1.32E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.45E+01	(mg/kg)	1.71E-06	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.7E-07	3.06E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.52E+01	(mg/kg)	1.75E-06	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.8E-07	3.15E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.86E+01	(mg/kg)	1.29E-06	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.3E-06	2.32E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.7E-03
				DIBENZ(A,H)ANTHRACENE	3.64E+00	(mg/kg)	2.53E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.5E-07	4.55E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.29E+01	(mg/kg)	8.98E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	9.0E-08	1.61E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.1E-06**					**8.9E-03**
		Exposure Point Total									**6.5E-06**					**5.4E-02**
	Exposure Medium Total										**6.5E-06**					**5.4E-02**

TABLE 191
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU13

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Air	DU13	Inhalation	**Inorganics**												
				ANTIMONY	2.86E-09	(mg/m^3)	2.91E-08	(ug/m^3)	NA	per (ug/m^3)	--	1.57E-10	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.03E-08	(mg/m^3)	1.05E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	4.5E-10	5.66E-10	(mg/m^3)	1.50E-05	(mg/m^3)	3.8E-05
				COBALT	7.40E-09	(mg/m^3)	7.54E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	6.8E-10	4.06E-10	(mg/m^3)	6.00E-06	(mg/m^3)	6.8E-05
				COPPER	7.31E-07	(mg/m^3)	7.44E-06	(ug/m^3)	NA	per (ug/m^3)	--	4.01E-08	(mg/m^3)	NA	(mg/m^3)	--
				IRON	1.64E-05	(mg/m^3)	1.67E-04	(ug/m^3)	NA	per (ug/m^3)	--	8.97E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	1.09E-06	(mg/m^3)	1.11E-05	(ug/m^3)	NA	per (ug/m^3)	--	5.98E-08	(mg/m^3)	5.00E-05	(mg/m^3)	1.2E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.02E-08	(mg/m^3)	6.18E-07	(ug/m^3)	6.00E-05	per (ug/m^3)	3.7E-11	1.11E-09	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.08E-08	(mg/m^3)	6.36E-07	(ug/m^3)	6.00E-05	per (ug/m^3)	3.8E-11	1.14E-09	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.54E-08	(mg/m^3)	4.69E-07	(ug/m^3)	6.00E-04	per (ug/m^3)	2.8E-10	8.42E-10	(mg/m^3)	2.00E-06	(mg/m^3)	4.2E-04
				DIBENZ(A,H)ANTHRACENE	3.01E-09	(mg/m^3)	9.18E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	5.5E-11	1.65E-10	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.07E-08	(mg/m^3)	3.25E-07	(ug/m^3)	6.00E-05	per (ug/m^3)	2.0E-11	5.84E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.6E-09**					**1.7E-03**
		Exposure Point Total									**1.6E-09**					**1.7E-03**
	Exposure Medium Total										**1.6E-09**					**1.7E-03**
Soil Total											**6.5E-06**					**5.6E-02**
										Total of Receptor Risks Across All Media	**6.5E-06**				Total of Receptor Hazards Across All Media	**5.6E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 192
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU13

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	4.7E-03	--	--	4.7E-03
			ARSENIC	2.2E-06	4.7E-07	2.3E-09	2.7E-06	ARSENIC	Skin, Cardiovascular	1.4E-02	2.9E-03	1.0E-04	1.7E-02
			COBALT	--	--	3.5E-09	3.5E-09	COBALT	Thyroid	1.6E-02	--	1.8E-04	1.7E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	1.2E-02	--	--	1.2E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.5E-02	--	--	1.5E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	5.2E-03	--	3.2E-03	8.4E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	4.8E-07	2.6E-07	6.3E-11	7.4E-07	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	4.9E-07	2.7E-07	6.5E-11	7.6E-07	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	3.6E-06	2.0E-06	4.8E-10	5.6E-06	BENZO(A)PYRENE	Developmental System	3.4E-02	1.9E-02	1.1E-03	5.4E-02
			DIBENZ(A,H)ANTHRACENE	7.1E-07	3.9E-07	9.4E-11	1.1E-06	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.5E-07	1.4E-07	3.3E-11	3.9E-07	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	7.8E-06	3.5E-06	6.5E-09	1.1E-05		(Total)	1.0E-01	2.2E-02	4.6E-03	1.3E-01
							Total Risk Across Surface Soil	**1.1E-05**					**Total Hazard Index Across Surface Soil**	**1.3E-01**
							Total Risk Across All Media and All Exposure Routes	**1E-05**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.1**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 193
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU13

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	1.5E-03	--	--	1.5E-03
			ARSENIC	8.6E-08	4.5E-08	9.0E-11	1.3E-07	ARSENIC	Skin, Cardiovascular	4.5E-03	2.4E-03	3.3E-05	6.8E-03
			COBALT	--	--	1.4E-10	1.4E-10	COBALT	Thyroid	5.3E-03	--	5.9E-05	5.4E-03
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	3.9E-03	--	--	3.9E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	5.0E-03	--	--	5.0E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.7E-03	--	1.0E-03	2.7E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	1.9E-08	2.6E-08	2.5E-12	4.4E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.9E-08	2.6E-08	2.5E-12	4.6E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.4E-07	2.0E-07	1.9E-11	3.4E-07	BENZO(A)PYRENE	Developmental System	1.1E-02	1.5E-02	3.6E-04	2.7E-02
			DIBENZ(A,H)ANTHRACENE	2.8E-08	3.8E-08	3.7E-12	6.6E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	9.8E-09	1.4E-08	1.3E-12	2.3E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	3.0E-07	3.4E-07	2.5E-10	6.5E-07		(Total)	3.3E-02	1.8E-02	1.5E-03	5.2E-02
							Total Risk Across Surface Soil	**6.5E-07**					**Total Hazard Index Across Surface Soil**	**5.2E-02**
							Total Risk Across All Media and All Exposure Routes	**6E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.05**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 194
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU13

Location: Iona Island
Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	4.7E-03	--	--	4.7E-03
			ARSENIC	5.0E-07	8.0E-08	1.3E-08	5.9E-07	ARSENIC	Skin, Cardiovascular	7.8E-02	1.2E-02	1.5E-02	1.0E-01
			COBALT	--	--	2.0E-08	2.0E-08	COBALT	Thyroid	9.3E-02	--	2.6E-02	1.2E-01
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	6.9E-02	--	--	6.9E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	8.8E-02	--	--	8.8E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.9E-02	--	4.6E-01	4.9E-01
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	1.1E-07	4.5E-08	3.7E-10	1.5E-07	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.1E-07	4.7E-08	3.8E-10	1.6E-07	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	8.3E-07	3.4E-07	2.8E-09	1.2E-06	BENZO(A)PYRENE	Developmental System	1.9E-01	8.0E-02	1.6E-01	4.4E-01
			DIBENZ(A,H)ANTHRACENE	1.6E-07	6.7E-08	5.5E-10	2.3E-07	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	5.7E-08	2.4E-08	1.9E-10	8.1E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	1.8E-06	6.1E-07	3.8E-08	2.4E-06		(Total)	5.5E-01	9.3E-02	6.7E-01	1.3E+00
						Total Risk Across Surface Soil	**2.4E-06**					**Total Hazard Index Across Surface Soil**	**1.3E+00**
						Total Risk Across All Media and All Exposure Routes	**2E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**1**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 195
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU13

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	9.2E-04	--	--	9.2E-04
			ARSENIC	3.4E-07	7.2E-08	1.8E-10	4.1E-07	ARSENIC	Skin, Cardiovascular	2.7E-03	5.6E-04	9.7E-06	3.2E-03
			COBALT	--	--	2.7E-10	2.7E-10	COBALT	Thyroid	3.2E-03	--	1.7E-05	3.2E-03
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	2.3E-03	--	--	2.3E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	3.0E-03	--	--	3.0E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.0E-03	--	3.1E-04	1.3E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	7.4E-08	4.1E-08	4.9E-12	1.2E-07	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	7.6E-08	4.2E-08	5.1E-12	1.2E-07	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	5.6E-07	3.1E-07	3.7E-11	8.7E-07	BENZO(A)PYRENE	Developmental System	6.6E-03	3.6E-03	1.1E-04	1.0E-02
			DIBENZ(A,H)ANTHRACENE	1.1E-07	6.1E-08	7.3E-12	1.7E-07	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	3.9E-08	2.1E-08	2.6E-12	6.1E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	1.2E-06	5.5E-07	5.1E-10	1.8E-06		(Total)	2.0E-02	4.2E-03	4.4E-04	2.4E-02
							Total Risk Across Surface Soil	**1.8E-06**					**Total Hazard Index Across Surface Soil**	**2.4E-02**
							Total Risk Across All Media and All Exposure Routes	**2E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 196
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU13

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	4.3E-03	--	--	4.3E-03
			ARSENIC	4.8E-07	1.1E-07	9.0E-11	5.9E-07	ARSENIC	Skin, Cardiovascular	1.2E-02	2.9E-03	1.6E-05	1.5E-02
			COBALT	--	--	1.3E-10	1.3E-10	COBALT	Thyroid	1.5E-02	--	2.9E-05	1.5E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	1.1E-02	--	--	1.1E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.4E-02	--	--	1.4E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.7E-03	--	5.1E-04	5.2E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	3.1E-07	1.9E-07	7.4E-12	5.0E-07	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	3.2E-07	2.0E-07	7.6E-12	5.2E-07	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	2.4E-06	1.4E-06	5.6E-11	3.8E-06	BENZO(A)PYRENE	Developmental System	3.1E-02	1.9E-02	1.8E-04	5.0E-02
			DIBENZ(A,H)ANTHRACENE	4.7E-07	2.8E-07	1.1E-11	7.5E-07	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	1.7E-07	1.0E-07	3.9E-12	2.7E-07	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	4.1E-06	2.3E-06	3.1E-10	6.5E-06		(Total)	9.2E-02	2.2E-02	7.4E-04	1.1E-01
							Total Risk Across Surface Soil	**6.5E-06**					**Total Hazard Index Across Surface Soil**	**1.1E-01**
							Total Risk Across All Media and All Exposure Routes	**6E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.1**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 197
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU13

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	9.2E-03	--	--	9.2E-03
			ARSENIC	6.8E-07	7.2E-08	3.6E-11	7.5E-07	ARSENIC	Skin, Cardiovascular	2.7E-02	2.8E-03	9.7E-06	2.9E-02
			COBALT	--	--	5.4E-11	5.4E-11	COBALT	Thyroid	3.2E-02	--	1.7E-05	3.2E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	2.3E-02	--	--	2.3E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	3.0E-02	--	--	3.0E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.0E-02	--	3.1E-04	1.0E-02
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	4.5E-07	1.2E-07	2.9E-12	5.7E-07	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	4.6E-07	1.3E-07	3.0E-12	5.8E-07	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	3.4E-06	9.3E-07	2.2E-11	4.3E-06	BENZO(A)PYRENE	Developmental System	6.6E-02	1.8E-02	1.1E-04	8.4E-02
			DIBENZ(A,H)ANTHRACENE	6.6E-07	1.8E-07	4.4E-12	8.4E-07	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.3E-07	6.4E-08	1.6E-12	3.0E-07	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	5.9E-06	1.5E-06	1.2E-10	7.4E-06		(Total)	2.0E-01	2.1E-02	4.4E-04	2.2E-01
						Total Risk Across Surface Soil	**7.4E-06**					**Total Hazard Index Across Surface Soil**	**2.2E-01**
						Total Risk Across All Media and All Exposure Routes	**7E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.2**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 198
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU13

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	6.7E-04	--	--	6.7E-04
			ARSENIC	7.4E-08	3.4E-08	2.8E-11	1.1E-07	ARSENIC	Skin, Cardiovascular	1.9E-03	8.9E-04	5.0E-06	2.8E-03
			COBALT	--	--	4.2E-11	4.2E-11	COBALT	Thyroid	2.3E-03	--	9.0E-06	2.3E-03
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	1.7E-03	--	--	1.7E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	2.2E-03	--	--	2.2E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	7.3E-04	--	1.6E-04	8.8E-04
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	4.8E-08	5.9E-08	2.3E-12	1.1E-07	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	5.0E-08	6.0E-08	2.3E-12	1.1E-07	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	3.7E-07	4.4E-07	1.7E-11	8.1E-07	BENZO(A)PYRENE	Developmental System	4.8E-03	5.8E-03	5.6E-05	1.1E-02
			DIBENZ(A,H)ANTHRACENE	7.2E-08	8.7E-08	3.4E-12	1.6E-07	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.6E-08	3.1E-08	1.2E-12	5.6E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	6.4E-07	7.2E-07	9.6E-11	1.4E-06		(Total)	1.4E-02	6.7E-03	2.3E-04	2.1E-02
							Total Risk Across Surface Soil	**1.4E-06**					**Total Hazard Index Across Surface Soil**	**2.1E-02**
							Total Risk Across All Media and All Exposure Routes	**1E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 199
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU13

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	2.1E-03	--	--	2.1E-03
			ARSENIC	5.1E-07	1.0E-07	4.5E-10	6.1E-07	ARSENIC	Skin, Cardiovascular	6.1E-03	1.2E-03	3.8E-05	7.3E-03
			COBALT	--	--	6.8E-10	6.8E-10	COBALT	Thyroid	7.3E-03	--	6.8E-05	7.3E-03
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	5.4E-03	--	--	5.4E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	6.9E-03	--	--	6.9E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.3E-03	--	1.2E-03	3.5E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	3.3E-07	1.7E-07	3.7E-11	5.0E-07	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	3.4E-07	1.8E-07	3.8E-11	5.2E-07	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	2.5E-06	1.3E-06	2.8E-10	3.8E-06	BENZO(A)PYRENE	Developmental System	1.5E-02	7.7E-03	4.2E-04	2.3E-02
			DIBENZ(A,H)ANTHRACENE	4.9E-07	2.5E-07	5.5E-11	7.5E-07	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	1.8E-07	9.0E-08	2.0E-11	2.6E-07	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	4.4E-06	2.1E-06	1.6E-09	6.5E-06		(Total)	4.5E-02	8.9E-03	1.7E-03	5.6E-02
							Total Risk Across Surface Soil	**6.5E-06**					**Total Hazard Index Across Surface Soil**	**5.6E-02**
							Total Risk Across All Media and All Exposure Routes	**6E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.06**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 200
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU14

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU14	Ingestion	**Inorganics**												
				ARSENIC	1.95E+01	(mg/kg)	2.29E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.4E-06	6.41E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.1E-02
				COBALT	7.67E+00	(mg/kg)	1.50E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.20E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-02
				MANGANESE	7.60E+02	(mg/kg)	1.49E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	4.16E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.0E-03
			Exp. Route Total								**3.4E-06**					**3.8E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.95E+01	(mg/kg)	4.85E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.3E-07	1.36E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.5E-03
				COBALT	7.67E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	7.60E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**7.3E-07**					**4.5E-03**
		Exposure Point Total									**4.2E-06**					**4.3E-02**
	Exposure Medium Total										**4.2E-06**					**4.3E-02**
	Air	DU14	Inhalation	**Inorganics**												
				ARSENIC	1.61E-08	(mg/m^3)	8.41E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	3.6E-09	2.35E-09	(mg/m^3)	1.50E-05	(mg/m^3)	1.6E-04
				COBALT	6.34E-09	(mg/m^3)	3.31E-07	(ug/m^3)	9.00E-03	per (ug/m^3)	3.0E-09	9.26E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.5E-04
				MANGANESE	6.28E-07	(mg/m^3)	3.28E-05	(ug/m^3)	NA	per (ug/m^3)	--	9.18E-08	(mg/m^3)	5.00E-05	(mg/m^3)	1.8E-03
			Exp. Route Total								**6.6E-09**					**2.1E-03**
		Exposure Point Total									**6.6E-09**					**2.1E-03**
	Exposure Medium Total										**6.6E-09**					**2.1E-03**
Soil Total											**4.2E-06**					**4.5E-02**
										Total of Receptor Risks Across All Media	**4.2E-06**			Total of Receptor Hazards Across All Media		**4.5E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 201
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU14

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU14	Ingestion	**Inorganics**												
				ARSENIC	1.95E+01	(mg/kg)	8.93E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.3E-07	2.08E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.9E-03
				COBALT	7.67E+00	(mg/kg)	5.85E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.37E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.6E-03
				MANGANESE	7.60E+02	(mg/kg)	5.80E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.35E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	9.7E-04
			Exp. Route Total								**1.3E-07**					**1.2E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.95E+01	(mg/kg)	4.72E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.1E-08	1.10E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.7E-03
				COBALT	7.67E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	7.60E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**7.1E-08**					**3.7E-03**
		Exposure Point Total									**2.0E-07**					**1.6E-02**
	Exposure Medium Total										**2.0E-07**					**1.6E-02**
	Air	DU14	Inhalation	**Inorganics**												
				ARSENIC	1.61E-08	(mg/m^3)	3.28E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.4E-10	7.65E-10	(mg/m^3)	1.50E-05	(mg/m^3)	5.1E-05
				COBALT	6.34E-09	(mg/m^3)	1.29E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.2E-10	3.01E-10	(mg/m^3)	6.00E-06	(mg/m^3)	5.0E-05
				MANGANESE	6.28E-07	(mg/m^3)	1.28E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.98E-08	(mg/m^3)	5.00E-05	(mg/m^3)	6.0E-04
			Exp. Route Total								**2.6E-10**					**7.0E-04**
		Exposure Point Total									**2.6E-10**					**7.0E-04**
	Exposure Medium Total										**2.6E-10**					**7.0E-04**
Soil Total											**2.1E-07**					**1.7E-02**
										Total of Receptor Risks Across All Media	**2.1E-07**			Total of Receptor Hazards Across All Media		**1.7E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 202
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU14

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU14	Ingestion	**Inorganics**												
				ARSENIC	1.95E+01	(mg/kg)	5.19E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.8E-07	3.64E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.2E-01
				COBALT	7.67E+00	(mg/kg)	3.41E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.38E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.9E-02
				MANGANESE	7.60E+02	(mg/kg)	3.37E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.36E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.7E-02
			Exp. Route Total								**7.8E-07**					**2.2E-01**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.95E+01	(mg/kg)	8.33E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.2E-07	5.83E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.9E-02
				COBALT	7.67E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	7.60E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**1.2E-07**					**1.9E-02**
		Exposure Point Total									**9.0E-07**					**2.4E-01**
	Exposure Medium Total										**9.0E-07**					**2.4E-01**
	Air	DU14	Inhalation	**Inorganics**												
				ARSENIC	9.47E-07	(mg/m^3)	4.88E-06	(ug/m^3)	4.3E-03	per (ug/m^3)	2.1E-08	3.42E-07	(mg/m^3)	1.50E-05	(mg/m^3)	2.3E-02
				COBALT	3.72E-07	(mg/m^3)	1.92E-06	(ug/m^3)	9.0E-03	per (ug/m^3)	1.7E-08	1.34E-07	(mg/m^3)	6.00E-06	(mg/m^3)	2.2E-02
				MANGANESE	3.69E-05	(mg/m^3)	1.90E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.33E-05	(mg/m^3)	5.00E-05	(mg/m^3)	2.7E-01
			Exp. Route Total								**3.8E-08**					**3.1E-01**
		Exposure Point Total									**3.8E-08**					**3.1E-01**
	Exposure Medium Total										**3.8E-08**					**3.1E-01**
Soil Total											**9.4E-07**					**5.5E-01**
										Total of Receptor Risks Across All Media	**9.4E-07**				Total of Receptor Hazards Across All Media	**5.5E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 203
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU14

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU14	Ingestion	**Inorganics**												
				ARSENIC	1.95E+01	(mg/kg)	3.55E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.3E-07	1.24E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.1E-03
				COBALT	7.67E+00	(mg/kg)	2.33E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	8.14E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.7E-03
				MANGANESE	7.60E+02	(mg/kg)	2.31E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	8.07E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	5.8E-04
			Exp. Route Total								**5.3E-07**					**7.4E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.95E+01	(mg/kg)	7.49E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.1E-07	2.62E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.7E-04
				COBALT	7.67E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	7.60E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**1.1E-07**					**8.7E-04**
		Exposure Point Total									**6.4E-07**					**8.3E-03**
	Exposure Medium Total										**6.4E-07**					**8.3E-03**
	Air	DU14	Inhalation	**Inorganics**												
				ARSENIC	1.61E-08	(mg/m^3)	6.52E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	2.8E-10	2.28E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.5E-05
				COBALT	6.34E-09	(mg/m^3)	2.56E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	2.3E-10	8.97E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.5E-05
				MANGANESE	6.28E-07	(mg/m^3)	2.54E-06	(ug/m^3)	NA	per (ug/m^3)	--	8.89E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.8E-04
			Exp. Route Total								**5.1E-10**					**2.1E-04**
		Exposure Point Total									**5.1E-10**					**2.1E-04**
	Exposure Medium Total										**5.1E-10**					**2.1E-04**
Soil Total											**6.5E-07**					**8.5E-03**
										Total of Receptor Risks Across All Media	**6.5E-07**			Total of Receptor Hazards Across All Media		**8.5E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 204
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU14

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU14	Ingestion	**Inorganics**												
				ARSENIC	1.95E+01	(mg/kg)	5.00E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.5E-07	5.83E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.9E-02
				COBALT	7.67E+00	(mg/kg)	3.28E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	3.82E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-02
				MANGANESE	7.60E+02	(mg/kg)	3.25E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.79E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.7E-03
			Exp. Route Total								**7.5E-07**					**3.5E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.95E+01	(mg/kg)	1.16E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.7E-07	1.35E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.5E-03
				COBALT	7.67E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	7.60E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**1.7E-07**					**4.5E-03**
		Exposure Point Total									**9.2E-07**					**3.9E-02**
	Exposure Medium Total										**9.2E-07**					**3.9E-02**
	Air	DU14	Inhalation	**Inorganics**												
				ARSENIC	1.61E-08	(mg/m^3)	3.26E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.4E-10	3.80E-10	(mg/m^3)	1.50E-05	(mg/m^3)	2.5E-05
				COBALT	6.34E-09	(mg/m^3)	1.28E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.2E-10	1.50E-10	(mg/m^3)	6.00E-06	(mg/m^3)	2.5E-05
				MANGANESE	6.28E-07	(mg/m^3)	1.27E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.48E-08	(mg/m^3)	5.00E-05	(mg/m^3)	3.0E-04
			Exp. Route Total								**2.6E-10**					**3.5E-04**
		Exposure Point Total									**2.6E-10**					**3.5E-04**
	Exposure Medium Total										**2.6E-10**					**3.5E-04**
Soil Total											**9.2E-07**					**4.0E-02**
										Total of Receptor Risks Across All Media	**9.2E-07**				Total of Receptor Hazards Across All Media	**4.0E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 205
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU14

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU14	Ingestion	**Inorganics**												
				ARSENIC	1.95E+01	(mg/kg)	7.10E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.1E-06	1.24E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.1E-02
				COBALT	7.67E+00	(mg/kg)	4.65E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	8.14E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.7E-02
				MANGANESE	7.60E+02	(mg/kg)	4.61E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	8.07E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	5.8E-03
			Exp. Route Total								**1.1E-06**					**7.4E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.95E+01	(mg/kg)	7.48E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.1E-07	1.31E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.4E-03
				COBALT	7.67E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	7.60E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**1.1E-07**					**4.4E-03**
		Exposure Point Total									**1.2E-06**					**7.9E-02**
	Exposure Medium Total										**1.2E-06**					**7.9E-02**
	Air	DU14	Inhalation	**Inorganics**												
				ARSENIC	1.61E-08	(mg/m^3)	1.30E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	5.6E-11	2.28E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.5E-05
				COBALT	6.34E-09	(mg/m^3)	5.13E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	4.6E-11	8.97E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.5E-05
				MANGANESE	6.28E-07	(mg/m^3)	5.08E-07	(ug/m^3)	NA	per (ug/m^3)	--	8.89E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.8E-04
			Exp. Route Total								**1.0E-10**					**2.1E-04**
		Exposure Point Total									**1.0E-10**					**2.1E-04**
	Exposure Medium Total										**1.0E-10**					**2.1E-04**
Soil Total											**1.2E-06**					**7.9E-02**
										Total of Receptor Risks Across All Media	**1.2E-06**			Total of Receptor Hazards Across All Media		**7.9E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABEL 206
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU14

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU14	Ingestion	**Inorganics**												
				ARSENIC	1.95E+01	(mg/kg)	7.71E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.2E-07	9.00E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.0E-03
				COBALT	7.67E+00	(mg/kg)	5.06E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	5.90E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.0E-03
				MANGANESE	7.60E+02	(mg/kg)	5.01E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	5.84E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.2E-04
			Exp. Route Total								**1.2E-07**					**5.4E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.95E+01	(mg/kg)	3.58E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.4E-08	4.18E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-03
				COBALT	7.67E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	7.60E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**5.4E-08**					**1.4E-03**
		Exposure Point Total									**1.7E-07**					**6.8E-03**
	Exposure Medium Total										**1.7E-07**					**6.8E-03**
	Air	DU14	Inhalation	**Inorganics**												
				ARSENIC	1.61E-08	(mg/m^3)	1.01E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	4.3E-11	1.18E-10	(mg/m^3)	1.50E-05	(mg/m^3)	7.8E-06
				COBALT	6.34E-09	(mg/m^3)	3.97E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	3.6E-11	4.63E-11	(mg/m^3)	6.00E-06	(mg/m^3)	7.7E-06
				MANGANESE	6.28E-07	(mg/m^3)	3.93E-07	(ug/m^3)	NA	per (ug/m^3)	--	4.59E-09	(mg/m^3)	5.00E-05	(mg/m^3)	9.2E-05
			Exp. Route Total								**7.9E-11**					**1.1E-04**
		Exposure Point Total									**7.9E-11**					**1.1E-04**
	Exposure Medium Total										**7.9E-11**					**1.1E-04**
Soil Total											**1.7E-07**					**6.9E-03**
										Total of Receptor Risks Across All Media	**1.7E-07**				Total of Receptor Hazards Across All Media	**6.9E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 207
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU14

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU14	Ingestion	**Inorganics**												
				ARSENIC	1.95E+01	(mg/kg)	5.29E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.9E-07	2.85E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.5E-03
				COBALT	7.67E+00	(mg/kg)	3.47E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.87E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.2E-03
				MANGANESE	7.60E+02	(mg/kg)	3.44E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.85E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.3E-03
			Exp. Route Total								**7.9E-07**					**1.7E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.95E+01	(mg/kg)	1.04E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.6E-07	5.62E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.9E-03
				COBALT	7.67E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	7.60E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**1.6E-07**					**1.9E-03**
		Exposure Point Total									**9.5E-07**					**1.9E-02**
	Exposure Medium Total										**9.5E-07**					**1.9E-02**
	Air	DU14	Inhalation	**Inorganics**												
				ARSENIC	1.61E-08	(mg/m^3)	1.64E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	7.1E-10	8.83E-10	(mg/m^3)	1.50E-05	(mg/m^3)	5.9E-05
				COBALT	6.34E-09	(mg/m^3)	6.45E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	5.8E-10	3.47E-10	(mg/m^3)	6.00E-06	(mg/m^3)	5.8E-05
				MANGANESE	6.28E-07	(mg/m^3)	6.39E-06	(ug/m^3)	NA	per (ug/m^3)	--	3.44E-08	(mg/m^3)	5.00E-05	(mg/m^3)	6.9E-04
			Exp. Route Total								**1.3E-09**					**8.1E-04**
		Exposure Point Total									**1.3E-09**					**8.1E-04**
	Exposure Medium Total										**1.3E-09**					**8.1E-04**
Soil Total											**9.5E-07**					**2.0E-02**
										Total of Receptor Risks Across All Media	**9.5E-07**				Total of Receptor Hazards Across All Media	**2.0E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 208
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU14

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	3.4E-06	7.3E-07	3.6E-09	4.2E-06	ARSENIC	Skin, Cardiovascular	2.1E-02	4.5E-03	1.6E-04	2.6E-02
			COBALT	--	--	3.0E-09	3.0E-09	COBALT	Thyroid	1.4E-02	--	1.5E-04	1.4E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.0E-03	--	1.8E-03	4.8E-03
			(Total)	3.4E-06	7.3E-07	6.6E-09	4.2E-06		(Total)	3.8E-02	4.5E-03	2.1E-03	4.5E-02
Total Risk Across Surface Soil							**4.2E-06**	**Total Hazard Index Across Surface Soil**					**4.5E-02**
Total Risk Across All Media and All Exposure Routes							**4E-06**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.05**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 209
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU14

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	1.3E-07	7.1E-08	1.4E-10	2.0E-07	ARSENIC	Skin, Cardiovascular	6.9E-03	3.7E-03	5.1E-05	1.1E-02
			COBALT	--	--	1.2E-10	1.2E-10	COBALT	Thyroid	4.6E-03	--	5.0E-05	4.6E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	9.7E-04	--	6.0E-04	1.6E-03
			(Total)	1.3E-07	7.1E-08	2.6E-10	2.1E-07		(Total)	1.2E-02	3.7E-03	7.0E-04	1.7E-02
							Total Risk Across Surface Soil	**2.1E-07**					**Total Hazard Index Across Surface Soil**	**1.7E-02**
							Total Risk Across All Media and All Exposure Routes	**2E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 210
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU14

Location: Iona Island
Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	7.8E-07	1.2E-07	2.1E-08	9.3E-07	ARSENIC	Skin, Cardiovascular	1.2E-01	1.9E-02	2.3E-02	1.6E-01
			COBALT	--	--	1.7E-08	1.7E-08	COBALT	Thyroid	7.9E-02	--	2.2E-02	1.0E-01
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.7E-02	--	2.7E-01	2.8E-01
			(Total)	7.8E-07	1.2E-07	3.8E-08	9.4E-07		(Total)	2.2E-01	1.9E-02	3.1E-01	5.5E-01
							Total Risk Across Surface Soil	**9.4E-07**					**Total Hazard Index Across Surface Soil**	**5.5E-01**
							Total Risk Across All Media and All Exposure Routes	**9E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.5**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 211
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU14

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	5.3E-07	1.1E-07	2.8E-10	6.5E-07	ARSENIC	Skin, Cardiovascular	4.1E-03	8.7E-04	1.5E-05	5.0E-03
			COBALT	--	--	2.3E-10	2.3E-10	COBALT	Thyroid	2.7E-03	--	1.5E-05	2.7E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	5.8E-04	--	1.8E-04	7.5E-04
			(Total)	5.3E-07	1.1E-07	5.1E-10	6.5E-07		(Total)	7.4E-03	8.7E-04	2.1E-04	8.5E-03
Total Risk Across Surface Soil							**6.5E-07**	**Total Hazard Index Across Surface Soil**					**8.5E-03**
Total Risk Across All Media and All Exposure Routes							**6E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.009**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 212
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU14

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	7.5E-07	1.7E-07	1.4E-10	9.2E-07	ARSENIC	Skin, Cardiovascular	1.9E-02	4.5E-03	2.5E-05	2.4E-02
			COBALT	--	--	1.2E-10	1.2E-10	COBALT	Thyroid	1.3E-02	--	2.5E-05	1.3E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.7E-03	--	3.0E-04	3.0E-03
			(Total)	7.5E-07	1.7E-07	2.6E-10	9.2E-07		(Total)	3.5E-02	4.5E-03	3.5E-04	4.0E-02
							Total Risk Across Surface Soil	**9.2E-07**					**Total Hazard Index Across Surface Soil**	**4.0E-02**
							Total Risk Across All Media and All Exposure Routes	**9E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.04**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 213
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU14

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	1.1E-06	1.1E-07	5.6E-11	1.2E-06	ARSENIC	Skin, Cardiovascular	4.1E-02	4.4E-03	1.5E-05	4.6E-02
			COBALT	--	--	4.6E-11	4.6E-11	COBALT	Thyroid	2.7E-02	--	1.5E-05	2.7E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	5.8E-03	--	1.8E-04	5.9E-03
			(Total)	1.1E-06	1.1E-07	1.0E-10	1.2E-06		(Total)	7.4E-02	4.4E-03	2.1E-04	7.9E-02
Total Risk Across Surface Soil							**1.2E-06**	**Total Hazard Index Across Surface Soil**					**7.9E-02**
Total Risk Across All Media and All Exposure Routes							**1E-06**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.08**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 214
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU14

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	1.2E-07	5.4E-08	4.3E-11	1.7E-07	ARSENIC	Skin, Cardiovascular	3.0E-03	1.4E-03	7.8E-06	4.4E-03
			COBALT	--	--	3.6E-11	3.6E-11	COBALT	Thyroid	2.0E-03	--	7.7E-06	2.0E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.2E-04	--	9.2E-05	5.1E-04
			(Total)	1.2E-07	5.4E-08	7.9E-11	1.7E-07		(Total)	5.4E-03	1.4E-03	1.1E-04	6.9E-03
Total Risk Across Surface Soil							**1.7E-07**		**Total Hazard Index Across Surface Soil**				**6.9E-03**
Total Risk Across All Media and All Exposure Routes							**2E-07**		**Total Hazard Index Across All Media and All Exposure Routes**				**0.007**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 215
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU14

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	7.9E-07	1.6E-07	7.1E-10	9.5E-07	ARSENIC	Skin, Cardiovascular	9.5E-03	1.9E-03	5.9E-05	1.1E-02
			COBALT	--	--	5.8E-10	5.8E-10	COBALT	Thyroid	6.2E-03	--	5.8E-05	6.3E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.3E-03	--	6.9E-04	2.0E-03
			(Total)	7.9E-07	1.6E-07	1.3E-09	9.5E-07		(Total)	1.7E-02	1.9E-03	8.1E-04	2.0E-02
Total Risk Across Surface Soil							**9.5E-07**	**Total Hazard Index Across Surface Soil**					**2.0E-02**
Total Risk Across All Media and All Exposure Routes							**1E-06**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 216
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU15

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU15	Ingestion	**Inorganics**												
				COBALT	6.91E+00	(mg/kg)	1.35E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	3.79E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-02
				MANGANESE	5.31E+02	(mg/kg)	1.04E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.91E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.1E-03
			Exp. Route Total								**0.0E+00**					**1.5E-02**
			Dermal[1]	**Inorganics**												
				COBALT	6.91E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.31E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**1.5E-02**
	Exposure Medium Total										**0.0E+00**					**1.5E-02**
	Air	DU15	Inhalation	**Inorganics**												
				COBALT	5.71E-09	(mg/m^3)	2.98E-07	(ug/m^3)	9.00E-03	per (ug/m^3)	2.7E-09	8.34E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.4E-04
				MANGANESE	4.39E-07	(mg/m^3)	2.29E-05	(ug/m^3)	NA	per (ug/m^3)	--	6.41E-08	(mg/m^3)	5.00E-05	(mg/m^3)	1.3E-03
			Exp. Route Total								**2.7E-09**					**1.4E-03**
		Exposure Point Total									**2.7E-09**					**1.4E-03**
	Exposure Medium Total										**2.7E-09**					**1.4E-03**
Soil Total											**2.7E-09**					**1.6E-02**
										Total of Receptor Risks Across All Media	**2.7E-09**				Total of Receptor Hazards Across All Media	**1.6E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 217
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU15

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU15	Ingestion	**Inorganics**												
				COBALT	6.91E+00	(mg/kg)	5.27E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.23E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.1E-03
				MANGANESE	5.31E+02	(mg/kg)	4.05E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	9.46E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	6.8E-04
			Exp. Route Total								**0.0E+00**					**4.8E-03**
			Dermal[1]	**Inorganics**												
				COBALT	6.91E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.31E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**4.8E-03**
	Exposure Medium Total										**0.0E+00**					**4.8E-03**
	Air	DU15	Inhalation	**Inorganics**												
				COBALT	5.71E-09	(mg/m^3)	1.16E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.0E-10	2.71E-10	(mg/m^3)	6.00E-06	(mg/m^3)	4.5E-05
				MANGANESE	4.39E-07	(mg/m^3)	8.93E-07	(ug/m^3)	NA	per (ug/m^3)	--	2.08E-08	(mg/m^3)	5.00E-05	(mg/m^3)	4.2E-04
			Exp. Route Total								**1.0E-10**					**4.6E-04**
		Exposure Point Total									**1.0E-10**					**4.6E-04**
	Exposure Medium Total										**1.0E-10**					**4.6E-04**
Soil Total											**1.0E-10**					**5.2E-03**
										Total of Receptor Risks Across All Media	**1.0E-10**				Total of Receptor Hazards Across All Media	**5.2E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 218
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU15

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU15	Ingestion	**Inorganics**												
				COBALT	6.91E+00	(mg/kg)	3.07E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.15E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.2E-02
				MANGANESE	5.31E+02	(mg/kg)	2.36E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.65E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.2E-02
			Exp. Route Total								**0.0E+00**					**8.3E-02**
			Dermal[1]	**Inorganics**												
				COBALT	6.91E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.31E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**8.3E-02**
	Exposure Medium Total										**0.0E+00**					**8.3E-02**
	Air	DU15	Inhalation	**Inorganics**												
				COBALT	3.35E-07	(mg/m^3)	1.73E-06	(ug/m^3)	9.0E-03	per (ug/m^3)	1.6E-08	1.21E-07	(mg/m^3)	6.00E-06	(mg/m^3)	2.0E-02
				MANGANESE	2.58E-05	(mg/m^3)	1.33E-04	(ug/m^3)	NA	per (ug/m^3)	--	9.31E-06	(mg/m^3)	5.00E-05	(mg/m^3)	1.9E-01
			Exp. Route Total								**1.6E-08**					**2.1E-01**
		Exposure Point Total									**1.6E-08**					**2.1E-01**
	Exposure Medium Total										**1.6E-08**					**2.1E-01**
Soil Total											**1.6E-08**					**2.9E-01**
											Total of Receptor Risks Across All Media **1.6E-08**					Total of Receptor Hazards Across All Media **2.9E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 219
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU15

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU15	Ingestion	**Inorganics**												
				COBALT	6.91E+00	(mg/kg)	2.10E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	7.34E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.4E-03
				MANGANESE	5.31E+02	(mg/kg)	1.61E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	5.64E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.0E-04
			Exp. Route Total								**0.0E+00**					**2.8E-03**
			Dermal[1]	**Inorganics**												
				COBALT	6.91E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.31E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**2.8E-03**
	Exposure Medium Total										**0.0E+00**					**2.8E-03**
	Air	DU15	Inhalation	**Inorganics**												
				COBALT	5.71E-09	(mg/m^3)	2.31E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	2.1E-10	8.08E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.3E-05
				MANGANESE	4.39E-07	(mg/m^3)	1.77E-06	(ug/m^3)	NA	per (ug/m^3)	--	6.21E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.2E-04
			Exp. Route Total								**2.1E-10**					**1.4E-04**
		Exposure Point Total									**2.1E-10**					**1.4E-04**
	Exposure Medium Total										**2.1E-10**					**1.4E-04**
Soil Total											**2.1E-10**					**3.0E-03**
										Total of Receptor Risks Across All Media	**2.1E-10**			Total of Receptor Hazards Across All Media		**3.0E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 220
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU15

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU15	Ingestion	**Inorganics**												
				COBALT	6.91E+00	(mg/kg)	2.95E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	3.44E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.1E-02
				MANGANESE	5.31E+02	(mg/kg)	2.27E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.65E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.9E-03
			Exp. Route Total								**0.0E+00**					**1.3E-02**
			Dermal[1]	**Inorganics**												
				COBALT	6.91E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.31E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**1.3E-02**
	Exposure Medium Total										**0.0E+00**					**1.3E-02**
	Air	DU15	Inhalation	**Inorganics**												
				COBALT	5.71E-09	(mg/m^3)	1.15E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.0E-10	1.35E-10	(mg/m^3)	6.00E-06	(mg/m^3)	2.2E-05
				MANGANESE	4.39E-07	(mg/m^3)	8.87E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.04E-08	(mg/m^3)	5.00E-05	(mg/m^3)	2.1E-04
			Exp. Route Total								**1.0E-10**					**2.3E-04**
		Exposure Point Total									**1.0E-10**					**2.3E-04**
	Exposure Medium Total										**1.0E-10**					**2.3E-04**
Soil Total											**1.0E-10**					**1.4E-02**
										Total of Receptor Risks Across All Media	**1.0E-10**			Total of Receptor Hazards Across All Media		**1.4E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 221
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU15

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU15	Ingestion	**Inorganics**												
				COBALT	6.91E+00	(mg/kg)	4.19E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	7.34E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.4E-02
				MANGANESE	5.31E+02	(mg/kg)	3.22E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	5.64E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.0E-03
			Exp. Route Total								**0.0E+00**					**2.8E-02**
			Dermal[1]	**Inorganics**												
				COBALT	6.91E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.31E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**2.8E-02**
	Exposure Medium Total										**0.0E+00**					**2.8E-02**
	Air	DU15	Inhalation	**Inorganics**												
				COBALT	5.71E-09	(mg/m^3)	4.62E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	4.2E-11	8.08E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.3E-05
				MANGANESE	4.39E-07	(mg/m^3)	3.55E-07	(ug/m^3)	NA	per (ug/m^3)	--	6.21E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.2E-04
			Exp. Route Total								**4.2E-11**					**1.4E-04**
		Exposure Point Total									**4.2E-11**					**1.4E-04**
	Exposure Medium Total										**4.2E-11**					**1.4E-04**
Soil Total											**4.2E-11**					**2.9E-02**
										Total of Receptor Risks Across All Media	**4.2E-11**				Total of Receptor Hazards Across All Media	**2.9E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 222
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU15

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU15	Ingestion	**Inorganics**												
				COBALT	6.91E+00	(mg/kg)	4.55E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	5.31E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.8E-03
				MANGANESE	5.31E+02	(mg/kg)	3.50E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.08E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.9E-04
			Exp. Route Total								**0.0E+00**					**2.1E-03**
			Dermal[1]	**Inorganics**												
				COBALT	6.91E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.31E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**2.1E-03**
	Exposure Medium Total										**0.0E+00**					**2.1E-03**
	Air	DU15	Inhalation	**Inorganics**												
				COBALT	5.71E-09	(mg/m^3)	3.58E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	3.2E-11	4.17E-11	(mg/m^3)	6.00E-06	(mg/m^3)	7.0E-06
				MANGANESE	4.39E-07	(mg/m^3)	2.75E-07	(ug/m^3)	NA	per (ug/m^3)	--	3.21E-09	(mg/m^3)	5.00E-05	(mg/m^3)	6.4E-05
			Exp. Route Total								**3.2E-11**					**7.1E-05**
		Exposure Point Total									**3.2E-11**					**7.1E-05**
	Exposure Medium Total										**3.2E-11**					**7.1E-05**
Soil Total											**3.2E-11**					**2.1E-03**
										Total of Receptor Risks Across All Media	**3.2E-11**				Total of Receptor Hazards Across All Media	**2.1E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 223
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU15

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU15	Ingestion	**Inorganics**												
				COBALT	6.91E+00	(mg/kg)	3.13E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.68E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.6E-03
				MANGANESE	5.31E+02	(mg/kg)	2.40E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.29E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	9.2E-04
			Exp. Route Total								**0.0E+00**					**6.5E-03**
			Dermal[1]	**Inorganics**												
				COBALT	6.91E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	5.31E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**6.5E-03**
	Exposure Medium Total										**0.0E+00**					**6.5E-03**
	Air	DU15	Inhalation	**Inorganics**												
				COBALT	5.71E-09	(mg/m^3)	5.81E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	5.2E-10	3.13E-10	(mg/m^3)	6.00E-06	(mg/m^3)	5.2E-05
				MANGANESE	4.39E-07	(mg/m^3)	4.47E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.40E-08	(mg/m^3)	5.00E-05	(mg/m^3)	4.8E-04
			Exp. Route Total								**5.2E-10**					**5.3E-04**
		Exposure Point Total									**5.2E-10**					**5.3E-04**
	Exposure Medium Total										**5.2E-10**					**5.3E-04**
Soil Total											**5.2E-10**					**7.1E-03**
										Total of Receptor Risks Across All Media	**5.2E-10**				Total of Receptor Hazards Across All Media	**7.1E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 224
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU15

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	2.7E-09	2.7E-09	COBALT	Thyroid	1.3E-02	--	1.4E-04	1.3E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.1E-03	--	1.3E-03	3.4E-03
			(Total)	---	---	2.7E-09	2.7E-09		(Total)	1.5E-02	---	1.4E-03	1.6E-02
Total Risk Across Surface Soil							**2.7E-09**	**Total Hazard Index Across Surface Soil**					**1.6E-02**
Total Risk Across All Media and All Exposure Routes							**3E-09**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 225
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU15

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	1.0E-10	1.0E-10	COBALT	Thyroid	4.1E-03	--	4.5E-05	4.1E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	6.8E-04	--	4.2E-04	1.1E-03
			(Total)	---	---	1.0E-10	1.0E-10		(Total)	4.8E-03	---	4.6E-04	5.2E-03
Total Risk Across Surface Soil							**1.0E-10**	**Total Hazard Index Across Surface Soil**					**5.2E-03**
Total Risk Across All Media and All Exposure Routes							**1E-10**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.005**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 226
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU15

Location: Iona Island
Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	1.6E-08	1.6E-08	COBALT	Thyroid	7.2E-02	--	2.0E-02	9.2E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.2E-02	--	1.9E-01	2.0E-01
			(Total)	---	---	1.6E-08	1.6E-08		(Total)	8.3E-02	---	2.1E-01	2.9E-01
							Total Risk Across Surface Soil	**1.6E-08**					**Total Hazard Index Across Surface Soil**	**2.9E-01**
							Total Risk Across All Media and All Exposure Routes	**2E-08**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.3**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 227
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU15

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	2.1E-10	2.1E-10	COBALT	Thyroid	2.4E-03	--	1.3E-05	2.5E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.0E-04	--	1.2E-04	5.3E-04
			(Total)	---	---	2.1E-10	2.1E-10		(Total)	2.8E-03	---	1.4E-04	3.0E-03
Total Risk Across Surface Soil							**2.1E-10**	**Total Hazard Index Across Surface Soil**					**3.0E-03**
Total Risk Across All Media and All Exposure Routes							**2E-10**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.003**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 228
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU15

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	1.0E-10	1.0E-10	COBALT	Thyroid	1.1E-02	--	2.2E-05	1.2E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.9E-03	--	2.1E-04	2.1E-03
			(Total)	---	---	1.0E-10	1.0E-10		(Total)	1.3E-02	---	2.3E-04	1.4E-02
Total Risk Across Surface Soil							**1.0E-10**	**Total Hazard Index Across Surface Soil**					**1.4E-02**
Total Risk Across All Media and All Exposure Routes							**1E-10**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.01**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 229
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU15

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	4.2E-11	4.2E-11	COBALT	Thyroid	2.4E-02	--	1.3E-05	2.4E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.0E-03	--	1.2E-04	4.2E-03
			(Total)	---	---	4.2E-11	4.2E-11		(Total)	2.8E-02	---	1.4E-04	2.9E-02
Total Risk Across Surface Soil							**4.2E-11**	**Total Hazard Index Across Surface Soil**					**2.9E-02**
Total Risk Across All Media and All Exposure Routes							**4E-11**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.03**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 230
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU15

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	3.2E-11	3.2E-11	COBALT	Thyroid	1.8E-03	--	7.0E-06	1.8E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.9E-04	--	6.4E-05	3.6E-04
			(Total)	---	---	3.2E-11	3.2E-11		(Total)	2.1E-03	---	7.1E-05	2.1E-03
Total Risk Across Surface Soil							**3.2E-11**	**Total Hazard Index Across Surface Soil**					**2.1E-03**
Total Risk Across All Media and All Exposure Routes							**3E-11**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.002**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 231
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU15

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	5.2E-10	5.2E-10	COBALT	Thyroid	5.6E-03	--	5.2E-05	5.7E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	9.2E-04	--	4.8E-04	1.4E-03
			(Total)	---	---	5.2E-10	5.2E-10		(Total)	6.5E-03	---	5.3E-04	7.1E-03
Total Risk Across Surface Soil							**5.2E-10**	**Total Hazard Index Across Surface Soil**					**7.1E-03**
Total Risk Across All Media and All Exposure Routes							**5E-10**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.007**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 232
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU16

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU16	Ingestion	**Inorganics**												
				COBALT	8.97E+00	(mg/kg)	1.76E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.92E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.6E-02
				IRON	2.35E+04	(mg/kg)	4.60E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.29E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.8E-02
				MANGANESE	4.65E+02	(mg/kg)	9.10E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.55E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.8E-03
			Exp. Route Total								**0.0E+00**					**3.7E-02**
			Dermal[1]	**Inorganics**												
				COBALT	8.97E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	2.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	4.65E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**3.7E-02**
	Exposure Medium Total										**0.0E+00**					**3.7E-02**
	Air	DU16	Inhalation	**Inorganics**												
				COBALT	7.41E-09	(mg/m^3)	3.87E-07	(ug/m^3)	9.00E-03	per (ug/m^3)	3.5E-09	1.08E-09	(mg/m^3)	6.00E-06	(mg/m^3)	1.8E-04
				IRON	1.94E-05	(mg/m^3)	1.01E-03	(ug/m^3)	NA	per (ug/m^3)	--	2.84E-06	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.84E-07	(mg/m^3)	2.01E-05	(ug/m^3)	NA	per (ug/m^3)	--	5.62E-08	(mg/m^3)	5.00E-05	(mg/m^3)	1.1E-03
			Exp. Route Total								**3.5E-09**					**1.3E-03**
		Exposure Point Total									**3.5E-09**					**1.3E-03**
	Exposure Medium Total										**3.5E-09**					**1.3E-03**
Soil Total											**3.5E-09**					**3.8E-02**
										Total of Receptor Risks Across All Media	**3.5E-09**				Total of Receptor Hazards Across All Media	**3.8E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 233
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU16

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU16	Ingestion	**Inorganics**												
				COBALT	8.97E+00	(mg/kg)	6.85E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.60E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.3E-03
				IRON	2.35E+04	(mg/kg)	1.79E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	4.18E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	6.0E-03
				MANGANESE	4.65E+02	(mg/kg)	3.55E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	8.28E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	5.9E-04
			Exp. Route Total								**0.0E+00**					**1.2E-02**
			Dermal[1]	**Inorganics**												
				COBALT	8.97E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	2.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	4.65E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**1.2E-02**
	Exposure Medium Total										**0.0E+00**					**1.2E-02**
	Air	DU16	Inhalation	**Inorganics**												
				COBALT	7.41E-09	(mg/m^3)	1.51E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.4E-10	3.52E-10	(mg/m^3)	6.00E-06	(mg/m^3)	5.9E-05
				IRON	1.94E-05	(mg/m^3)	3.95E-05	(ug/m^3)	NA	per (ug/m^3)	--	9.22E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.84E-07	(mg/m^3)	7.82E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.82E-08	(mg/m^3)	5.00E-05	(mg/m^3)	3.6E-04
			Exp. Route Total								**1.4E-10**					**4.2E-04**
		Exposure Point Total									**1.4E-10**					**4.2E-04**
	Exposure Medium Total										**1.4E-10**					**4.2E-04**
Soil Total											**1.4E-10**					**1.2E-02**
										Total of Receptor Risks Across All Media	**1.4E-10**				Total of Receptor Hazards Across All Media	**1.2E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 234
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU16

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU16	Ingestion	**Inorganics**												
				COBALT	8.97E+00	(mg/kg)	3.98E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.79E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.3E-02
				IRON	2.35E+04	(mg/kg)	1.04E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	7.30E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.0E-01
				MANGANESE	4.65E+02	(mg/kg)	2.06E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.45E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.0E-02
			Exp. Route Total								**0.0E+00**					**2.1E-01**
			Dermal[1]	**Inorganics**												
				COBALT	8.97E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	2.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	4.65E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**2.1E-01**
	Exposure Medium Total										**0.0E+00**					**2.1E-01**
	Air	DU16	Inhalation	**Inorganics**												
				COBALT	4.35E-07	(mg/m^3)	2.25E-06	(ug/m^3)	9.0E-03	per (ug/m^3)	2.0E-08	1.57E-07	(mg/m^3)	6.00E-06	(mg/m^3)	2.6E-02
				IRON	1.14E-03	(mg/m^3)	5.88E-03	(ug/m^3)	NA	per (ug/m^3)	--	4.12E-04	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	2.26E-05	(mg/m^3)	1.16E-04	(ug/m^3)	NA	per (ug/m^3)	--	8.15E-06	(mg/m^3)	5.00E-05	(mg/m^3)	1.6E-01
			Exp. Route Total								**2.0E-08**					**1.9E-01**
		Exposure Point Total									**2.0E-08**					**1.9E-01**
	Exposure Medium Total										**2.0E-08**					**1.9E-01**
Soil Total											**2.0E-08**					**4.0E-01**
										Total of Receptor Risks Across All Media	**2.0E-08**				Total of Receptor Hazards Across All Media	**4.0E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 235
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU16

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU16	Ingestion	**Inorganics**												
				COBALT	8.97E+00	(mg/kg)	2.72E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	9.52E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.2E-03
				IRON	2.35E+04	(mg/kg)	7.13E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.49E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	3.6E-03
				MANGANESE	4.65E+02	(mg/kg)	1.41E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	4.94E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.5E-04
			Exp. Route Total								**0.0E+00**					**7.1E-03**
			Dermal[1]	**Inorganics**												
				COBALT	8.97E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	2.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	4.65E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**7.1E-03**
	Exposure Medium Total										**0.0E+00**					**7.1E-03**
	Air	DU16	Inhalation	**Inorganics**												
				COBALT	7.41E-09	(mg/m^3)	3.00E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	2.7E-10	1.05E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.7E-05
				IRON	1.94E-05	(mg/m^3)	7.85E-05	(ug/m^3)	NA	per (ug/m^3)	--	2.75E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.84E-07	(mg/m^3)	1.55E-06	(ug/m^3)	NA	per (ug/m^3)	--	5.44E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.1E-04
			Exp. Route Total								**2.7E-10**					**1.3E-04**
		Exposure Point Total									**2.7E-10**					**1.3E-04**
	Exposure Medium Total										**2.7E-10**					**1.3E-04**
Soil Total											**2.7E-10**					**7.2E-03**
										Total of Receptor Risks Across All Media	**2.7E-10**				Total of Receptor Hazards Across All Media	**7.2E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 236
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU16

Scenario Timeframe: Current/Future
Receptor Population: Recreator (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU16	Ingestion	**Inorganics**												
				COBALT	8.97E+00	(mg/kg)	3.83E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	4.47E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				IRON	2.35E+04	(mg/kg)	1.00E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.17E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.7E-02
				MANGANESE	4.65E+02	(mg/kg)	1.99E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.32E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.7E-03
			Exp. Route Total								**0.0E+00**					**3.3E-02**
			Dermal[1]	**Inorganics**												
				COBALT	8.97E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	2.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	4.65E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**3.3E-02**
	Exposure Medium Total										**0.0E+00**					**3.3E-02**
	Air	DU16	Inhalation	**Inorganics**												
				COBALT	7.41E-09	(mg/m^3)	1.50E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.3E-10	1.75E-10	(mg/m^3)	6.00E-06	(mg/m^3)	2.9E-05
				IRON	1.94E-05	(mg/m^3)	3.93E-05	(ug/m^3)	NA	per (ug/m^3)	--	4.58E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.84E-07	(mg/m^3)	7.77E-07	(ug/m^3)	NA	per (ug/m^3)	--	9.07E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.8E-04
			Exp. Route Total								**1.3E-10**					**2.1E-04**
		Exposure Point Total									**1.3E-10**					**2.1E-04**
	Exposure Medium Total										**1.3E-10**					**2.1E-04**
Soil Total											**1.3E-10**					**3.4E-02**
										Total of Receptor Risks Across All Media	**1.3E-10**				Total of Receptor Hazards Across All Media	**3.4E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 237
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU16

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	CSF/Unit Risk Value	CSF/Unit Risk Units	Cancer Risk	Non-Cancer Hazard Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	RfD/RfC Value	RfD/RfC Units	Hazard Quotient
Soil	Surface Soil	DU16	Ingestion	**Inorganics**												
				COBALT	8.97E+00	(mg/kg)	5.44E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	9.52E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.2E-02
				IRON	2.35E+04	(mg/kg)	1.43E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	2.49E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	3.6E-02
				MANGANESE	4.65E+02	(mg/kg)	2.82E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	4.94E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.5E-03
			Exp. Route Total								**0.0E+00**					**7.1E-02**
			Dermal[1]	**Inorganics**												
				COBALT	8.97E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	2.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	4.65E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**7.1E-02**
	Exposure Medium Total										**0.0E+00**					**7.1E-02**
	Air	DU16	Inhalation	**Inorganics**												
				COBALT	7.41E-09	(mg/m^3)	6.00E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	5.4E-11	1.05E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.7E-05
				IRON	1.94E-05	(mg/m^3)	1.57E-05	(ug/m^3)	NA	per (ug/m^3)	--	2.75E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.84E-07	(mg/m^3)	3.11E-07	(ug/m^3)	NA	per (ug/m^3)	--	5.44E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.1E-04
			Exp. Route Total								**5.4E-11**					**1.3E-04**
		Exposure Point Total									**5.4E-11**					**1.3E-04**
	Exposure Medium Total										**5.4E-11**					**1.3E-04**
Soil Total											**5.4E-11**					**7.1E-02**
										Total of Receptor Risks Across All Media	**5.4E-11**				Total of Receptor Hazards Across All Media	**7.1E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 238
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU16

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU16	Ingestion	**Inorganics**												
				COBALT	8.97E+00	(mg/kg)	5.91E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	6.90E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.3E-03
				IRON	2.35E+04	(mg/kg)	1.55E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	1.81E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	2.6E-03
				MANGANESE	4.65E+02	(mg/kg)	3.07E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	3.58E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.6E-04
			Exp. Route Total								**0.0E+00**					**5.1E-03**
			Dermal[1]	**Inorganics**												
				COBALT	8.97E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	2.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	4.65E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**5.1E-03**
	Exposure Medium Total										**0.0E+00**					**5.1E-03**
	Air	DU16	Inhalation	**Inorganics**												
				COBALT	7.41E-09	(mg/m^3)	4.64E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	4.2E-11	5.42E-11	(mg/m^3)	6.00E-06	(mg/m^3)	9.0E-06
				IRON	1.94E-05	(mg/m^3)	1.22E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.42E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.84E-07	(mg/m^3)	2.41E-07	(ug/m^3)	NA	per (ug/m^3)	--	2.81E-09	(mg/m^3)	5.00E-05	(mg/m^3)	5.6E-05
			Exp. Route Total								**4.2E-11**					**6.5E-05**
		Exposure Point Total									**4.2E-11**					**6.5E-05**
	Exposure Medium Total										**4.2E-11**					**6.5E-05**
Soil Total											**4.2E-11**					**5.2E-03**
										Total of Receptor Risks Across All Media	**4.2E-11**				Total of Receptor Hazards Across All Media	**5.2E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 239
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
ISLAND EXPOSURE AREA - DU16

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU16	Ingestion	**Inorganics**												
				COBALT	8.97E+00	(mg/kg)	4.06E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.18E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.3E-03
				IRON	2.35E+04	(mg/kg)	1.06E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	5.72E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	8.2E-03
				MANGANESE	4.65E+02	(mg/kg)	2.10E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.13E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	8.1E-04
			Exp. Route Total								**0.0E+00**					**1.6E-02**
			Dermal[1]	**Inorganics**												
				COBALT	8.97E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	2.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	4.65E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**0.0E+00**					**0.0E+00**
		Exposure Point Total									**0.0E+00**					**1.6E-02**
	Exposure Medium Total										**0.0E+00**					**1.6E-02**
	Air	DU16	Inhalation	**Inorganics**												
				COBALT	7.41E-09	(mg/m^3)	7.54E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	6.8E-10	4.06E-10	(mg/m^3)	6.00E-06	(mg/m^3)	6.8E-05
				IRON	1.94E-05	(mg/m^3)	1.98E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.06E-06	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.84E-07	(mg/m^3)	3.91E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.11E-08	(mg/m^3)	5.00E-05	(mg/m^3)	4.2E-04
			Exp. Route Total								**6.8E-10**					**4.9E-04**
		Exposure Point Total									**6.8E-10**					**4.9E-04**
	Exposure Medium Total										**6.8E-10**					**4.9E-04**
Soil Total											**6.8E-10**					**1.7E-02**
										Total of Receptor Risks Across All Media	**6.8E-10**				Total of Receptor Hazards Across All Media	**1.7E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 240
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU16

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	3.5E-09	3.5E-09	COBALT	Thyroid	1.6E-02	--	1.8E-04	1.7E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.8E-02	--	--	1.8E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.8E-03	--	1.1E-03	2.9E-03
			(Total)	---	---	3.5E-09	3.5E-09		(Total)	3.7E-02	---	1.3E-03	3.8E-02
Total Risk Across Surface Soil							**3.5E-09**	**Total Hazard Index Across Surface Soil**					**3.8E-02**
Total Risk Across All Media and All Exposure Routes							**3E-09**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.04**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 241
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU16

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	1.4E-10	1.4E-10	COBALT	Thyroid	5.3E-03	--	5.9E-05	5.4E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	6.0E-03	--	--	6.0E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	5.9E-04	--	3.6E-04	9.6E-04
			(Total)	---	---	1.4E-10	1.4E-10		(Total)	1.2E-02	---	4.2E-04	1.2E-02
Total Risk Across Surface Soil							**1.4E-10**	**Total Hazard Index Across Surface Soil**					**1.2E-02**
Total Risk Across All Media and All Exposure Routes							**1E-10**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.01**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 242
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU16

Location: Iona Island
Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	2.0E-08	2.0E-08	COBALT	Thyroid	9.3E-02	--	2.6E-02	1.2E-01
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.0E-01	--	--	1.0E-01
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.0E-02	--	1.6E-01	1.7E-01
			(Total)	---	---	2.0E-08	2.0E-08		(Total)	2.1E-01	---	1.9E-01	4.0E-01
Total Risk Across Surface Soil							**2.0E-08**	**Total Hazard Index Across Surface Soil**					**4.0E-01**
Total Risk Across All Media and All Exposure Routes							**2E-08**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.4**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 243
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU16

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	2.7E-10	2.7E-10	COBALT	Thyroid	3.2E-03	--	1.7E-05	3.2E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	3.6E-03	--	--	3.6E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.5E-04	--	1.1E-04	4.6E-04
			(Total)	---	---	2.7E-10	2.7E-10		(Total)	7.1E-03	---	1.3E-04	7.2E-03
							Total Risk Across Surface Soil	**2.7E-10**					**Total Hazard Index Across Surface Soil**	**7.2E-03**
							Total Risk Across All Media and All Exposure Routes	**3E-10**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.007**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 244
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU16

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	1.3E-10	1.3E-10	COBALT	Thyroid	1.5E-02	--	2.9E-05	1.5E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.7E-02	--	--	1.7E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.7E-03	--	1.8E-04	1.8E-03
			(Total)	---	---	1.3E-10	1.3E-10		(Total)	3.3E-02	---	2.1E-04	3.4E-02
Total Risk Across Surface Soil							**1.3E-10**	**Total Hazard Index Across Surface Soil**					**3.4E-02**
Total Risk Across All Media and All Exposure Routes							**1E-10**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.03**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 245
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU16

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	5.4E-11	5.4E-11	COBALT	Thyroid	3.2E-02	--	1.7E-05	3.2E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	3.6E-02	--	--	3.6E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.5E-03	--	1.1E-04	3.6E-03
			(Total)	---	---	5.4E-11	5.4E-11		(Total)	7.1E-02	---	1.3E-04	7.1E-02
Total Risk Across Surface Soil							**5.4E-11**	**Total Hazard Index Across Surface Soil**					**7.1E-02**
Total Risk Across All Media and All Exposure Routes							**5E-11**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.07**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 246
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU16

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	4.2E-11	4.2E-11	COBALT	Thyroid	2.3E-03	--	9.0E-06	2.3E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	2.6E-03	--	--	2.6E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.6E-04	--	5.6E-05	3.1E-04
			(Total)	---	---	4.2E-11	4.2E-11		(Total)	5.1E-03	---	6.5E-05	5.2E-03
Total Risk Across Surface Soil							**4.2E-11**	**Total Hazard Index Across Surface Soil**					**5.2E-03**
Total Risk Across All Media and All Exposure Routes							**4E-11**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.005**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 247
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU16

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			COBALT	--	--	6.8E-10	6.8E-10	COBALT	Thyroid	7.3E-03	--	6.8E-05	7.3E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	8.2E-03	--	--	8.2E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	8.1E-04	--	4.2E-04	1.2E-03
			(Total)	---	---	6.8E-10	6.8E-10		(Total)	1.6E-02	---	4.9E-04	1.7E-02
							Total Risk Across Surface Soil	**6.8E-10**					**Total Hazard Index Across Surface Soil**	**1.7E-02**
							Total Risk Across All Media and All Exposure Routes	**7E-10**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 248
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU17

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU17	Ingestion	**Inorganics**												
				ANTIMONY	8.50E+00	(mg/kg)	1.66E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.66E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	1.2E-02
				ARSENIC	1.96E+01	(mg/kg)	2.30E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.5E-06	6.44E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.1E-02
				CADMIUM	1.84E+01	(mg/kg)	3.60E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.01E-05	(mg/kg-day)	1.00E-03	(mg/kg-day)	1.0E-02
				COPPER	3.00E+02	(mg/kg)	5.87E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.64E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	4.1E-03
				IRON	2.42E+04	(mg/kg)	4.75E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.33E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.9E-02
				MANGANESE	3.27E+02	(mg/kg)	6.40E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.79E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.3E-03
				THALLIUM	5.50E-01	(mg/kg)	1.08E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	3.01E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	3.0E-02
				ZINC	6.38E+03	(mg/kg)	1.25E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	3.50E-03	(mg/kg-day)	3.0E-01	(mg/kg-day)	1.2E-02
			Exp. Route Total								**3.5E-06**					**1.1E-01**
			Dermal[1]	**Inorganics**												
				ANTIMONY	8.50E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.96E+01	(mg/kg)	4.87E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.3E-07	1.36E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.5E-03
				CADMIUM	1.84E+01	(mg/kg)	1.52E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	4.27E-08	(mg/kg-day)	2.50E-05	(mg/kg-day)	1.7E-03
				COPPER	3.00E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	2.42E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.27E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	5.50E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				ZINC	6.38E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.0E-01	(mg/kg-day)	--
			Exp. Route Total								**7.3E-07**					**6.3E-03**
		Exposure Point Total									**4.2E-06**					**1.2E-01**
	Exposure Medium Total										**4.2E-06**					**1.2E-01**
	Air	DU17	Inhalation	**Inorganics**												
				ANTIMONY	7.02E-09	(mg/m^3)	3.67E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.03E-09	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.62E-08	(mg/m^3)	8.45E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	3.6E-09	2.37E-09	(mg/m^3)	1.50E-05	(mg/m^3)	1.6E-04
				CADMIUM	1.52E-08	(mg/m^3)	7.94E-07	(ug/m^3)	1.80E-03	per (ug/m^3)	1.4E-09	2.22E-09	(mg/m^3)	1.00E-05	(mg/m^3)	2.2E-04
				COPPER	2.48E-07	(mg/m^3)	1.29E-05	(ug/m^3)	NA	per (ug/m^3)	--	3.62E-08	(mg/m^3)	NA	(mg/m^3)	--
				IRON	2.00E-05	(mg/m^3)	1.05E-03	(ug/m^3)	NA	per (ug/m^3)	--	2.93E-06	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	2.70E-07	(mg/m^3)	1.41E-05	(ug/m^3)	NA	per (ug/m^3)	--	3.95E-08	(mg/m^3)	5.00E-05	(mg/m^3)	7.9E-04
				THALLIUM	4.55E-10	(mg/m^3)	2.37E-08	(ug/m^3)	NA	per (ug/m^3)	--	6.64E-11	(mg/m^3)	NA	(mg/m^3)	--
				ZINC	5.28E-06	(mg/m^3)	2.75E-04	(ug/m3)	NA	per (ug/m3)	--	7.71E-07	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**5.1E-09**					**1.2E-03**
		Exposure Point Total									**5.1E-09**					**1.2E-03**
	Exposure Medium Total										**5.1E-09**					**1.2E-03**
Soil Total											**4.2E-06**					**1.2E-01**
										Total of Receptor Risks Across All Media	**4.2E-06**			Total of Receptor Hazards Across All Media		**1.2E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 249
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU17

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk			Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Cancer Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU17	Ingestion	**Inorganics**												
				ANTIMONY	8.50E+00	(mg/kg)	6.49E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.51E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	3.8E-03
				ARSENIC	1.96E+01	(mg/kg)	8.98E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.3E-07	2.09E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.0E-03
				CADMIUM	1.84E+01	(mg/kg)	1.40E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	3.28E-06	(mg/kg-day)	1.00E-03	(mg/kg-day)	3.3E-03
				COPPER	3.00E+02	(mg/kg)	2.29E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	5.34E-05	(mg/kg-day)	4.00E-02	(mg/kg-day)	1.3E-03
				IRON	2.42E+04	(mg/kg)	1.85E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	4.32E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	6.2E-03
				MANGANESE	3.27E+02	(mg/kg)	2.50E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	5.82E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.2E-04
				THALLIUM	5.50E-01	(mg/kg)	4.20E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	9.79E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	9.8E-03
				ZINC	6.38E+03	(mg/kg)	4.87E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.14E-03	(mg/kg-day)	3.0E-01	(mg/kg-day)	3.8E-03
			Exp. Route Total								**1.3E-07**					**3.6E-02**
			Dermal[1]	**Inorganics**												
				ANTIMONY	8.50E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.96E+01	(mg/kg)	4.75E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.1E-08	1.11E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.7E-03
				CADMIUM	1.84E+01	(mg/kg)	1.49E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	3.47E-08	(mg/kg-day)	2.50E-05	(mg/kg-day)	1.4E-03
				COPPER	3.00E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	2.42E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.27E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	5.50E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				ZINC	6.38E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.0E-01	(mg/kg-day)	--
			Exp. Route Total								**7.1E-08**					**5.1E-03**
		Exposure Point Total									**2.1E-07**					**4.1E-02**
	Exposure Medium Total										**2.1E-07**					**4.1E-02**
	Air	DU17	Inhalation	**Inorganics**												
				ANTIMONY	7.02E-09	(mg/m^3)	1.43E-08	(ug/m^3)	NA	per (ug/m^3)	--	3.34E-10	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.62E-08	(mg/m^3)	3.30E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.4E-10	7.69E-10	(mg/m^3)	1.50E-05	(mg/m^3)	5.1E-05
				CADMIUM	1.52E-08	(mg/m^3)	3.09E-08	(ug/m^3)	1.80E-03	per (ug/m^3)	5.6E-11	7.22E-10	(mg/m^3)	1.00E-05	(mg/m^3)	7.2E-05
				COPPER	2.48E-07	(mg/m^3)	5.05E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.18E-08	(mg/m^3)	NA	(mg/m^3)	--
				IRON	2.00E-05	(mg/m^3)	4.08E-05	(ug/m^3)	NA	per (ug/m^3)	--	9.52E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	2.70E-07	(mg/m^3)	5.50E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.28E-08	(mg/m^3)	5.00E-05	(mg/m^3)	2.6E-04
				THALLIUM	4.55E-10	(mg/m^3)	9.25E-10	(ug/m^3)	NA	per (ug/m^3)	--	2.16E-11	(mg/m^3)	NA	(mg/m^3)	--
				ZINC	5.28E-06	(mg/m^3)	7.73E-05	(ug/m3)	NA	per (ug/m3)	--	2.51E-07	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**2.0E-10**					**3.8E-04**
		Exposure Point Total									**2.0E-10**					**3.8E-04**
	Exposure Medium Total										**2.0E-10**					**3.8E-04**
Soil Total											**2.1E-07**					**4.1E-02**
										Total of Receptor Risks Across All Media	**2.1E-07**			Total of Receptor Hazards Across All Media		**4.1E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 250
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU17

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU17	Ingestion	**Inorganics**												
				ANTIMONY	8.50E+00	(mg/kg)	2.58E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	9.02E-07	(mg/kg-day)	4.00E-04	(mg/kg-day)	2.3E-03
				ARSENIC	1.96E+01	(mg/kg)	3.57E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.4E-07	1.25E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.2E-03
				CADMIUM	1.84E+01	(mg/kg)	5.58E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.95E-06	(mg/kg-day)	1.00E-03	(mg/kg-day)	2.0E-03
				COPPER	3.00E+02	(mg/kg)	9.10E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	3.18E-05	(mg/kg-day)	4.00E-02	(mg/kg-day)	8.0E-04
				IRON	2.42E+04	(mg/kg)	7.36E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.57E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	3.7E-03
				MANGANESE	3.27E+02	(mg/kg)	9.92E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	3.47E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.5E-04
				THALLIUM	5.50E-01	(mg/kg)	1.67E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	5.84E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	5.8E-03
				ZINC	6.38E+03	(mg/kg)	1.94E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	6.78E-04	(mg/kg-day)	3.0E-01	(mg/kg-day)	2.3E-03
			Exp. Route Total								**5.4E-07**					**2.1E-02**
			Dermal[1]	**Inorganics**												
				ANTIMONY	8.50E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.96E+01	(mg/kg)	7.53E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.1E-07	2.64E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.8E-04
				CADMIUM	1.84E+01	(mg/kg)	2.36E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	8.25E-09	(mg/kg-day)	2.50E-05	(mg/kg-day)	3.3E-04
				COPPER	3.00E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	2.42E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.27E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	5.50E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				ZINC	6.38E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.0E-01	(mg/kg-day)	--
			Exp. Route Total								**1.1E-07**					**1.2E-03**
		Exposure Point Total									**6.5E-07**					**2.2E-02**
	Exposure Medium Total										**6.5E-07**					**2.2E-02**
	Air	DU17	Inhalation	**Inorganics**												
				ANTIMONY	7.02E-09	(mg/m^3)	2.84E-08	(ug/m^3)	NA	per (ug/m^3)	--	9.94E-11	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.62E-08	(mg/m^3)	6.55E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	2.8E-10	2.29E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.5E-05
				CADMIUM	1.52E-08	(mg/m^3)	6.15E-08	(ug/m^3)	1.80E-03	per (ug/m^3)	1.1E-10	2.15E-10	(mg/m^3)	1.00E-05	(mg/m^3)	2.2E-05
				COPPER	2.48E-07	(mg/m^3)	1.00E-06	(ug/m^3)	NA	per (ug/m^3)	--	3.51E-09	(mg/m^3)	NA	(mg/m^3)	--
				IRON	2.00E-05	(mg/m^3)	8.11E-05	(ug/m^3)	NA	per (ug/m^3)	--	2.84E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	2.70E-07	(mg/m^3)	1.09E-06	(ug/m^3)	NA	per (ug/m^3)	--	3.83E-09	(mg/m^3)	5.00E-05	(mg/m^3)	7.7E-05
				THALLIUM	4.55E-10	(mg/m^3)	1.84E-09	(ug/m^3)	NA	per (ug/m^3)	--	6.43E-12	(mg/m^3)	NA	(mg/m^3)	--
				ZINC	5.28E-06	(mg/m^3)	2.13E-05	(ug/m3)	NA	per (ug/m3)	--	7.47E-08	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**3.9E-10**					**1.1E-04**
		Exposure Point Total									**3.9E-10**					**1.1E-04**
	Exposure Medium Total										**3.9E-10**					**1.1E-04**
Soil Total											**6.5E-07**					**2.3E-02**
										Total of Receptor Risks Across All Media	**6.5E-07**				Total of Receptor Hazards Across All Media	**2.3E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 251
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU17

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU17	Ingestion	**Inorganics**												
				ANTIMONY	8.50E+00	(mg/kg)	1.66E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.66E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	1.2E-02
				ARSENIC	1.96E+01	(mg/kg)	5.22E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.8E-07	3.65E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.2E-01
				CADMIUM	1.84E+01	(mg/kg)	8.17E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	5.72E-05	(mg/kg-day)	1.00E-03	(mg/kg-day)	5.7E-02
				COPPER	3.00E+02	(mg/kg)	1.33E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	9.32E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	2.3E-02
				IRON	2.42E+04	(mg/kg)	1.08E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	7.54E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.1E-01
				MANGANESE	3.27E+02	(mg/kg)	1.45E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.02E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	7.3E-03
				THALLIUM	5.50E-01	(mg/kg)	2.44E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	9.16E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	9.2E-02
				ZINC	6.38E+03	(mg/kg)	2.83E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	1.06E-02	(mg/kg-day)	3.00E-01	(mg/kg-day)	3.55E-02
			Exp. Route Total								**7.8E-07**					**4.6E-01**
			Dermal[1]	**Inorganics**												
				ANTIMONY	8.50E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.96E+01	(mg/kg)	8.37E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.3E-07	5.86E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.0E-02
				CADMIUM	1.84E+01	(mg/kg)	2.62E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	1.83E-07	(mg/kg-day)	2.50E-05	(mg/kg-day)	7.3E-03
				COPPER	3.00E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	2.42E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.27E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	5.50E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				ZINC	6.38E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-01	(mg/kg-day)	--
			Exp. Route Total								**1.3E-07**					**2.7E-02**
		Exposure Point Total									**9.1E-07**					**4.8E-01**
	Exposure Medium Total										**9.1E-07**					**4.8E-01**
	Air	DU17	Inhalation	**Inorganics**												
				ANTIMONY	7.02E-09	(mg/m^3)	3.62E-08	(ug/m^3)	NA	per (ug/m^3)	--	2.54E-09	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	9.51E-07	(mg/m^3)	4.91E-06	(ug/m^3)	4.3E-03	per (ug/m^3)	2.1E-08	3.43E-07	(mg/m^3)	1.50E-05	(mg/m^3)	2.3E-02
				CADMIUM	8.93E-07	(mg/m^3)	4.61E-06	(ug/m^3)	1.8E-03	per (ug/m^3)	8.3E-09	3.22E-07	(mg/m^3)	1.00E-05	(mg/m^3)	3.2E-02
				COPPER	1.46E-05	(mg/m^3)	7.51E-05	(ug/m^3)	NA	per (ug/m^3)	--	5.26E-06	(mg/m^3)	NA	(mg/m^3)	--
				IRON	1.18E-03	(mg/m^3)	6.07E-03	(ug/m^3)	NA	per (ug/m^3)	--	4.25E-04	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	1.59E-05	(mg/m^3)	8.19E-05	(ug/m^3)	NA	per (ug/m^3)	--	5.73E-06	(mg/m^3)	5.00E-05	(mg/m^3)	1.1E-01
				THALLIUM	4.55E-10	(mg/m^3)	2.34E-09	(ug/m^3)	NA	per (ug/m^3)	--	1.64E-10	(mg/m^3)	NA	(mg/m^3)	--
				ZINC	5.28E-06	(mg/m^3)	1.81E-04	(ug/m^3)	NA	per (ug/m^3)	--	8.79E-05	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**2.9E-08**					**1.7E-01**
		Exposure Point Total									**2.9E-08**					**1.7E-01**
	Exposure Medium Total										**2.9E-08**					**1.7E-01**
Soil Total											**9.4E-07**					**6.5E-01**
										Total of Receptor Risks Across All Media	**9.4E-07**			Total of Receptor Hazards Across All Media		**6.5E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 252
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU17

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU17	Ingestion	**Inorganics**												
				ANTIMONY	8.50E+00	(mg/kg)	3.63E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	4.24E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	1.1E-02
				ARSENIC	1.96E+01	(mg/kg)	5.02E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.5E-07	5.86E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.0E-02
				CADMIUM	1.84E+01	(mg/kg)	7.86E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	9.17E-06	(mg/kg-day)	1.00E-03	(mg/kg-day)	9.2E-03
				COPPER	3.00E+02	(mg/kg)	1.28E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.50E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	3.7E-03
				IRON	2.42E+04	(mg/kg)	1.04E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.21E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.7E-02
				MANGANESE	3.27E+02	(mg/kg)	1.40E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.63E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.2E-03
				THALLIUM	5.50E-01	(mg/kg)	2.35E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	2.74E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	2.7E-02
				ZINC	6.38E+03	(mg/kg)	2.73E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	3.18E-03	(mg/kg-day)	3.00E-01	(mg/kg-day)	1.1E-02
			Exp. Route Total								**7.5E-07**					**9.9E-02**
			Dermal[1]	**Inorganics**												
				ANTIMONY	8.50E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.96E+01	(mg/kg)	1.17E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.8E-07	1.36E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.5E-03
				CADMIUM	1.84E+01	(mg/kg)	3.65E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	4.26E-08	(mg/kg-day)	2.50E-05	(mg/kg-day)	1.7E-03
				COPPER	3.00E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	2.42E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.27E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	5.50E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				ZINC	6.38E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-01	(mg/kg-day)	--
			Exp. Route Total								**1.8E-07**					**6.2E-03**
		Exposure Point Total									**9.3E-07**					**1.1E-01**
	Exposure Medium Total										**9.3E-07**					**1.1E-01**
	Air	DU17	Inhalation	**Inorganics**												
				ANTIMONY	7.02E-09	(mg/m^3)	1.42E-08	(ug/m^3)	NA	per (ug/m^3)	--	1.66E-10	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.62E-08	(mg/m^3)	3.28E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.4E-10	3.82E-10	(mg/m^3)	1.50E-05	(mg/m^3)	2.5E-05
				CADMIUM	1.52E-08	(mg/m^3)	3.08E-08	(ug/m^3)	1.80E-03	per (ug/m^3)	5.5E-11	3.59E-10	(mg/m^3)	1.00E-05	(mg/m^3)	3.6E-05
				COPPER	2.48E-07	(mg/m^3)	5.01E-07	(ug/m^3)	NA	per (ug/m^3)	--	5.85E-09	(mg/m^3)	NA	(mg/m^3)	--
				IRON	2.00E-05	(mg/m^3)	4.05E-05	(ug/m^3)	NA	per (ug/m^3)	--	4.73E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	2.70E-07	(mg/m^3)	5.46E-07	(ug/m^3)	NA	per (ug/m^3)	--	6.38E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.3E-04
				THALLIUM	4.55E-10	(mg/m^3)	9.19E-10	(ug/m^3)	NA	per (ug/m^3)	--	1.07E-11	(mg/m^3)	NA	(mg/m^3)	--
				ZINC	5.28E-06	(mg/m^3)	1.07E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.24E-07	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**2.0E-10**					**1.9E-04**
		Exposure Point Total									**2.0E-10**					**1.9E-04**
	Exposure Medium Total										**2.0E-10**					**1.9E-04**
Soil Total											**9.3E-07**					**1.1E-01**
										Total of Receptor Risks Across All Media	**9.3E-07**			Total of Receptor Hazards Across All Media		**1.1E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 253
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU17

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU17	Ingestion	**Inorganics**												
				ANTIMONY	8.50E+00	(mg/kg)	5.16E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	9.02E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	2.3E-02
				ARSENIC	1.96E+01	(mg/kg)	7.13E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.1E-06	1.25E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.2E-02
				CADMIUM	1.84E+01	(mg/kg)	1.12E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.95E-05	(mg/kg-day)	1.00E-03	(mg/kg-day)	2.0E-02
				COPPER	3.00E+02	(mg/kg)	1.82E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.18E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	8.0E-03
				IRON	2.42E+04	(mg/kg)	1.47E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	2.57E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	3.7E-02
				MANGANESE	3.27E+02	(mg/kg)	1.98E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.47E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.5E-03
				THALLIUM	5.50E-01	(mg/kg)	3.34E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	5.84E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	5.8E-02
				ZINC	6.38E+03	(mg/kg)	3.87E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	6.78E-03	(mg/kg-day)	3.0E-01	(mg/kg-day)	2.3E-02
			Exp. Route Total								**1.1E-06**					**2.1E-01**
			Dermal[1]	**Inorganics**												
				ANTIMONY	8.50E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.96E+01	(mg/kg)	7.52E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.1E-07	1.32E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.4E-03
				CADMIUM	1.84E+01	(mg/kg)	2.35E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	4.12E-08	(mg/kg-day)	2.50E-05	(mg/kg-day)	1.6E-03
				COPPER	3.00E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	2.42E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.27E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	5.50E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				ZINC	6.38E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.0E-01	(mg/kg-day)	--
			Exp. Route Total								**1.1E-07**					**6.0E-03**
		Exposure Point Total									**1.2E-06**					**2.2E-01**
	Exposure Medium Total										**1.2E-06**					**2.2E-01**
	Air	DU17	Inhalation	**Inorganics**												
				ANTIMONY	7.02E-09	(mg/m^3)	5.68E-09	(ug/m^3)	NA	per (ug/m^3)	--	9.94E-11	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.62E-08	(mg/m^3)	1.31E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	5.6E-11	2.29E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.5E-05
				CADMIUM	1.52E-08	(mg/m^3)	1.23E-08	(ug/m^3)	1.80E-03	per (ug/m^3)	2.2E-11	2.15E-10	(mg/m^3)	1.00E-05	(mg/m^3)	2.2E-05
				COPPER	2.48E-07	(mg/m^3)	2.01E-07	(ug/m^3)	NA	per (ug/m^3)	--	3.51E-09	(mg/m^3)	NA	(mg/m^3)	--
				IRON	2.00E-05	(mg/m^3)	1.62E-05	(ug/m^3)	NA	per (ug/m^3)	--	2.84E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	2.70E-07	(mg/m^3)	2.19E-07	(ug/m^3)	NA	per (ug/m^3)	--	3.83E-09	(mg/m^3)	5.00E-05	(mg/m^3)	7.7E-05
				THALLIUM	4.55E-10	(mg/m^3)	3.68E-10	(ug/m^3)	NA	per (ug/m^3)	--	6.43E-12	(mg/m^3)	NA	(mg/m^3)	--
				ZINC	5.28E-06	(mg/m^3)	4.27E-06	(ug/m3)	NA	per (ug/m3)	--	7.47E-08	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**7.8E-11**					**1.1E-04**
		Exposure Point Total									**7.8E-11**					**1.1E-04**
	Exposure Medium Total										**7.8E-11**					**1.1E-04**
Soil Total											**1.2E-06**					**2.2E-01**
										Total of Receptor Risks Across All Media	**1.2E-06**			Total of Receptor Hazards Across All Media		**2.2E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 254
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU17

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure	Exposure	Exposure	Chemical of	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
Soil	Surface Soil	DU17	Ingestion	**Inorganics**												
				ANTIMONY	8.50E+00	(mg/kg)	5.60E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	6.54E-07	(mg/kg-day)	4.00E-04	(mg/kg-day)	1.6E-03
				ARSENIC	1.96E+01	(mg/kg)	7.75E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.2E-07	9.04E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.0E-03
				CADMIUM	1.84E+01	(mg/kg)	1.21E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.42E-06	(mg/kg-day)	1.00E-03	(mg/kg-day)	1.4E-03
				COPPER	3.00E+02	(mg/kg)	1.98E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	2.31E-05	(mg/kg-day)	4.00E-02	(mg/kg-day)	5.8E-04
				IRON	2.42E+04	(mg/kg)	1.60E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	1.86E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	2.7E-03
				MANGANESE	3.27E+02	(mg/kg)	2.16E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	2.51E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.8E-04
				THALLIUM	5.50E-01	(mg/kg)	3.63E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	4.23E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	4.2E-03
				ZINC	6.38E+03	(mg/kg)	4.21E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	4.91E-04	(mg/kg-day)	3.00E-01	(mg/kg-day)	1.6E-03
			Exp. Route Total								**1.2E-07**					**1.5E-02**
			Dermal[1]	**Inorganics**												
				ANTIMONY	8.50E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.96E+01	(mg/kg)	3.60E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.4E-08	4.20E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-03
				CADMIUM	1.84E+01	(mg/kg)	1.13E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	1.31E-08	(mg/kg-day)	2.50E-05	(mg/kg-day)	5.3E-04
				COPPER	3.00E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	2.42E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.27E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	5.50E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				ZINC	6.38E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-01	(mg/kg-day)	--
			Exp. Route Total								**5.4E-08**					**1.9E-03**
		Exposure Point Total									**1.7E-07**					**1.7E-02**
	Exposure Medium Total										**1.7E-07**					**1.7E-02**
	Air	DU17	Inhalation	**Inorganics**												
				ANTIMONY	7.02E-09	(mg/m^3)	4.40E-09	(ug/m^3)	NA	per (ug/m^3)	--	5.13E-11	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.62E-08	(mg/m^3)	1.01E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	4.4E-11	1.18E-10	(mg/m^3)	1.50E-05	(mg/m^3)	7.9E-06
				CADMIUM	1.52E-08	(mg/m^3)	9.52E-09	(ug/m^3)	1.80E-03	per (ug/m^3)	1.7E-11	1.11E-10	(mg/m^3)	1.00E-05	(mg/m^3)	1.1E-05
				COPPER	2.48E-07	(mg/m^3)	1.55E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.81E-09	(mg/m^3)	NA	(mg/m^3)	--
				IRON	2.00E-05	(mg/m^3)	1.25E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.46E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	2.70E-07	(mg/m^3)	1.69E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.97E-09	(mg/m^3)	5.00E-05	(mg/m^3)	3.9E-05
				THALLIUM	4.55E-10	(mg/m^3)	2.85E-10	(ug/m^3)	NA	per (ug/m^3)	--	3.32E-12	(mg/m^3)	NA	(mg/m^3)	--
				ZINC	5.28E-06	(mg/m^3)	3.30E-06	(ug/m^3)	NA	per (ug/m^3)	--	3.85E-08	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**6.1E-11**					**5.8E-05**
		Exposure Point Total									**6.1E-11**					**5.8E-05**
	Exposure Medium Total										**6.1E-11**					**5.8E-05**
Soil Total											**1.7E-07**					**1.7E-02**
										Total of Receptor Risks Across All Media	**1.7E-07**			Total of Receptor Hazards Across All Media		**1.7E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 255
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU17

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU17	Ingestion	**Inorganics**												
				ANTIMONY	8.50E+00	(mg/kg)	3.84E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.07E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	5.2E-03
				ARSENIC	1.96E+01	(mg/kg)	5.32E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.0E-07	2.86E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.5E-03
				CADMIUM	1.84E+01	(mg/kg)	8.32E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	4.48E-06	(mg/kg-day)	1.00E-03	(mg/kg-day)	4.5E-03
				COPPER	3.00E+02	(mg/kg)	1.36E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	7.31E-05	(mg/kg-day)	4.00E-02	(mg/kg-day)	1.8E-03
				IRON	2.42E+04	(mg/kg)	1.10E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	5.91E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	8.4E-03
				MANGANESE	3.27E+02	(mg/kg)	1.48E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	7.96E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	5.7E-04
				THALLIUM	5.50E-01	(mg/kg)	2.49E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.34E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	1.3E-02
				ZINC	6.38E+03	(mg/kg)	2.89E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	1.55E-03	(mg/kg-day)	3.00E-01	(mg/kg-day)	5.2E-03
			Exp. Route Total								**8.0E-07**					**4.9E-02**
			Dermal[1]	**Inorganics**												
				ANTIMONY	8.50E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.96E+01	(mg/kg)	1.05E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.6E-07	5.65E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.9E-03
				CADMIUM	1.84E+01	(mg/kg)	3.28E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	1.77E-08	(mg/kg-day)	2.50E-05	(mg/kg-day)	7.1E-04
				COPPER	3.00E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	2.42E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.27E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	5.50E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				ZINC	6.38E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-01	(mg/kg-day)	--
			Exp. Route Total								**1.6E-07**					**2.6E-03**
		Exposure Point Total									**9.6E-07**					**5.1E-02**
	Exposure Medium Total										**9.6E-07**					**5.1E-02**
	Air	DU17	Inhalation	**Inorganics**												
				ANTIMONY	7.02E-09	(mg/m^3)	7.15E-08	(ug/m^3)	NA	per (ug/m^3)	--	3.85E-10	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.62E-08	(mg/m^3)	1.65E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	7.1E-10	8.88E-10	(mg/m^3)	1.50E-05	(mg/m^3)	5.9E-05
				CADMIUM	1.52E-08	(mg/m^3)	1.55E-07	(ug/m^3)	1.80E-03	per (ug/m^3)	2.8E-10	8.33E-10	(mg/m^3)	1.00E-05	(mg/m^3)	8.3E-05
				COPPER	2.48E-07	(mg/m^3)	2.52E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.36E-08	(mg/m^3)	NA	(mg/m^3)	--
				IRON	2.00E-05	(mg/m^3)	2.04E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.10E-06	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	2.70E-07	(mg/m^3)	2.75E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.48E-08	(mg/m^3)	5.00E-05	(mg/m^3)	3.0E-04
				THALLIUM	4.55E-10	(mg/m^3)	4.63E-09	(ug/m^3)	NA	per (ug/m^3)	--	2.49E-11	(mg/m^3)	NA	(mg/m^3)	--
				ZINC	5.28E-06	(mg/m^3)	5.37E-05	(ug/m^3)	NA	per (ug/m^3)	--	2.89E-07	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**9.9E-10**					**4.4E-04**
		Exposure Point Total									**9.9E-10**					**4.4E-04**
	Exposure Medium Total										**9.9E-10**					**4.4E-04**
Soil Total											**9.6E-07**					**5.2E-02**
										Total of Receptor Risks Across All Media	**9.6E-07**				Total of Receptor Hazards Across All Media	**5.2E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 256
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU17

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU17	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	1.2E-02	--	--	1.2E-02
			ARSENIC	3.5E-06	7.3E-07	3.6E-09	4.2E-06	ARSENIC	Skin, Cardiovascular	2.1E-02	4.5E-03	1.6E-04	2.6E-02
			CADMIUM	--	--	1.4E-09	1.4E-09	CADMIUM	Kidneys, Urinary	1.0E-02	1.7E-03	2.2E-04	1.2E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	4.1E-03	--	--	4.1E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.9E-02	--	--	1.9E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.3E-03	--	7.9E-04	2.1E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	3.0E-02	--	--	3.0E-02
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	1.2E-02	--	--	1.2E-02
			(Total)	3.5E-06	7.3E-07	5.1E-09	4.2E-06		(Total)	1.1E-01	6.3E-03	1.2E-03	1.2E-01
Total Risk Across Surface Soil							**4.2E-06**	**Total Hazard Index Across Surface Soil**					**1.2E-01**
Total Risk Across All Media and All Exposure Routes							**4E-06**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.1**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 257
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU17

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Researcher

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU17	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	3.8E-03	--	--	3.8E-03
			ARSENIC	1.3E-07	7.1E-08	1.4E-10	2.1E-07	ARSENIC	Skin, Cardiovascular	7.0E-03	3.7E-03	5.1E-05	1.1E-02
			CADMIUM	--	--	5.6E-11	5.6E-11	CADMIUM	Kidneys, Urinary	3.3E-03	1.4E-03	7.2E-05	4.7E-03
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	1.3E-03	--	--	1.3E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	6.2E-03	--	--	6.2E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.2E-04	--	2.6E-04	6.7E-04
			THALLIUM	--	--	--	NA	THALLIUM	Hair	9.8E-03	--	--	9.8E-03
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	3.8E-03	--	--	3.8E-03
			(Total)	1.3E-07	7.1E-08	2.0E-10	2.1E-07		(Total)	3.6E-02	5.1E-03	3.8E-04	4.1E-02
Total Risk Across Surface Soil							**2.1E-07**		**Total Hazard Index Across Surface Soil**				**4.1E-02**
Total Risk Across All Media and All Exposure Routes							**2E-07**		**Total Hazard Index Across All Media and All Exposure Routes**				**0.04**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 258
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU17

Location: Iona Island
Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU17	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	1.2E-02	--	--	1.2E-02
			ARSENIC	7.8E-07	1.3E-07	2.1E-08	9.3E-07	ARSENIC	Skin, Cardiovascular	1.2E-01	2.0E-02	2.3E-02	1.6E-01
			CADMIUM	--	--	8.3E-09	8.3E-09	CADMIUM	Kidneys, Urinary	5.7E-02	7.3E-03	3.2E-02	9.7E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	2.3E-02	--	--	2.3E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.1E-01	--	--	1.1E-01
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	7.3E-03	--	1.1E-01	1.2E-01
			THALLIUM	--	--	--	NA	THALLIUM	Hair	9.2E-02	--	--	9.2E-02
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	3.5E-02	--	--	3.5E-02
			(Total)	7.8E-07	1.3E-07	2.9E-08	9.4E-07		(Total)	4.6E-01	2.7E-02	1.7E-01	6.5E-01
							Total Risk Across Surface Soil	**9.4E-07**					**Total Hazard Index Across Surface Soil**	**6.5E-01**
							Total Risk Across All Media and All Exposure Routes	**9E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.7**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 259
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU17

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU17	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	2.3E-03	--	--	2.3E-03
			ARSENIC	5.4E-07	1.1E-07	2.8E-10	6.5E-07	ARSENIC	Skin, Cardiovascular	4.2E-03	8.8E-04	1.5E-05	5.1E-03
			CADMIUM	--	--	1.1E-10	1.1E-10	CADMIUM	Kidneys, Urinary	2.0E-03	3.3E-04	2.2E-05	2.3E-03
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	8.0E-04	--	--	8.0E-04
			IRON	--	--	--	NA	IRON	Gastrointestinal System	3.7E-03	--	--	3.7E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.5E-04	--	7.7E-05	3.2E-04
			THALLIUM	--	--	--	NA	THALLIUM	Hair	5.8E-03	--	--	5.8E-03
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	2.3E-03	--	--	2.3E-03
			(Total)	5.4E-07	1.1E-07	3.9E-10	6.5E-07		(Total)	2.1E-02	1.2E-03	1.1E-04	2.3E-02
							Total Risk Across Surface Soil	**6.5E-07**					**Total Hazard Index Across Surface Soil**	**2.3E-02**
							Total Risk Across All Media and All Exposure Routes	**6E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 260
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU17

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU17	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	1.1E-02	--	--	1.1E-02
			ARSENIC	7.5E-07	1.8E-07	1.4E-10	9.3E-07	ARSENIC	Skin, Cardiovascular	2.0E-02	4.5E-03	2.5E-05	2.4E-02
			CADMIUM	--	--	5.5E-11	5.5E-11	CADMIUM	Kidneys, Urinary	9.2E-03	1.7E-03	3.6E-05	1.1E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	3.7E-03	--	--	3.7E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.7E-02	--	--	1.7E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.2E-03	--	1.3E-04	1.3E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	2.7E-02	--	--	2.7E-02
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	1.1E-02	--	--	1.1E-02
			(Total)	7.5E-07	1.8E-07	2.0E-10	9.3E-07		(Total)	9.9E-02	6.2E-03	1.9E-04	1.1E-01
							Total Risk Across Surface Soil	**9.3E-07**					**Total Hazard Index Across Surface Soil**	**1.1E-01**
							Total Risk Across All Media and All Exposure Routes	**9E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.1**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 261
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU17

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU17	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	2.3E-02	--	--	2.3E-02
			ARSENIC	1.1E-06	1.1E-07	5.6E-11	1.2E-06	ARSENIC	Skin, Cardiovascular	4.2E-02	4.4E-03	1.5E-05	4.6E-02
			CADMIUM	--	--	2.2E-11	2.2E-11	CADMIUM	Kidneys, Urinary	2.0E-02	1.6E-03	2.2E-05	2.1E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	8.0E-03	--	--	8.0E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	3.7E-02	--	--	3.7E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.5E-03	--	7.7E-05	2.6E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	5.8E-02	--	--	5.8E-02
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	2.3E-02	--	--	2.3E-02
			(Total)	1.1E-06	1.1E-07	7.8E-11	1.2E-06		(Total)	2.1E-01	6.0E-03	1.1E-04	2.2E-01
							Total Risk Across Surface Soil	**1.2E-06**					**Total Hazard Index Across Surface Soil**	**2.2E-01**
							Total Risk Across All Media and All Exposure Routes	**1E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.2**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 262
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
DUMP AREA EXPOSURE AREA - DU17

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU17	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	1.6E-03	--	--	1.6E-03
			ARSENIC	1.2E-07	5.4E-08	4.4E-11	1.7E-07	ARSENIC	Skin, Cardiovascular	3.0E-03	1.4E-03	7.9E-06	4.4E-03
			CADMIUM	--	--	1.7E-11	1.7E-11	CADMIUM	Kidneys, Urinary	1.4E-03	5.3E-04	1.1E-05	2.0E-03
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	5.8E-04	--	--	5.8E-04
			IRON	--	--	--	NA	IRON	Gastrointestinal System	2.7E-03	--	--	2.7E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.8E-04	--	3.9E-05	2.2E-04
			THALLIUM	--	--	--	NA	THALLIUM	Hair	4.2E-03	--	--	4.2E-03
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	1.6E-03	--	--	1.6E-03
			(Total)	1.2E-07	5.4E-08	6.1E-11	1.7E-07		(Total)	1.5E-02	1.9E-03	5.8E-05	1.7E-02
							Total Risk Across Surface Soil	**1.7E-07**					**Total Hazard Index Across Surface Soil**	**1.7E-02**
							Total Risk Across All Media and All Exposure Routes	**2E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 263
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU17

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Camper
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU17	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	5.2E-03	--	--	5.2E-03
			ARSENIC	8.0E-07	1.6E-07	7.1E-10	9.6E-07	ARSENIC	Skin, Cardiovascular	9.5E-03	1.9E-03	5.9E-05	1.1E-02
			CADMIUM	--	--	2.8E-10	2.8E-10	CADMIUM	Kidneys, Urinary	4.5E-03	7.1E-04	8.3E-05	5.3E-03
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	1.8E-03	--	--	1.8E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	8.4E-03	--	--	8.4E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	5.7E-04	--	3.0E-04	8.6E-04
			LEAD	--	--	--	NA	LEAD	NA	--	--	--	NA
			THALLIUM	--	--	--	NA	THALLIUM	Hair	1.3E-02	--	--	1.3E-02
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	5.2E-03	--	--	5.2E-03
			(Total)	8.0E-07	1.6E-07	9.9E-10	9.6E-07		(Total)	4.9E-02	2.6E-03	4.4E-04	5.2E-02
							Total Risk Across Surface Soil	**9.6E-07**					**Total Hazard Index Across Surface Soil**	**5.2E-02**
							Total Risk Across All Media and All Exposure Routes	**1E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.05**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 264
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU18	Ingestion	**Inorganics**												
				ANTIMONY	1.31E+01	(mg/kg)	2.56E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	7.18E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	1.8E-02
				ARSENIC	2.05E+01	(mg/kg)	2.41E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.6E-06	6.74E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.2E-02
				COBALT	8.40E+00	(mg/kg)	1.64E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.60E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				COPPER	4.26E+03	(mg/kg)	8.33E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.33E-03	(mg/kg-day)	4.00E-02	(mg/kg-day)	5.8E-02
				IRON	4.35E+04	(mg/kg)	8.52E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	2.38E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	3.4E-02
				MANGANESE	5.76E+02	(mg/kg)	1.13E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	3.16E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.3E-03
				MERCURY	4.00E+00	(mg/kg)	7.83E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.19E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.3E-03
				THALLIUM	3.20E-01	(mg/kg)	6.26E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.75E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	1.8E-02
				ZINC	4.89E+03	(mg/kg)	9.56E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.68E-03	(mg/kg-day)	3.0E-01	(mg/kg-day)	8.9E-03
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.70E+00	(mg/kg)	3.33E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.3E-08	9.32E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	9.00E-01	(mg/kg)	1.76E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.8E-07	4.93E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.6E-03
				DIBENZ(A,H)ANTHRACENE	2.40E-01	(mg/kg)	4.70E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.7E-08	1.32E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.83E-01	(mg/kg)	7.50E-08	(mg/kg-day)	2.0E+00	per (mg/kg-day)	1.5E-07	2.10E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**4.0E-06**					**1.9E-01**
			Dermal[1]	**Inorganics**												
				ANTIMONY	1.31E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	2.05E+01	(mg/kg)	5.09E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.6E-07	1.43E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.8E-03
				COBALT	8.40E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	4.26E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	4.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	5.76E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				MERCURY	4.00E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	2.10E-05	(mg/kg-day)	--
				THALLIUM	3.20E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				ZINC	4.89E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.0E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.70E+00	(mg/kg)	1.83E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.8E-08	5.13E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	9.00E-01	(mg/kg)	9.69E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	9.7E-08	2.71E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	9.0E-04
				DIBENZ(A,H)ANTHRACENE	2.40E-01	(mg/kg)	2.58E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.6E-08	7.24E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.83E-01	(mg/kg)	4.44E-08	(mg/kg-day)	2.0E+00	per (mg/kg-day)	8.9E-08	1.24E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**9.9E-07**					**5.7E-03**
		Exposure Point Total									**5.0E-06**					**1.9E-01**
	Exposure Medium Total										**5.0E-06**					**1.9E-01**

TABLE 264
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU18	Inhalation	**Inorganics**												
				ANTIMONY	1.08E-08	(mg/m^3)	5.65E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.58E-09	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.69E-08	(mg/m^3)	8.84E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	3.8E-09	2.48E-09	(mg/m^3)	1.50E-05	(mg/m^3)	1.7E-04
				COBALT	6.94E-09	(mg/m^3)	3.62E-07	(ug/m^3)	9.00E-03	per (ug/m^3)	3.3E-09	1.01E-09	(mg/m^3)	6.00E-06	(mg/m^3)	1.7E-04
				COPPER	3.52E-06	(mg/m^3)	1.84E-04	(ug/m^3)	NA	per (ug/m^3)	--	5.14E-07	(mg/m^3)	NA	(mg/m^3)	--
				IRON	3.60E-05	(mg/m^3)	1.88E-03	(ug/m^3)	NA	per (ug/m^3)	--	5.26E-06	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	4.76E-07	(mg/m^3)	2.48E-05	(ug/m^3)	NA	per (ug/m^3)	--	6.96E-08	(mg/m^3)	5.00E-05	(mg/m^3)	1.4E-03
				MERCURY	3.31E-09	(mg/m^3)	1.73E-07	(ug/m^3)	NA	per (ug/m^3)	--	4.83E-10	(mg/m^3)	3.00E-04	(mg/m^3)	1.6E-06
				THALLIUM	2.64E-10	(mg/m^3)	1.38E-08	(ug/m^3)	NA	per (ug/m^3)	--	3.86E-11	(mg/m^3)	NA	(mg/m^3)	--
				ZINC	4.04E-06	(mg/m^3)	2.11E-04	(ug/m3)	NA	per (ug/m3)	--	5.90E-07	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.40E-09	(mg/m^3)	7.33E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	4.4E-12	2.05E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	7.44E-10	(mg/m^3)	3.88E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	2.3E-11	1.09E-10	(mg/m^3)	2.00E-06	(mg/m^3)	5.4E-05
				DIBENZ(A,H)ANTHRACENE	1.98E-10	(mg/m^3)	1.04E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	6.2E-12	2.90E-11	(mg/m^3)	NA	(mg/m^3)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.17E-10	(mg/m^3)	1.65E-08	(ug/m3)	1.00E-04	per (ug/m3)	1.7E-12	4.63E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**7.1E-09**					**1.8E-03**
		Exposure Point Total									**7.1E-09**					**1.8E-03**
	Exposure Medium Total										**7.1E-09**					**1.8E-03**
Soil Total											**5.0E-06**					**1.9E-01**
										Total of Receptor Risks Across All Media	**5.0E-06**				Total of Receptor Hazards Across All Media	**1.9E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 265
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Intake/Exposure Concentration		RfD/RfC		Hazard
							Value	Units	Value	Units	Cancer Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU18	Ingestion	**Inorganics**												
				ANTIMONY	1.31E+01	(mg/kg)	1.00E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.33E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	5.8E-03
				ARSENIC	2.05E+01	(mg/kg)	9.39E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.4E-07	2.19E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.3E-03
				COBALT	8.40E+00	(mg/kg)	6.41E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.50E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.0E-03
				COPPER	4.26E+03	(mg/kg)	3.25E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	7.58E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	1.9E-02
				IRON	4.35E+04	(mg/kg)	3.32E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	7.75E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.1E-02
				MANGANESE	5.76E+02	(mg/kg)	4.40E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.03E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	7.3E-04
				MERCURY	4.00E+00	(mg/kg)	3.05E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	7.12E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.4E-03
				THALLIUM	3.20E-01	(mg/kg)	2.44E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	5.70E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	5.7E-03
				ZINC	4.89E+03	(mg/kg)	3.73E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	8.70E-04	(mg/kg-day)	3.0E-01	(mg/kg-day)	2.9E-03
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.70E+00	(mg/kg)	1.30E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.3E-09	3.03E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	9.00E-01	(mg/kg)	6.87E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	6.9E-09	1.60E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	5.3E-04
				DIBENZ(A,H)ANTHRACENE	2.40E-01	(mg/kg)	1.83E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.8E-09	4.27E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.83E-01	(mg/kg)	2.92E-09	(mg/kg-day)	2.0E+00	per (mg/kg-day)	5.8E-09	6.82E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.6E-07**					**6.0E-02**
			Dermal[1]	**Inorganics**												
				ANTIMONY	1.31E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	2.05E+01	(mg/kg)	4.97E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.4E-08	1.16E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.9E-03
				COBALT	8.40E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	4.26E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	4.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	5.76E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				MERCURY	4.00E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	2.10E-05	(mg/kg-day)	--
				THALLIUM	3.20E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				ZINC	4.89E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.0E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.70E+00	(mg/kg)	1.78E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.8E-09	4.16E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	9.00E-01	(mg/kg)	9.45E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	9.4E-09	2.20E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	7.3E-04
				DIBENZ(A,H)ANTHRACENE	2.40E-01	(mg/kg)	2.52E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.5E-09	5.88E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.83E-01	(mg/kg)	4.33E-09	(mg/kg-day)	2.0E+00	per (mg/kg-day)	8.7E-09	1.01E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**9.7E-08**					**4.6E-03**
		Exposure Point Total									**2.5E-07**					**6.5E-02**
	Exposure Medium Total										**2.5E-07**					**6.5E-02**

TABLE 265
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Intake/Exposure Concentration		RfD/RfC		Hazard
							Value	Units	Value	Units	Cancer Risk	Value	Units	Value	Units	Quotient
Soil	Air	DU18	Inhalation	**Inorganics**												
				ANTIMONY	1.08E-08	(mg/m^3)	2.20E-08	(ug/m^3)	NA	per (ug/m^3)	--	5.14E-10	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.69E-08	(mg/m^3)	3.45E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.5E-10	8.05E-10	(mg/m^3)	1.50E-05	(mg/m^3)	5.4E-05
				COBALT	6.94E-09	(mg/m^3)	1.41E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.3E-10	3.30E-10	(mg/m^3)	6.00E-06	(mg/m^3)	5.5E-05
				COPPER	3.52E-06	(mg/m^3)	7.16E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.67E-07	(mg/m^3)	NA	(mg/m^3)	--
				IRON	3.60E-05	(mg/m^3)	7.32E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.71E-06	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	4.76E-07	(mg/m^3)	9.69E-07	(ug/m^3)	NA	per (ug/m^3)	--	2.26E-08	(mg/m^3)	5.00E-05	(mg/m^3)	4.5E-04
				MERCURY	3.31E-09	(mg/m^3)	6.73E-09	(ug/m^3)	NA	per (ug/m^3)	--	1.57E-10	(mg/m^3)	3.00E-04	(mg/m^3)	5.2E-07
				THALLIUM	2.64E-10	(mg/m^3)	5.38E-10	(ug/m^3)	NA	per (ug/m^3)	--	1.26E-11	(mg/m^3)	NA	(mg/m^3)	--
				ZINC	4.04E-06	(mg/m^3)	5.92E-05	(ug/m3)	NA	per (ug/m3)	--	1.92E-07	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.40E-09	(mg/m^3)	2.86E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.7E-13	6.67E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	7.44E-10	(mg/m^3)	1.51E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	9.1E-13	3.53E-11	(mg/m^3)	2.00E-06	(mg/m^3)	1.8E-05
				DIBENZ(A,H)ANTHRACENE	1.98E-10	(mg/m^3)	4.04E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	2.4E-13	9.42E-12	(mg/m^3)	NA	(mg/m^3)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.17E-10	(mg/m^3)	6.44E-10	(ug/m3)	1.00E-04	per (ug/m3)	6.4E-14	1.50E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**2.8E-10**					**5.8E-04**
		Exposure Point Total									**2.8E-10**					**5.8E-04**
	Exposure Medium Total										**2.8E-10**					**5.8E-04**
Soil Total											**2.5E-07**					**6.6E-02**
										Total of Receptor Risks Across All Media	**2.5E-07**			Total of Receptor Hazards Across All Media		**6.6E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 266
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentratio		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU18	Ingestion	**Inorganics**												
				ANTIMONY	1.31E+01	(mg/kg)	2.56E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	7.18E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	1.8E-02
				ARSENIC	2.05E+01	(mg/kg)	5.46E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.2E-07	3.82E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-01
				COBALT	8.40E+00	(mg/kg)	3.73E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.61E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.7E-02
				COPPER	4.26E+03	(mg/kg)	1.89E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	1.32E-02	(mg/kg-day)	4.00E-02	(mg/kg-day)	3.3E-01
				IRON	4.35E+04	(mg/kg)	1.93E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.35E-01	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.9E-01
				MANGANESE	5.76E+02	(mg/kg)	2.56E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.79E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.3E-02
				MERCURY	4.00E+00	(mg/kg)	1.78E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.24E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.1E-02
				THALLIUM	3.20E-01	(mg/kg)	1.42E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	5.33E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	5.3E-02
				ZINC	4.89E+03	(mg/kg)	2.17E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	8.14E-03	(mg/kg-day)	3.00E-01	(mg/kg-day)	2.71E-02
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.70E+00	(mg/kg)	7.55E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	7.5E-09	5.28E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	9.00E-01	(mg/kg)	4.00E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.0E-08	2.80E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.3E-03
				DIBENZ(A,H)ANTHRACENE	2.40E-01	(mg/kg)	1.07E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.1E-08	7.46E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs								0.00E+00				
				AROCLOR-1260	3.83E-01	(mg/kg)	1.70E-08	(mg/kg-day)	2.00E+00	per (mg/kg-day)	3.4E-08	1.19E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**9.1E-07**					**9.0E-01**
			Dermal[1]	**Inorganics**												
				ANTIMONY	1.31E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	2.05E+01	(mg/kg)	8.75E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.3E-07	6.13E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.0E-02
				COBALT	8.40E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	4.26E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	4.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	5.76E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				MERCURY	4.00E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	2.10E-05	(mg/kg-day)	--
				THALLIUM	3.20E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				ZINC	4.89E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.70E+00	(mg/kg)	3.15E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.1E-09	2.20E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	9.00E-01	(mg/kg)	1.67E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.7E-08	1.17E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.9E-03
				DIBENZ(A,H)ANTHRACENE	2.40E-01	(mg/kg)	4.44E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.4E-09	3.11E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.83E-01	(mg/kg)	7.63E-09	(mg/kg-day)	2.00E+00	per (mg/kg-day)	1.5E-08	5.34E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.7E-07**					**2.4E-02**
		Exposure Point Total									**1.1E-06**					**9.2E-01**
	Exposure Medium Total										**1.1E-06**					**9.2E-01**

TABLE 266
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentratio		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU18	Inhalation	**Inorganics**												
				ANTIMONY	1.08E-08	(mg/m^3)	5.58E-08	(ug/m^3)	NA	per (ug/m^3)	--	3.91E-09	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	9.95E-07	(mg/m^3)	5.13E-06	(ug/m^3)	4.3E-03	per (ug/m^3)	2.2E-08	3.59E-07	(mg/m^3)	1.50E-05	(mg/m^3)	2.4E-02
				COBALT	4.08E-07	(mg/m^3)	2.10E-06	(ug/m^3)	9.0E-03	per (ug/m^3)	1.9E-08	1.47E-07	(mg/m^3)	6.00E-06	(mg/m^3)	2.5E-02
				COPPER	2.07E-04	(mg/m^3)	1.07E-03	(ug/m^3)	NA	per (ug/m^3)	--	7.46E-05	(mg/m^3)	NA	(mg/m^3)	--
				IRON	2.11E-03	(mg/m^3)	1.09E-02	(ug/m^3)	NA	per (ug/m^3)	--	7.63E-04	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	2.80E-05	(mg/m^3)	1.44E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.01E-05	(mg/m^3)	5.00E-05	(mg/m^3)	2.0E-01
				MERCURY	1.94E-07	(mg/m^3)	1.00E-06	(ug/m^3)	NA	per (ug/m^3)	--	7.01E-08	(mg/m^3)	3.00E-04	(mg/m^3)	2.3E-04
				THALLIUM	2.64E-10	(mg/m^3)	1.36E-09	(ug/m^3)	NA	per (ug/m^3)	--	9.55E-11	(mg/m^3)	NA	(mg/m^3)	--
				ZINC	4.04E-06	(mg/m^3)	1.38E-04	(ug/m^3)	NA	per (ug/m^3)	--	6.73E-05	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	8.25E-08	(mg/m^3)	4.26E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	2.6E-11	2.98E-08	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	4.37E-08	(mg/m^3)	2.25E-07	(ug/m^3)	6.0E-04	per (ug/m^3)	1.4E-10	1.58E-08	(mg/m^3)	2.00E-06	(mg/m^3)	7.9E-03
				DIBENZ(A,H)ANTHRACENE	1.17E-08	(mg/m^3)	6.01E-08	(ug/m^3)	6.0E-04	per (ug/m^3)	3.6E-11	4.21E-09	(mg/m^3)	NA	(mg/m^3)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.17E-10	(mg/m^3)	1.63E-09	(ug/m^3)	1.00E-04	per (ug/m^3)	1.6E-13	1.14E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**4.1E-08**					**2.6E-01**
		Exposure Point Total									**4.1E-08**					**2.6E-01**
	Exposure Medium Total										**4.1E-08**					**2.6E-01**
Soil Total											**1.1E-06**					**1.2E+00**
										Total of Receptor Risks Across All Media	**1.1E-06**			Total of Receptor Hazards Across All Media		**1.2E+00**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 267
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU18	Ingestion	**Inorganics**												
				ANTIMONY	1.31E+01	(mg/kg)	3.97E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.39E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	3.5E-03
				ARSENIC	2.05E+01	(mg/kg)	3.73E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.6E-07	1.31E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.4E-03
				COBALT	8.40E+00	(mg/kg)	2.55E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	8.92E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.0E-03
				COPPER	4.26E+03	(mg/kg)	1.29E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	4.52E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	1.1E-02
				IRON	4.35E+04	(mg/kg)	1.32E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	4.62E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	6.6E-03
				MANGANESE	5.76E+02	(mg/kg)	1.75E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	6.12E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.4E-04
				MERCURY	4.00E+00	(mg/kg)	1.21E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	4.25E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-03
				THALLIUM	3.20E-01	(mg/kg)	9.71E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	3.40E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	3.4E-03
				ZINC	4.89E+03	(mg/kg)	1.48E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	5.19E-04	(mg/kg-day)	3.0E-01	(mg/kg-day)	1.7E-03
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.70E+00	(mg/kg)	5.16E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	5.2E-09	1.80E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	9.00E-01	(mg/kg)	2.73E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.7E-08	9.55E-08	(mg/kg-day)	3.0E-04	(mg/kg-day)	3.2E-04
				DIBENZ(A,H)ANTHRACENE	2.40E-01	(mg/kg)	7.28E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	7.3E-09	2.55E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.83E-01	(mg/kg)	1.16E-08	(mg/kg-day)	2.0E+00	per (mg/kg-day)	2.3E-08	4.07E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**6.2E-07**					**3.6E-02**
			Dermal[1]	**Inorganics**												
				ANTIMONY	1.31E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	2.05E+01	(mg/kg)	7.88E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.2E-07	2.76E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.2E-04
				COBALT	8.40E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	4.26E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	4.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	5.76E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				MERCURY	4.00E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	2.10E-05	(mg/kg-day)	--
				THALLIUM	3.20E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				ZINC	4.89E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.0E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.70E+00	(mg/kg)	2.83E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.8E-09	9.91E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	9.00E-01	(mg/kg)	1.50E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.5E-08	5.24E-08	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.7E-04
				DIBENZ(A,H)ANTHRACENE	2.40E-01	(mg/kg)	4.00E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.0E-09	1.40E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.83E-01	(mg/kg)	6.87E-09	(mg/kg-day)	2.0E+00	per (mg/kg-day)	1.4E-08	2.40E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.5E-07**					**1.1E-03**
		Exposure Point Total									**7.8E-07**					**3.7E-02**
	Exposure Medium Total										**7.8E-07**					**3.7E-02**

TABLE 267
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU18	Inhalation	**Inorganics**												
				ANTIMONY	1.08E-08	(mg/m^3)	4.38E-08	(ug/m^3)	NA	per (ug/m^3)	--	1.53E-10	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.69E-08	(mg/m^3)	6.85E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	2.9E-10	2.40E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.6E-05
				COBALT	6.94E-09	(mg/m^3)	2.81E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	2.5E-10	9.83E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.6E-05
				COPPER	3.52E-06	(mg/m^3)	1.42E-05	(ug/m^3)	NA	per (ug/m^3)	--	4.98E-08	(mg/m^3)	NA	(mg/m^3)	--
				IRON	3.60E-05	(mg/m^3)	1.45E-04	(ug/m^3)	NA	per (ug/m^3)	--	5.09E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	4.76E-07	(mg/m^3)	1.93E-06	(ug/m^3)	NA	per (ug/m^3)	--	6.74E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.3E-04
				MERCURY	3.31E-09	(mg/m^3)	1.34E-08	(ug/m^3)	NA	per (ug/m^3)	--	4.68E-11	(mg/m^3)	3.00E-04	(mg/m^3)	1.6E-07
				THALLIUM	2.64E-10	(mg/m^3)	1.07E-09	(ug/m^3)	NA	per (ug/m^3)	--	3.74E-12	(mg/m^3)	NA	(mg/m^3)	--
				ZINC	4.04E-06	(mg/m^3)	1.63E-05	(ug/m3)	NA	per (ug/m3)	--	5.72E-08	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.40E-09	(mg/m^3)	5.68E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	3.4E-13	1.99E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	7.44E-10	(mg/m^3)	3.01E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	1.8E-12	1.05E-11	(mg/m^3)	2.00E-06	(mg/m^3)	5.3E-06
				DIBENZ(A,H)ANTHRACENE	1.98E-10	(mg/m^3)	8.02E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	4.8E-13	2.81E-12	(mg/m^3)	NA	(mg/m^3)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.17E-10	(mg/m^3)	1.28E-09	(ug/m3)	1.00E-04	per (ug/m3)	1.3E-13	4.48E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**5.5E-10**					**1.7E-04**
		Exposure Point Total									**5.5E-10**					**1.7E-04**
	Exposure Medium Total										**5.5E-10**					**1.7E-04**
Soil Total											**7.8E-07**					**3.7E-02**
										Total of Receptor Risks Across All Media	**7.8E-07**				Total of Receptor Hazards Across All Media	**3.7E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 268
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU18	Ingestion	**Inorganics**												
				ANTIMONY	1.31E+01	(mg/kg)	5.60E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	6.53E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	1.6E-02
				ARSENIC	2.05E+01	(mg/kg)	5.25E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.9E-07	6.13E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.0E-02
				COBALT	8.40E+00	(mg/kg)	3.59E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	4.19E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-02
				COPPER	4.26E+03	(mg/kg)	1.82E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.12E-03	(mg/kg-day)	4.00E-02	(mg/kg-day)	5.3E-02
				IRON	4.35E+04	(mg/kg)	1.86E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	2.17E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	3.1E-02
				MANGANESE	5.76E+02	(mg/kg)	2.46E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.87E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.1E-03
				MERCURY	4.00E+00	(mg/kg)	1.71E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.99E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.6E-03
				THALLIUM	3.20E-01	(mg/kg)	1.37E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.59E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	1.6E-02
				ZINC	4.89E+03	(mg/kg)	2.09E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.44E-03	(mg/kg-day)	3.00E-01	(mg/kg-day)	8.1E-03
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.70E+00	(mg/kg)	2.18E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.2E-08	8.47E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	9.00E-01	(mg/kg)	1.15E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.2E-07	4.49E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-03
				DIBENZ(A,H)ANTHRACENE	2.40E-01	(mg/kg)	3.08E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	3.1E-08	1.20E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.83E-01	(mg/kg)	1.64E-08	(mg/kg-day)	2.00E+00	per (mg/kg-day)	3.3E-08	1.91E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**9.9E-07**					**1.7E-01**
			Dermal[1]	**Inorganics**												
				ANTIMONY	1.31E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	2.05E+01	(mg/kg)	1.22E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.8E-07	1.42E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.7E-03
				COBALT	8.40E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	4.26E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	4.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	5.76E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				MERCURY	4.00E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	2.10E-05	(mg/kg-day)	--
				THALLIUM	3.20E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				ZINC	4.89E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.70E+00	(mg/kg)	1.32E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.3E-08	5.12E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	9.00E-01	(mg/kg)	6.97E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	7.0E-08	2.71E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.0E-04
				DIBENZ(A,H)ANTHRACENE	2.40E-01	(mg/kg)	1.86E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.9E-08	7.22E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.83E-01	(mg/kg)	1.06E-08	(mg/kg-day)	2.00E+00	per (mg/kg-day)	2.1E-08	1.24E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.1E-07**					**5.6E-03**
		Exposure Point Total									**1.3E-06**					**1.7E-01**
	Exposure Medium Total										**1.3E-06**					**1.7E-01**

TABLE 268
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU18	Inhalation	**Inorganics**												
				ANTIMONY	1.08E-08	(mg/m^3)	2.19E-08	(ug/m^3)	NA	per (ug/m^3)	--	2.55E-10	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.69E-08	(mg/m^3)	3.43E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.5E-10	4.00E-10	(mg/m^3)	1.50E-05	(mg/m^3)	2.7E-05
				COBALT	6.94E-09	(mg/m^3)	1.40E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.3E-10	1.64E-10	(mg/m^3)	6.00E-06	(mg/m^3)	2.7E-05
				COPPER	3.52E-06	(mg/m^3)	7.11E-06	(ug/m^3)	NA	per (ug/m^3)	--	8.30E-08	(mg/m^3)	NA	(mg/m^3)	--
				IRON	3.60E-05	(mg/m^3)	7.27E-05	(ug/m^3)	NA	per (ug/m^3)	--	8.49E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	4.76E-07	(mg/m^3)	9.63E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.12E-08	(mg/m^3)	5.00E-05	(mg/m^3)	2.2E-04
				MERCURY	3.31E-09	(mg/m^3)	6.68E-09	(ug/m^3)	NA	per (ug/m^3)	--	7.80E-11	(mg/m^3)	3.00E-04	(mg/m^3)	2.6E-07
				THALLIUM	2.64E-10	(mg/m^3)	5.35E-10	(ug/m^3)	NA	per (ug/m^3)	--	6.24E-12	(mg/m^3)	NA	(mg/m^3)	--
				ZINC	4.04E-06	(mg/m^3)	8.17E-06	(ug/m^3)	NA	per (ug/m^3)	--	9.53E-08	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.40E-09	(mg/m^3)	8.52E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	5.1E-13	3.31E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	7.44E-10	(mg/m^3)	4.51E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	2.7E-12	1.75E-11	(mg/m^3)	2.00E-06	(mg/m^3)	8.8E-06
				DIBENZ(A,H)ANTHRACENE	1.98E-10	(mg/m^3)	1.20E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	7.2E-13	4.68E-12	(mg/m^3)	NA	(mg/m^3)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.17E-10	(mg/m^3)	6.40E-10	(ug/m^3)	1.00E-04	per (ug/m^3)	6.4E-14	7.47E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**2.8E-10**					**2.9E-04**
		Exposure Point Total									**2.8E-10**					**2.9E-04**
	Exposure Medium Total										**2.8E-10**					**2.9E-04**
Soil Total											**1.3E-06**					**1.7E-01**
										Total of Receptor Risks Across All Media	**1.3E-06**			Total of Receptor Hazards Across All Media		**1.7E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 269
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU18	Ingestion	**Inorganics**												
				ANTIMONY	1.31E+01	(mg/kg)	7.95E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.39E-05	(mg/kg-day)	4.00E-04	(mg/kg-day)	3.5E-02
				ARSENIC	2.05E+01	(mg/kg)	7.46E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.1E-06	1.31E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.4E-02
				COBALT	8.40E+00	(mg/kg)	5.10E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	8.92E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.0E-02
				COPPER	4.26E+03	(mg/kg)	2.58E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	4.52E-03	(mg/kg-day)	4.00E-02	(mg/kg-day)	1.1E-01
				IRON	4.35E+04	(mg/kg)	2.64E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	4.62E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	6.6E-02
				MANGANESE	5.76E+02	(mg/kg)	3.49E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	6.12E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.4E-03
				MERCURY	4.00E+00	(mg/kg)	2.43E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	4.25E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-02
				THALLIUM	3.20E-01	(mg/kg)	1.94E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	3.40E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	3.4E-02
				ZINC	4.89E+03	(mg/kg)	2.96E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	5.19E-03	(mg/kg-day)	3.0E-01	(mg/kg-day)	1.7E-02
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.70E+00	(mg/kg)	3.09E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.1E-08	1.80E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	9.00E-01	(mg/kg)	1.64E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.6E-07	9.55E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	3.2E-03
				DIBENZ(A,H)ANTHRACENE	2.40E-01	(mg/kg)	4.37E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.4E-08	2.55E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.83E-01	(mg/kg)	2.32E-08	(mg/kg-day)	2.0E+00	per (mg/kg-day)	4.6E-08	4.07E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.4E-06**					**3.6E-01**
			Dermal[1]	**Inorganics**												
				ANTIMONY	1.31E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	2.05E+01	(mg/kg)	7.86E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.2E-07	1.38E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.6E-03
				COBALT	8.40E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	4.26E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	4.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	5.76E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				MERCURY	4.00E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	2.10E-05	(mg/kg-day)	--
				THALLIUM	3.20E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				ZINC	4.89E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.0E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.70E+00	(mg/kg)	8.47E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	8.5E-09	4.94E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	9.00E-01	(mg/kg)	4.49E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.5E-08	2.62E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	8.7E-04
				DIBENZ(A,H)ANTHRACENE	2.40E-01	(mg/kg)	1.20E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.2E-08	6.98E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.83E-01	(mg/kg)	6.85E-09	(mg/kg-day)	2.0E+00	per (mg/kg-day)	1.4E-08	1.20E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.0E-07**					**5.5E-03**
		Exposure Point Total									**1.6E-06**					**3.7E-01**
	Exposure Medium Total										**1.6E-06**					**3.7E-01**

TABLE 269
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU18	Inhalation	**Inorganics**												
				ANTIMONY	1.08E-08	(mg/m^3)	8.76E-09	(ug/m^3)	NA	per (ug/m^3)	--	1.53E-10	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.69E-08	(mg/m^3)	1.37E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	5.9E-11	2.40E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.6E-05
				COBALT	6.94E-09	(mg/m^3)	5.62E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	5.1E-11	9.83E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.6E-05
				COPPER	3.52E-06	(mg/m^3)	2.85E-06	(ug/m^3)	NA	per (ug/m^3)	--	4.98E-08	(mg/m^3)	NA	(mg/m^3)	--
				IRON	3.60E-05	(mg/m^3)	2.91E-05	(ug/m^3)	NA	per (ug/m^3)	--	5.09E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	4.76E-07	(mg/m^3)	3.85E-07	(ug/m^3)	NA	per (ug/m^3)	--	6.74E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.3E-04
				MERCURY	3.31E-09	(mg/m^3)	2.67E-09	(ug/m^3)	NA	per (ug/m^3)	--	4.68E-11	(mg/m^3)	3.00E-04	(mg/m^3)	1.6E-07
				THALLIUM	2.64E-10	(mg/m^3)	2.14E-10	(ug/m^3)	NA	per (ug/m^3)	--	3.74E-12	(mg/m^3)	NA	(mg/m^3)	--
				ZINC	4.04E-06	(mg/m^3)	3.27E-06	(ug/m3)	NA	per (ug/m3)	--	5.72E-08	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.40E-09	(mg/m^3)	3.41E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.0E-13	1.99E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	7.44E-10	(mg/m^3)	1.80E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	1.1E-12	1.05E-11	(mg/m^3)	2.00E-06	(mg/m^3)	5.3E-06
				DIBENZ(A,H)ANTHRACENE	1.98E-10	(mg/m^3)	4.81E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	2.9E-13	2.81E-12	(mg/m^3)	NA	(mg/m^3)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.17E-10	(mg/m^3)	2.56E-10	(ug/m3)	1.00E-04	per (ug/m3)	2.6E-14	4.48E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.1E-10**					**1.7E-04**
		Exposure Point Total									**1.1E-10**					**1.7E-04**
	Exposure Medium Total										**1.1E-10**					**1.7E-04**
Soil Total											**1.6E-06**					**3.7E-01**
										Total of Receptor Risks Across All Media	**1.6E-06**				Total of Receptor Hazards Across All Media	**3.7E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 270
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU18	Ingestion	**Inorganics**												
				ANTIMONY	1.31E+01	(mg/kg)	8.64E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.01E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	2.5E-03
				ARSENIC	2.05E+01	(mg/kg)	8.11E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.2E-07	9.46E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.2E-03
				COBALT	8.40E+00	(mg/kg)	5.54E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	6.46E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.2E-03
				COPPER	4.26E+03	(mg/kg)	2.81E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.27E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	8.2E-03
				IRON	4.35E+04	(mg/kg)	2.87E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	3.35E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	4.8E-03
				MANGANESE	5.76E+02	(mg/kg)	3.80E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.43E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.2E-04
				MERCURY	4.00E+00	(mg/kg)	2.64E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	3.08E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.0E-03
				THALLIUM	3.20E-01	(mg/kg)	2.11E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	2.46E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	2.5E-03
				ZINC	4.89E+03	(mg/kg)	3.22E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.76E-04	(mg/kg-day)	3.00E-01	(mg/kg-day)	1.3E-03
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.70E+00	(mg/kg)	3.36E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.4E-09	1.31E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	9.00E-01	(mg/kg)	1.78E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.8E-08	6.92E-08	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.3E-04
				DIBENZ(A,H)ANTHRACENE	2.40E-01	(mg/kg)	4.75E-09	(mg/kg-day)	1.00E+00	per (mg/kg-day)	4.7E-09	1.85E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.83E-01	(mg/kg)	2.52E-09	(mg/kg-day)	2.00E+00	per (mg/kg-day)	5.0E-09	2.95E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.5E-07**					**2.6E-02**
			Dermal[1]	**Inorganics**												
				ANTIMONY	1.31E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	2.05E+01	(mg/kg)	3.77E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.6E-08	4.39E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-03
				COBALT	8.40E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	4.26E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	4.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	5.76E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				MERCURY	4.00E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	2.10E-05	(mg/kg-day)	--
				THALLIUM	3.20E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				ZINC	4.89E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.70E+00	(mg/kg)	4.06E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	4.1E-09	1.58E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	9.00E-01	(mg/kg)	2.15E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.1E-08	8.36E-08	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.8E-04
				DIBENZ(A,H)ANTHRACENE	2.40E-01	(mg/kg)	5.73E-09	(mg/kg-day)	1.00E+00	per (mg/kg-day)	5.7E-09	2.23E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.83E-01	(mg/kg)	3.28E-09	(mg/kg-day)	2.00E+00	per (mg/kg-day)	6.6E-09	3.83E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**9.4E-08**					**1.7E-03**
		Exposure Point Total									**2.5E-07**					**2.8E-02**
	Exposure Medium Total										**2.5E-07**					**2.8E-02**

TABLE 270
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU18	Inhalation	**Inorganics**												
				ANTIMONY	1.08E-08	(mg/m^3)	6.78E-09	(ug/m^3)	NA	per (ug/m^3)	--	7.91E-11	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.69E-08	(mg/m^3)	1.06E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	4.6E-11	1.24E-10	(mg/m^3)	1.50E-05	(mg/m^3)	8.3E-06
				COBALT	6.94E-09	(mg/m^3)	4.35E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	3.9E-11	5.07E-11	(mg/m^3)	6.00E-06	(mg/m^3)	8.5E-06
				COPPER	3.52E-06	(mg/m^3)	2.20E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.57E-08	(mg/m^3)	NA	(mg/m^3)	--
				IRON	3.60E-05	(mg/m^3)	2.25E-05	(ug/m^3)	NA	per (ug/m^3)	--	2.63E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	4.76E-07	(mg/m^3)	2.98E-07	(ug/m^3)	NA	per (ug/m^3)	--	3.48E-09	(mg/m^3)	5.00E-05	(mg/m^3)	7.0E-05
				MERCURY	3.31E-09	(mg/m^3)	2.07E-09	(ug/m^3)	NA	per (ug/m^3)	--	2.42E-11	(mg/m^3)	3.00E-04	(mg/m^3)	8.1E-08
				THALLIUM	2.64E-10	(mg/m^3)	1.66E-10	(ug/m^3)	NA	per (ug/m^3)	--	1.93E-12	(mg/m^3)	NA	(mg/m^3)	--
				ZINC	4.04E-06	(mg/m^3)	2.53E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.95E-08	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.40E-09	(mg/m^3)	2.64E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.6E-13	1.03E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	7.44E-10	(mg/m^3)	1.40E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	8.4E-13	5.43E-12	(mg/m^3)	2.00E-06	(mg/m^3)	2.7E-06
				DIBENZ(A,H)ANTHRACENE	1.98E-10	(mg/m^3)	3.73E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	2.2E-13	1.45E-12	(mg/m^3)	NA	(mg/m^3)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.17E-10	(mg/m^3)	1.98E-10	(ug/m^3)	1.00E-04	per (ug/m^3)	2.0E-14	2.31E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**8.6E-11**					**8.9E-05**
		Exposure Point Total									**8.6E-11**					**8.9E-05**
	Exposure Medium Total										**8.6E-11**					**8.9E-05**
Soil Total											**2.5E-07**					**2.8E-02**
										Total of Receptor Risks Across All Media	**2.5E-07**				Total of Receptor Hazards Across All Media	**2.8E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 271
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU18	Ingestion	**Inorganics**												
				ANTIMONY	1.31E+01	(mg/kg)	5.92E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	3.19E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	8.0E-03
				ARSENIC	2.05E+01	(mg/kg)	5.56E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.3E-07	3.00E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.0E-02
				COBALT	8.40E+00	(mg/kg)	3.80E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.05E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.8E-03
				COPPER	4.26E+03	(mg/kg)	1.93E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	1.04E-03	(mg/kg-day)	4.00E-02	(mg/kg-day)	2.6E-02
				IRON	4.35E+04	(mg/kg)	1.97E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.06E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.5E-02
				MANGANESE	5.76E+02	(mg/kg)	2.61E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.40E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.0E-03
				MERCURY	4.00E+00	(mg/kg)	1.81E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	9.74E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.2E-03
				THALLIUM	3.20E-01	(mg/kg)	1.45E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	7.79E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	7.8E-03
				ZINC	4.89E+03	(mg/kg)	2.21E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	1.19E-03	(mg/kg-day)	3.00E-01	(mg/kg-day)	4.0E-03
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.70E+00	(mg/kg)	2.31E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.3E-08	4.14E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	9.00E-01	(mg/kg)	1.22E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.2E-07	2.19E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.3E-04
				DIBENZ(A,H)ANTHRACENE	2.40E-01	(mg/kg)	3.26E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	3.3E-08	5.84E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.83E-01	(mg/kg)	1.73E-08	(mg/kg-day)	2.00E+00	per (mg/kg-day)	3.5E-08	9.33E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.0E-06**					**8.3E-02**
			Dermal[1]	**Inorganics**												
				ANTIMONY	1.31E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	2.05E+01	(mg/kg)	1.10E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.6E-07	5.91E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.0E-03
				COBALT	8.40E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	4.26E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	4.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	5.76E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				MERCURY	4.00E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	2.10E-05	(mg/kg-day)	--
				THALLIUM	3.20E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				ZINC	4.89E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.70E+00	(mg/kg)	1.18E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.2E-08	2.12E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	9.00E-01	(mg/kg)	6.27E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	6.3E-08	1.12E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.7E-04
				DIBENZ(A,H)ANTHRACENE	2.40E-01	(mg/kg)	1.67E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.7E-08	3.00E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.83E-01	(mg/kg)	9.57E-09	(mg/kg-day)	2.00E+00	per (mg/kg-day)	1.9E-08	5.15E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.8E-07**					**2.3E-03**
		Exposure Point Total									**1.3E-06**					**8.5E-02**
	Exposure Medium Total										**1.3E-06**					**8.5E-02**

TABLE 271
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU18	Inhalation	**Inorganics**												
				ANTIMONY	1.08E-08	(mg/m^3)	1.10E-07	(ug/m^3)	NA	per (ug/m^3)	--	5.93E-10	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.69E-08	(mg/m^3)	1.72E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	7.4E-10	9.28E-10	(mg/m^3)	1.50E-05	(mg/m^3)	6.2E-05
				COBALT	6.94E-09	(mg/m^3)	7.06E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	6.4E-10	3.80E-10	(mg/m^3)	6.00E-06	(mg/m^3)	6.3E-05
				COPPER	3.52E-06	(mg/m^3)	3.58E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.93E-07	(mg/m^3)	NA	(mg/m^3)	--
				IRON	3.60E-05	(mg/m^3)	3.66E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.97E-06	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	4.76E-07	(mg/m^3)	4.84E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.61E-08	(mg/m^3)	5.00E-05	(mg/m^3)	5.2E-04
				MERCURY	3.31E-09	(mg/m^3)	3.36E-08	(ug/m^3)	NA	per (ug/m^3)	--	1.81E-10	(mg/m^3)	3.00E-04	(mg/m^3)	6.0E-07
				THALLIUM	2.64E-10	(mg/m^3)	2.69E-09	(ug/m^3)	NA	per (ug/m^3)	--	1.45E-11	(mg/m^3)	NA	(mg/m^3)	--
				ZINC	4.04E-06	(mg/m^3)	4.11E-05	(ug/m^3)	NA	per (ug/m^3)	--	2.21E-07	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(B)FLUORANTHENE	1.40E-09	(mg/m^3)	4.29E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	2.6E-12	7.70E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	7.44E-10	(mg/m^3)	2.27E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	1.4E-11	4.08E-11	(mg/m^3)	2.00E-06	(mg/m^3)	2.0E-05
				DIBENZ(A,H)ANTHRACENE	1.98E-10	(mg/m^3)	6.06E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	3.6E-12	1.09E-11	(mg/m^3)	NA	(mg/m^3)	--
				Pesticides/PCBs												
				AROCLOR-1260	3.17E-10	(mg/m^3)	3.22E-09	(ug/m^3)	1.00E-04	per (ug/m^3)	3.2E-13	1.73E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.4E-09**					**6.7E-04**
		Exposure Point Total									**1.4E-09**					**6.7E-04**
	Exposure Medium Total										**1.4E-09**					**6.7E-04**
Soil Total											**1.3E-06**					**8.6E-02**
										Total of Receptor Risks Across All Media	**1.3E-06**				Total of Receptor Hazards Across All Media	**8.6E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 272
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU18	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	1.8E-02	--	--	1.8E-02
			ARSENIC	3.6E-06	7.6E-07	3.8E-09	4.4E-06	ARSENIC	Skin, Cardiovascular	2.2E-02	4.8E-03	1.7E-04	2.7E-02
			COBALT	--	--	3.3E-09	3.3E-09	COBALT	Thyroid	1.5E-02	--	1.7E-04	1.6E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	5.8E-02	--	--	5.8E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	3.4E-02	--	--	3.4E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.3E-03	--	1.4E-03	3.6E-03
			MERCURY	--	--	--	NA	MERCURY	Nervous System, Developmental	7.3E-03	--	1.6E-06	7.3E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	1.8E-02	--	--	1.8E-02
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	8.9E-03	--	--	8.9E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(B)FLUORANTHENE	3.3E-08	1.8E-08	4.4E-12	5.2E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.8E-07	9.7E-08	2.3E-11	2.7E-07	BENZO(A)PYRENE	Developmental System	1.6E-03	9.0E-04	5.4E-05	2.6E-03
			DIBENZ(A,H)ANTHRACENE	4.7E-08	2.6E-08	6.2E-12	7.3E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			Pesticides/PCBs					**Pesticides/PCBs**					
			AROCLOR-1260	1.5E-07	8.9E-08	1.7E-12	2.4E-07	AROCLOR-1260	NA	--	--	--	NA
			(Total)	4.0E-06	9.9E-07	7.1E-09	5.0E-06		(Total)	1.9E-01	5.7E-03	1.8E-03	1.9E-01
							Total Risk Across Surface Soil	**5.0E-06**					**Total Hazard Index Across Surface Soil**	**1.9E-01**
							Total Risk Across All Media and All Exposure Routes	**5E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.2**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 273
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Researcher

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU18	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	5.8E-03	--	--	5.8E-03
			ARSENIC	1.4E-07	7.4E-08	1.5E-10	2.2E-07	ARSENIC	Skin, Cardiovascular	7.3E-03	3.9E-03	5.4E-05	1.1E-02
			COBALT	--	--	1.3E-10	1.3E-10	COBALT	Thyroid	5.0E-03	--	5.5E-05	5.0E-03
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	1.9E-02	--	--	1.9E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.1E-02	--	--	1.1E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	7.3E-04	--	4.5E-04	1.2E-03
			MERCURY	--	--	--	NA	MERCURY	Nervous System, Developmental	2.4E-03	--	5.2E-07	2.4E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	5.7E-03	--	--	5.7E-03
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	2.9E-03	--	--	2.9E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(B)FLUORANTHENE	1.3E-09	1.8E-09	1.7E-13	3.1E-09	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	6.9E-09	9.4E-09	9.1E-13	1.6E-08	BENZO(A)PYRENE	Developmental System	5.3E-04	7.3E-04	1.8E-05	1.3E-03
			DIBENZ(A,H)ANTHRACENE	1.8E-09	2.5E-09	2.4E-13	4.4E-09	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			Pesticides/PCBs					**Pesticides/PCBs**					NA
			AROCLOR-1260	5.8E-09	8.7E-09	6.4E-14	1.5E-08	AROCLOR-1260	NA	--	--	--	NA
			(Total)	1.6E-07	9.7E-08	2.8E-10	2.5E-07		(Total)	6.0E-02	4.6E-03	5.8E-04	6.6E-02
							Total Risk Across Surface Soil	**2.5E-07**					**Total Hazard Index Across Surface Soil**	**6.6E-02**
							Total Risk Across All Media and All Exposure Routes	**3E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.07**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 274
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Location: Iona Island
Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU18	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	1.8E-02	--	--	1.8E-02
			ARSENIC	8.2E-07	1.3E-07	2.2E-08	9.7E-07	ARSENIC	Skin, Cardiovascular	1.3E-01	2.0E-02	2.4E-02	1.7E-01
			COBALT	--	--	1.9E-08	1.9E-08	COBALT	Thyroid	8.7E-02	--	2.5E-02	1.1E-01
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	3.3E-01	--	--	3.3E-01
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.9E-01	--	--	1.9E-01
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.3E-02	--	2.0E-01	2.1E-01
			MERCURY	--	--	--	NA	MERCURY	Nervous System, Developmental	4.1E-02	--	2.3E-04	4.2E-02
			THALLIUM	--	--	--	NA	THALLIUM	Hair	5.3E-02	--	--	5.3E-02
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	2.7E-02	--	--	2.7E-02
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(B)FLUORANTHENE	7.5E-09	3.1E-09	2.6E-11	1.1E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	4.0E-08	1.7E-08	1.4E-10	5.7E-08	BENZO(A)PYRENE	Developmental System	9.3E-03	3.9E-03	7.9E-03	2.1E-02
			DIBENZ(A,H)ANTHRACENE	1.1E-08	4.4E-09	3.6E-11	1.5E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			Pesticides/PCBs					**Pesticides/PCBs**					
			AROCLOR-1260	3.4E-08	1.5E-08	1.6E-13	4.9E-08	AROCLOR-1260	NA	--	--	--	NA
			(Total)	9.1E-07	1.7E-07	4.1E-08	1.1E-06		(Total)	9.0E-01	2.4E-02	2.6E-01	1.2E+00
							Total Risk Across Surface Soil	**1.1E-06**					**Total Hazard Index Across Surface Soil**	**1.2E+00**
							Total Risk Across All Media and All Exposure Routes	**1E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**1**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 275
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU18	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	3.5E-03	--	--	3.5E-03
			ARSENIC	5.6E-07	1.2E-07	2.9E-10	6.8E-07	ARSENIC	Skin, Cardiovascular	4.4E-03	9.2E-04	1.6E-05	5.3E-03
			COBALT	--	--	2.5E-10	2.5E-10	COBALT	Thyroid	3.0E-03	--	1.6E-05	3.0E-03
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	1.1E-02	--	--	1.1E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	6.6E-03	--	--	6.6E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.4E-04	--	1.3E-04	5.7E-04
			MERCURY	--	--	--	NA	MERCURY	Nervous System, Developmental	1.4E-03	--	1.6E-07	1.4E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	3.4E-03	--	--	3.4E-03
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	1.7E-03	--	--	1.7E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(B)FLUORANTHENE	5.2E-09	2.8E-09	3.4E-13	8.0E-09	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	2.7E-08	1.5E-08	1.8E-12	4.2E-08	BENZO(A)PYRENE	Developmental System	3.2E-04	1.7E-04	5.3E-06	5.0E-04
			DIBENZ(A,H)ANTHRACENE	7.3E-09	4.0E-09	4.8E-13	1.1E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			Pesticides/PCBs					**Pesticides/PCBs**					
			AROCLOR-1260	2.3E-08	1.4E-08	1.3E-13	3.7E-08	AROCLOR-1260	NA	--	--	--	NA
			(Total)	6.2E-07	1.5E-07	5.5E-10	7.8E-07		(Total)	3.6E-02	1.1E-03	1.7E-04	3.7E-02
							Total Risk Across Surface Soil	**7.8E-07**					**Total Hazard Index Across Surface Soil**	**3.7E-02**
							Total Risk Across All Media and All Exposure Routes	**8E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.04**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 276
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU18	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	1.6E-02	--	--	1.6E-02
			ARSENIC	7.9E-07	1.8E-07	1.5E-10	9.7E-07	ARSENIC	Skin, Cardiovascular	2.0E-02	4.7E-03	2.7E-05	2.5E-02
			COBALT	--	--	1.3E-10	1.3E-10	COBALT	Thyroid	1.4E-02	--	2.7E-05	1.4E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	5.3E-02	--	--	5.3E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	3.1E-02	--	--	3.1E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.1E-03	--	2.2E-04	2.3E-03
			MERCURY	--	--	--	NA	MERCURY	Nervous System, Developmental	6.6E-03	--	2.6E-07	6.6E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	1.6E-02	--	--	1.6E-02
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	8.1E-03	--	--	8.1E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(B)FLUORANTHENE	2.2E-08	1.3E-08	5.1E-13	3.5E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.2E-07	7.0E-08	2.7E-12	1.9E-07	BENZO(A)PYRENE	Developmental System	1.5E-03	9.0E-04	8.8E-06	2.4E-03
			DIBENZ(A,H)ANTHRACENE	3.1E-08	1.9E-08	7.2E-13	4.9E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			Pesticides/PCBs					**Pesticides/PCBs**					
			AROCLOR-1260	3.3E-08	2.1E-08	6.4E-14	5.4E-08	AROCLOR-1260	NA	--	--	--	NA
			(Total)	9.9E-07	3.1E-07	2.8E-10	1.3E-06		(Total)	1.7E-01	5.6E-03	2.9E-04	1.7E-01
							Total Risk Across Surface Soil	**1.3E-06**					**Total Hazard Index Across Surface Soil**	**1.7E-01**
							Total Risk Across All Media and All Exposure Routes	**1E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.2**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 277
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU18	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	3.5E-02	--	--	3.5E-02
			ARSENIC	1.1E-06	1.2E-07	5.9E-11	1.2E-06	ARSENIC	Skin, Cardiovascular	4.4E-02	4.6E-03	1.6E-05	4.8E-02
			COBALT	--	--	5.1E-11	5.1E-11	COBALT	Thyroid	3.0E-02	--	1.6E-05	3.0E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	1.1E-01	--	--	1.1E-01
			IRON	--	--	--	NA	IRON	Gastrointestinal System	6.6E-02	--	--	6.6E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.4E-03	--	1.3E-04	4.5E-03
			MERCURY	--	--	--	NA	MERCURY	Nervous System, Developmental	1.4E-02	--	1.6E-07	1.4E-02
			THALLIUM	--	--	--	NA	THALLIUM	Hair	3.4E-02	--	--	3.4E-02
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	1.7E-02	--	--	1.7E-02
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(B)FLUORANTHENE	3.1E-08	8.5E-09	2.0E-13	3.9E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.6E-07	4.5E-08	1.1E-12	2.1E-07	BENZO(A)PYRENE	Developmental System	3.2E-03	8.7E-04	5.3E-06	4.1E-03
			DIBENZ(A,H)ANTHRACENE	4.4E-08	1.2E-08	2.9E-13	5.6E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			Pesticides/PCBs					**Pesticides/PCBs**					
			AROCLOR-1260	4.6E-08	1.4E-08	2.6E-14	6.0E-08	AROCLOR-1260	NA	--	--	--	NA
			(Total)	1.4E-06	2.0E-07	1.1E-10	1.6E-06		(Total)	3.6E-01	5.5E-03	1.7E-04	3.7E-01
							Total Risk Across Surface Soil	**1.6E-06**					**Total Hazard Index Across Surface Soil**	**3.7E-01**
							Total Risk Across All Media and All Exposure Routes	**2E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.4**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 278
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU18	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	2.5E-03	--	--	2.5E-03
			ARSENIC	1.2E-07	5.6E-08	4.6E-11	1.8E-07	ARSENIC	Skin, Cardiovascular	3.2E-03	1.5E-03	8.3E-06	4.6E-03
			COBALT	--	--	3.9E-11	3.9E-11	COBALT	Thyroid	2.2E-03	--	8.5E-06	2.2E-03
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	8.2E-03	--	--	8.2E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	4.8E-03	--	--	4.8E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.2E-04	--	7.0E-05	3.9E-04
			MERCURY	--	--	--	NA	MERCURY	Nervous System, Developmental	1.0E-03	--	8.1E-08	1.0E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	2.5E-03	--	--	2.5E-03
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	1.3E-03	--	--	1.3E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(B)FLUORANTHENE	3.4E-09	4.1E-09	1.6E-13	7.4E-09	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.8E-08	2.1E-08	8.4E-13	3.9E-08	BENZO(A)PYRENE	Developmental System	2.3E-04	2.8E-04	2.7E-06	5.1E-04
			DIBENZ(A,H)ANTHRACENE	4.7E-09	5.7E-09	2.2E-13	1.0E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			Pesticides/PCBs					**Pesticides/PCBs**					
			AROCLOR-1260	5.0E-09	6.6E-09	2.0E-14	1.2E-08	AROCLOR-1260	NA	--	--	--	NA
			(Total)	1.5E-07	9.4E-08	8.6E-11	2.5E-07		(Total)	2.6E-02	1.7E-03	8.9E-05	2.8E-02
							Total Risk Across Surface Soil	**2.5E-07**					**Total Hazard Index Across Surface Soil**	**2.8E-02**
							Total Risk Across All Media and All Exposure Routes	**2E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.03**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 279
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU18

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Camper
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU18	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	8.0E-03	--	--	8.0E-03
			ARSENIC	8.3E-07	1.6E-07	7.4E-10	1.0E-06	ARSENIC	Skin, Cardiovascular	1.0E-02	2.0E-03	6.2E-05	1.2E-02
			COBALT	--	--	6.4E-10	6.4E-10	COBALT	Thyroid	6.8E-03	--	6.3E-05	6.9E-03
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	2.6E-02	--	--	2.6E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.5E-02	--	--	1.5E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.0E-03	--	5.2E-04	1.5E-03
			MERCURY	--	--	--	NA	MERCURY	Nervous System, Developmental	3.2E-03	--	6.0E-07	3.2E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	7.8E-03	--	--	7.8E-03
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	4.0E-03	--	--	4.0E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(B)FLUORANTHENE	2.3E-08	1.2E-08	2.6E-12	3.5E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.2E-07	6.3E-08	1.4E-11	1.8E-07	BENZO(A)PYRENE	Developmental System	7.3E-04	3.7E-04	2.0E-05	1.1E-03
			DIBENZ(A,H)ANTHRACENE	3.3E-08	1.7E-08	3.6E-12	4.9E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			Pesticides/PCBs					**Pesticides/PCBs**					
			AROCLOR-1260	3.5E-08	1.9E-08	3.2E-13	5.4E-08	AROCLOR-1260	NA	--	--	--	NA
			(Total)	1.0E-06	2.8E-07	1.4E-09	1.3E-06		(Total)	8.3E-02	2.3E-03	6.7E-04	8.6E-02
							Total Risk Across Surface Soil	**1.3E-06**					**Total Hazard Index Across Surface Soil**	**8.6E-02**
							Total Risk Across All Media and All Exposure Routes	**1E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.09**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 280
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU19	Ingestion	**Inorganics**												
				ALUMINUM	2.77E+04	(mg/kg)	5.43E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.52E-02	(mg/kg-day)	1.00E+00	(mg/kg-day)	1.5E-02
				ARSENIC	9.40E+00	(mg/kg)	1.10E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.7E-06	3.09E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.0E-02
				COBALT	2.01E+01	(mg/kg)	3.93E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.10E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.7E-02
				IRON	4.04E+04	(mg/kg)	7.91E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	2.21E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	3.2E-02
				MANGANESE	3.98E+02	(mg/kg)	7.79E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.18E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.6E-03
				VANADIUM	5.82E+01	(mg/kg)	1.14E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.19E-05	(mg/kg-day)	5.00E-03	(mg/kg-day)	6.4E-03
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.80E+00	(mg/kg)	3.52E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.5E-08	9.86E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.40E+00	(mg/kg)	4.70E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.7E-08	1.32E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.30E+00	(mg/kg)	2.54E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.5E-07	7.12E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	2.4E-03
				DIBENZ(A,H)ANTHRACENE	2.60E-01	(mg/kg)	5.09E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	5.1E-08	1.42E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.00E+00	(mg/kg)	1.96E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.0E-08	5.48E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.1E-06**					**1.0E-01**
			Dermal[1]	**Inorganics**												
				ALUMINUM	2.77E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E+00	(mg/kg-day)	--
				ARSENIC	9.40E+00	(mg/kg)	2.34E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.5E-07	6.54E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.2E-03
				COBALT	2.01E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	4.04E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.98E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				VANADIUM	5.82E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.30E-04	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.80E+00	(mg/kg)	1.94E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.9E-08	5.43E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.40E+00	(mg/kg)	2.58E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.6E-08	7.24E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.30E+00	(mg/kg)	1.40E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.4E-07	3.92E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.3E-03
				DIBENZ(A,H)ANTHRACENE	2.60E-01	(mg/kg)	2.80E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.8E-08	7.84E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.00E+00	(mg/kg)	1.08E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.1E-08	3.01E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**5.7E-07**					**3.5E-03**
		Exposure Point Total									**2.6E-06**					**1.1E-01**
	Exposure Medium Total										**2.6E-06**					**1.1E-01**

TABLE 280
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU19	Inhalation	**Inorganics**												
				ALUMINUM	2.29E-05	(mg/m^3)	1.20E-03	(ug/m^3)	NA	per (ug/m^3)	--	3.35E-06	(mg/m^3)	5.00E-03	(mg/m^3)	6.7E-04
				ARSENIC	7.77E-09	(mg/m^3)	4.05E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	1.7E-09	1.14E-09	(mg/m^3)	1.50E-05	(mg/m^3)	7.6E-05
				COBALT	1.66E-08	(mg/m^3)	8.67E-07	(ug/m^3)	9.00E-03	per (ug/m^3)	7.8E-09	2.43E-09	(mg/m^3)	6.00E-06	(mg/m^3)	4.0E-04
				IRON	3.34E-05	(mg/m^3)	1.74E-03	(ug/m^3)	NA	per (ug/m^3)	--	4.88E-06	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.29E-07	(mg/m^3)	1.72E-05	(ug/m^3)	NA	per (ug/m^3)	--	4.81E-08	(mg/m^3)	5.00E-05	(mg/m^3)	9.6E-04
				VANADIUM	4.81E-08	(mg/m^3)	2.51E-06	(ug/m^3)	NA	per (ug/m^3)	--	7.03E-09	(mg/m^3)	1.00E-04	(mg/m^3)	7.0E-05
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.49E-09	(mg/m^3)	7.76E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	4.7E-12	2.17E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.98E-09	(mg/m^3)	1.04E-07	(ug/m^3)	6.00E-05	per (ug/m^3)	6.2E-12	2.90E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.07E-09	(mg/m^3)	5.61E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	3.4E-11	1.57E-10	(mg/m^3)	2.00E-06	(mg/m^3)	7.8E-05
				DIBENZ(A,H)ANTHRACENE	2.15E-10	(mg/m^3)	1.12E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	6.7E-12	3.14E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	8.26E-10	(mg/m^3)	4.31E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	2.6E-12	1.21E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**9.6E-09**					**2.3E-03**
		Exposure Point Total									**9.6E-09**					**2.3E-03**
	Exposure Medium Total										**9.6E-09**					**2.3E-03**
Soil Total											**2.6E-06**					**1.1E-01**
										Total of Receptor Risks Across All Media	**2.6E-06**				Total of Receptor Hazards Across All Media	**1.1E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 281
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Intake/Exposure Concentration		RfD/RfC		Hazard
							Value	Units	Value	Units	Cancer Risk	Value	Units	Value	Units	Quotient
Soil	Surface Soil	DU19	Ingestion	**Inorganics**												
				ALUMINUM	2.77E+04	(mg/kg)	2.12E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	4.94E-03	(mg/kg-day)	1.00E+00	(mg/kg-day)	4.9E-03
				ARSENIC	9.40E+00	(mg/kg)	4.30E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	6.5E-08	1.00E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.3E-03
				COBALT	2.01E+01	(mg/kg)	1.53E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	3.58E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.2E-02
				IRON	4.04E+04	(mg/kg)	3.08E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	7.20E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.0E-02
				MANGANESE	3.98E+02	(mg/kg)	3.04E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	7.09E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	5.1E-04
				VANADIUM	5.82E+01	(mg/kg)	4.44E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.04E-05	(mg/kg-day)	5.00E-03	(mg/kg-day)	2.1E-03
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.80E+00	(mg/kg)	1.37E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.4E-09	3.21E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.40E+00	(mg/kg)	1.83E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.8E-09	4.27E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.30E+00	(mg/kg)	9.92E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	9.9E-09	2.32E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	7.7E-04
				DIBENZ(A,H)ANTHRACENE	2.60E-01	(mg/kg)	1.98E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.0E-09	4.63E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.00E+00	(mg/kg)	7.63E-09	(mg/kg-day)	1.0E-01	per (mg/kg-day)	7.6E-10	1.78E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**8.0E-08**					**3.4E-02**
			Dermal[1]	**Inorganics**												
				ALUMINUM	2.77E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E+00	(mg/kg-day)	--
				ARSENIC	9.40E+00	(mg/kg)	2.28E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.4E-08	5.31E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.8E-03
				COBALT	2.01E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	4.04E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.98E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				VANADIUM	5.82E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.30E-04	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.80E+00	(mg/kg)	1.89E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.9E-09	4.41E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.40E+00	(mg/kg)	2.52E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.5E-09	5.88E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.30E+00	(mg/kg)	1.36E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.4E-08	3.18E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.1E-03
				DIBENZ(A,H)ANTHRACENE	2.60E-01	(mg/kg)	2.73E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.7E-09	6.37E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.00E+00	(mg/kg)	1.05E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.0E-09	2.45E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**5.6E-08**					**2.8E-03**
		Exposure Point Total									**1.4E-07**					**3.7E-02**
	Exposure Medium Total										**1.4E-07**					**3.7E-02**

TABLE 281
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Intake/Exposure Concentration		RfD/RfC		Hazard
							Value	Units	Value	Units	Cancer Risk	Value	Units	Value	Units	Quotient
Soil	Air	DU19	Inhalation	**Inorganics**												
				ALUMINUM	2.29E-05	(mg/m^3)	4.67E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.09E-06	(mg/m^3)	5.00E-03	(mg/m^3)	2.2E-04
				ARSENIC	7.77E-09	(mg/m^3)	1.58E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	6.8E-11	3.69E-10	(mg/m^3)	1.50E-05	(mg/m^3)	2.5E-05
				COBALT	1.66E-08	(mg/m^3)	3.38E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	3.0E-10	7.89E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.3E-04
				IRON	3.34E-05	(mg/m^3)	6.80E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.59E-06	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.29E-07	(mg/m^3)	6.69E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.56E-08	(mg/m^3)	5.00E-05	(mg/m^3)	3.1E-04
				VANADIUM	4.81E-08	(mg/m^3)	9.79E-08	(ug/m^3)	NA	per (ug/m^3)	--	2.28E-09	(mg/m^3)	1.00E-04	(mg/m^3)	2.3E-05
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.49E-09	(mg/m^3)	3.03E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.8E-13	7.06E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.98E-09	(mg/m^3)	4.04E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.4E-13	9.42E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.07E-09	(mg/m^3)	2.19E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	1.3E-12	5.10E-11	(mg/m^3)	2.00E-06	(mg/m^3)	2.6E-05
				DIBENZ(A,H)ANTHRACENE	2.15E-10	(mg/m^3)	4.37E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	2.6E-13	1.02E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	8.26E-10	(mg/m^3)	1.68E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.0E-13	3.92E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**3.7E-10**					**7.3E-04**
		Exposure Point Total									**3.7E-10**					**7.3E-04**
	Exposure Medium Total										**3.7E-10**					**7.3E-04**
Soil Total											**1.4E-07**					**3.7E-02**
										Total of Receptor Risks Across All Media	**1.4E-07**				Total of Receptor Hazards Across All Media	**3.7E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 282
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentratio		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU19	Ingestion	**Inorganics**												
				ALUMINUM	2.77E+04	(mg/kg)	1.23E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	8.62E-02	(mg/kg-day)	1.00E+00	(mg/kg-day)	8.6E-02
				ARSENIC	9.40E+00	(mg/kg)	2.50E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.8E-07	1.75E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.8E-02
				COBALT	2.01E+01	(mg/kg)	8.92E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	6.25E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.1E-01
				IRON	4.04E+04	(mg/kg)	1.79E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.26E-01	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.8E-01
				MANGANESE	3.98E+02	(mg/kg)	1.77E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.24E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	8.8E-03
				VANADIUM	5.82E+01	(mg/kg)	2.58E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.81E-04	(mg/kg-day)	5.00E-03	(mg/kg-day)	3.6E-02
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.80E+00	(mg/kg)	7.99E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	8.0E-09	5.59E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.40E+00	(mg/kg)	1.07E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.1E-08	7.46E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.30E+00	(mg/kg)	5.77E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	5.8E-08	4.04E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-02
				DIBENZ(A,H)ANTHRACENE	2.60E-01	(mg/kg)	1.15E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.2E-08	8.08E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.00E+00	(mg/kg)	4.44E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.4E-09	3.11E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**4.7E-07**					**5.9E-01**
			Dermal[1]	**Inorganics**												
				ALUMINUM	2.77E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E+00	(mg/kg-day)	--
				ARSENIC	9.40E+00	(mg/kg)	4.01E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	6.0E-08	2.81E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.4E-03
				COBALT	2.01E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	4.04E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.98E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				VANADIUM	5.82E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.30E-04	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.80E+00	(mg/kg)	3.33E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.3E-09	2.33E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.40E+00	(mg/kg)	4.44E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.4E-09	3.11E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.30E+00	(mg/kg)	2.41E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.4E-08	1.68E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.6E-03
				DIBENZ(A,H)ANTHRACENE	2.60E-01	(mg/kg)	4.81E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.8E-09	3.37E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.00E+00	(mg/kg)	1.85E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.9E-09	1.30E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**9.9E-08**					**1.5E-02**
		Exposure Point Total									**5.7E-07**					**6.1E-01**
	Exposure Medium Total										**5.7E-07**					**6.1E-01**

TABLE 282
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentratio		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU19	Inhalation	**Inorganics**												
				ALUMINUM	1.35E-03	(mg/m^3)	6.95E-03	(ug/m^3)	NA	per (ug/m^3)	--	4.86E-04	(mg/m^3)	5.00E-03	(mg/m^3)	9.7E-02
				ARSENIC	4.56E-07	(mg/m^3)	2.35E-06	(ug/m^3)	4.3E-03	per (ug/m^3)	1.0E-08	1.65E-07	(mg/m^3)	1.50E-05	(mg/m^3)	1.1E-02
				COBALT	9.76E-07	(mg/m^3)	5.03E-06	(ug/m^3)	9.0E-03	per (ug/m^3)	4.5E-08	3.52E-07	(mg/m^3)	6.00E-06	(mg/m^3)	5.9E-02
				IRON	1.96E-03	(mg/m^3)	1.01E-02	(ug/m^3)	NA	per (ug/m^3)	--	7.08E-04	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	1.93E-05	(mg/m^3)	9.96E-05	(ug/m^3)	NA	per (ug/m^3)	--	6.97E-06	(mg/m^3)	5.00E-05	(mg/m^3)	1.4E-01
				VANADIUM	4.81E-08	(mg/m^3)	2.48E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.74E-08	(mg/m^3)	1.00E-04	(mg/m^3)	1.7E-04
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	8.74E-08	(mg/m^3)	4.51E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	2.7E-11	3.15E-08	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.17E-07	(mg/m^3)	6.01E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	3.6E-11	4.21E-08	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	6.31E-08	(mg/m^3)	3.25E-07	(ug/m^3)	6.0E-04	per (ug/m^3)	2.0E-10	2.28E-08	(mg/m^3)	2.00E-06	(mg/m^3)	1.1E-02
				DIBENZ(A,H)ANTHRACENE	1.26E-08	(mg/m^3)	6.51E-08	(ug/m^3)	6.0E-04	per (ug/m^3)	3.9E-11	4.56E-09	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	4.85E-08	(mg/m^3)	2.50E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	1.5E-11	1.75E-08	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**5.6E-08**					**3.2E-01**
		Exposure Point Total									**5.6E-08**					**3.2E-01**
	Exposure Medium Total										**5.6E-08**					**3.2E-01**
Soil Total											**6.2E-07**					**9.2E-01**
										Total of Receptor Risks Across All Media	**6.2E-07**				Total of Receptor Hazards Across All Media	**9.2E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 283
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU19	Ingestion	**Inorganics**												
				ALUMINUM	2.77E+04	(mg/kg)	8.42E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.95E-03	(mg/kg-day)	1.00E+00	(mg/kg-day)	2.9E-03
				ARSENIC	9.40E+00	(mg/kg)	1.71E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.6E-07	5.99E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.0E-03
				COBALT	2.01E+01	(mg/kg)	6.10E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.13E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.1E-03
				IRON	4.04E+04	(mg/kg)	1.23E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	4.29E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	6.1E-03
				MANGANESE	3.98E+02	(mg/kg)	1.21E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	4.23E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.0E-04
				VANADIUM	5.82E+01	(mg/kg)	1.77E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	6.18E-06	(mg/kg-day)	5.00E-03	(mg/kg-day)	1.2E-03
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.80E+00	(mg/kg)	5.46E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	5.5E-09	1.91E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.40E+00	(mg/kg)	7.28E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	7.3E-09	2.55E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.30E+00	(mg/kg)	3.94E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.9E-08	1.38E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	4.6E-04
				DIBENZ(A,H)ANTHRACENE	2.60E-01	(mg/kg)	7.89E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	7.9E-09	2.76E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.00E+00	(mg/kg)	3.03E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.0E-09	1.06E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.2E-07**					**2.0E-02**
			Dermal[1]	**Inorganics**												
				ALUMINUM	2.77E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E+00	(mg/kg-day)	--
				ARSENIC	9.40E+00	(mg/kg)	3.61E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.4E-08	1.26E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.2E-04
				COBALT	2.01E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	4.04E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.98E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				VANADIUM	5.82E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.30E-04	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.80E+00	(mg/kg)	3.00E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.0E-09	1.05E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.40E+00	(mg/kg)	4.00E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.0E-09	1.40E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.30E+00	(mg/kg)	2.16E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.2E-08	7.58E-08	(mg/kg-day)	3.0E-04	(mg/kg-day)	2.5E-04
				DIBENZ(A,H)ANTHRACENE	2.60E-01	(mg/kg)	4.33E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.3E-09	1.52E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.00E+00	(mg/kg)	1.66E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.7E-09	5.83E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**8.9E-08**					**6.7E-04**
		Exposure Point Total									**4.1E-07**					**2.1E-02**
	Exposure Medium Total										**4.1E-07**					**2.1E-02**

TABLE 283
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU19	Inhalation	**Inorganics**												
				ALUMINUM	2.29E-05	(mg/m^3)	9.27E-05	(ug/m^3)	NA	per (ug/m^3)	--	3.25E-07	(mg/m^3)	5.00E-03	(mg/m^3)	6.5E-05
				ARSENIC	7.77E-09	(mg/m^3)	3.14E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.4E-10	1.10E-10	(mg/m^3)	1.50E-05	(mg/m^3)	7.3E-06
				COBALT	1.66E-08	(mg/m^3)	6.72E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	6.0E-10	2.35E-10	(mg/m^3)	6.00E-06	(mg/m^3)	3.9E-05
				IRON	3.34E-05	(mg/m^3)	1.35E-04	(ug/m^3)	NA	per (ug/m^3)	--	4.73E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.29E-07	(mg/m^3)	1.33E-06	(ug/m^3)	NA	per (ug/m^3)	--	4.66E-09	(mg/m^3)	5.00E-05	(mg/m^3)	9.3E-05
				VANADIUM	4.81E-08	(mg/m^3)	1.95E-07	(ug/m^3)	NA	per (ug/m^3)	--	6.81E-10	(mg/m^3)	1.00E-04	(mg/m^3)	6.8E-06
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.49E-09	(mg/m^3)	6.02E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	3.6E-13	2.11E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.98E-09	(mg/m^3)	8.02E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	4.8E-13	2.81E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.07E-09	(mg/m^3)	4.35E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	2.6E-12	1.52E-11	(mg/m^3)	2.00E-06	(mg/m^3)	7.6E-06
				DIBENZ(A,H)ANTHRACENE	2.15E-10	(mg/m^3)	8.69E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	5.2E-13	3.04E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	8.26E-10	(mg/m^3)	3.34E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.0E-13	1.17E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**7.4E-10**					**2.2E-04**
		Exposure Point Total									**7.4E-10**					**2.2E-04**
	Exposure Medium Total										**7.4E-10**					**2.2E-04**
Soil Total											**4.1E-07**					**2.1E-02**
										Total of Receptor Risks Across All Media	**4.1E-07**				Total of Receptor Hazards Across All Media	**2.1E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 284
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU19	Ingestion	**Inorganics**												
				ALUMINUM	2.77E+04	(mg/kg)	1.19E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.38E-02	(mg/kg-day)	1.00E+00	(mg/kg-day)	1.4E-02
				ARSENIC	9.40E+00	(mg/kg)	2.41E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.6E-07	2.81E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.4E-03
				COBALT	2.01E+01	(mg/kg)	8.59E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.00E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.3E-02
				IRON	4.04E+04	(mg/kg)	1.73E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	2.01E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	2.9E-02
				MANGANESE	3.98E+02	(mg/kg)	1.70E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.98E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.4E-03
				VANADIUM	5.82E+01	(mg/kg)	2.49E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	2.90E-05	(mg/kg-day)	5.00E-03	(mg/kg-day)	5.8E-03
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.80E+00	(mg/kg)	2.31E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.3E-08	8.97E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.40E+00	(mg/kg)	3.08E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.1E-08	1.20E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.30E+00	(mg/kg)	1.67E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.7E-07	6.48E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.2E-03
				DIBENZ(A,H)ANTHRACENE	2.60E-01	(mg/kg)	3.33E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	3.3E-08	1.30E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.00E+00	(mg/kg)	1.28E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.3E-08	4.98E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**6.3E-07**					**9.5E-02**
			Dermal[1]	**Inorganics**												
				ALUMINUM	2.77E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E+00	(mg/kg-day)	--
				ARSENIC	9.40E+00	(mg/kg)	5.60E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.4E-08	6.53E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.2E-03
				COBALT	2.01E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	4.04E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.98E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				VANADIUM	5.82E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.30E-04	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.80E+00	(mg/kg)	1.39E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.4E-08	5.42E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.40E+00	(mg/kg)	1.86E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.9E-08	7.22E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.30E+00	(mg/kg)	1.01E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.0E-07	3.91E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-03
				DIBENZ(A,H)ANTHRACENE	2.60E-01	(mg/kg)	2.01E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.0E-08	7.83E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.00E+00	(mg/kg)	7.74E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	7.7E-09	3.01E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.4E-07**					**3.5E-03**
		Exposure Point Total									**8.7E-07**					**9.8E-02**
	Exposure Medium Total										**8.7E-07**					**9.8E-02**

TABLE 284
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU19	Inhalation	**Inorganics**												
				ALUMINUM	2.29E-05	(mg/m^3)	4.64E-05	(ug/m^3)	NA	per (ug/m^3)	--	5.41E-07	(mg/m^3)	5.00E-03	(mg/m^3)	1.1E-04
				ARSENIC	7.77E-09	(mg/m^3)	1.57E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	6.8E-11	1.83E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.2E-05
				COBALT	1.66E-08	(mg/m^3)	3.36E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	3.0E-10	3.92E-10	(mg/m^3)	6.00E-06	(mg/m^3)	6.5E-05
				IRON	3.34E-05	(mg/m^3)	6.75E-05	(ug/m^3)	NA	per (ug/m^3)	--	7.88E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.29E-07	(mg/m^3)	6.65E-07	(ug/m^3)	NA	per (ug/m^3)	--	7.76E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.6E-04
				VANADIUM	4.81E-08	(mg/m^3)	9.73E-08	(ug/m^3)	NA	per (ug/m^3)	--	1.13E-09	(mg/m^3)	1.00E-04	(mg/m^3)	1.1E-05
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.49E-09	(mg/m^3)	9.02E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	5.4E-13	3.51E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.98E-09	(mg/m^3)	1.20E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	7.2E-13	4.68E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.07E-09	(mg/m^3)	6.52E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	3.9E-12	2.53E-11	(mg/m^3)	2.00E-06	(mg/m^3)	1.3E-05
				DIBENZ(A,H)ANTHRACENE	2.15E-10	(mg/m^3)	1.30E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	7.8E-13	5.07E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	8.26E-10	(mg/m^3)	5.01E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	3.0E-13	1.95E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**3.8E-10**					**3.6E-04**
		Exposure Point Total									**3.8E-10**					**3.6E-04**
	Exposure Medium Total										**3.8E-10**					**3.6E-04**
Soil Total											**8.7E-07**					**9.9E-02**
										Total of Receptor Risks Across All Media	**8.7E-07**				Total of Receptor Hazards Across All Media	**9.9E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 285
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU19	Ingestion	**Inorganics**												
				ALUMINUM	2.77E+04	(mg/kg)	1.68E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	2.95E-02	(mg/kg-day)	1.00E+00	(mg/kg-day)	2.9E-02
				ARSENIC	9.40E+00	(mg/kg)	3.42E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.1E-07	5.99E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.0E-02
				COBALT	2.01E+01	(mg/kg)	1.22E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	2.13E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.1E-02
				IRON	4.04E+04	(mg/kg)	2.45E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	4.29E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	6.1E-02
				MANGANESE	3.98E+02	(mg/kg)	2.41E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	4.23E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.0E-03
				VANADIUM	5.82E+01	(mg/kg)	3.53E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	6.18E-05	(mg/kg-day)	5.00E-03	(mg/kg-day)	1.2E-02
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.80E+00	(mg/kg)	3.28E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.3E-08	1.91E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.40E+00	(mg/kg)	4.37E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.4E-08	2.55E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.30E+00	(mg/kg)	2.37E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.4E-07	1.38E-06	(mg/kg-day)	3.0E-04	(mg/kg-day)	4.6E-03
				DIBENZ(A,H)ANTHRACENE	2.60E-01	(mg/kg)	4.73E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.7E-08	2.76E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.00E+00	(mg/kg)	1.82E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.8E-08	1.06E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**8.9E-07**					**2.0E-01**
			Dermal[1]	**Inorganics**												
				ALUMINUM	2.77E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E+00	(mg/kg-day)	--
				ARSENIC	9.40E+00	(mg/kg)	3.60E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.4E-08	6.31E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.1E-03
				COBALT	2.01E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	4.04E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.98E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				VANADIUM	5.82E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.30E-04	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.80E+00	(mg/kg)	8.97E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	9.0E-09	5.23E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.40E+00	(mg/kg)	1.20E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.2E-08	6.98E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.30E+00	(mg/kg)	6.48E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	6.5E-08	3.78E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.3E-03
				DIBENZ(A,H)ANTHRACENE	2.60E-01	(mg/kg)	1.30E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.3E-08	7.56E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.00E+00	(mg/kg)	4.99E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	5.0E-09	2.91E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.6E-07**					**3.4E-03**
		Exposure Point Total									**1.0E-06**					**2.1E-01**
	Exposure Medium Total										**1.0E-06**					**2.1E-01**

TABLE 285
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU19	Inhalation	**Inorganics**												
				ALUMINUM	2.29E-05	(mg/m^3)	1.85E-05	(ug/m^3)	NA	per (ug/m^3)	--	3.25E-07	(mg/m^3)	5.00E-03	(mg/m^3)	6.5E-05
				ARSENIC	7.77E-09	(mg/m^3)	6.28E-09	(ug/m^3)	4.30E-03	per (ug/m^3)	2.7E-11	1.10E-10	(mg/m^3)	1.50E-05	(mg/m^3)	7.3E-06
				COBALT	1.66E-08	(mg/m^3)	1.34E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.2E-10	2.35E-10	(mg/m^3)	6.00E-06	(mg/m^3)	3.9E-05
				IRON	3.34E-05	(mg/m^3)	2.70E-05	(ug/m^3)	NA	per (ug/m^3)	--	4.73E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.29E-07	(mg/m^3)	2.66E-07	(ug/m^3)	NA	per (ug/m^3)	--	4.66E-09	(mg/m^3)	5.00E-05	(mg/m^3)	9.3E-05
				VANADIUM	4.81E-08	(mg/m^3)	3.89E-08	(ug/m^3)	NA	per (ug/m^3)	--	6.81E-10	(mg/m^3)	1.00E-04	(mg/m^3)	6.8E-06
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.49E-09	(mg/m^3)	3.61E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.2E-13	2.11E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.98E-09	(mg/m^3)	4.81E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.9E-13	2.81E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.07E-09	(mg/m^3)	2.61E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	1.6E-12	1.52E-11	(mg/m^3)	2.00E-06	(mg/m^3)	7.6E-06
				DIBENZ(A,H)ANTHRACENE	2.15E-10	(mg/m^3)	5.21E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	3.1E-13	3.04E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	8.26E-10	(mg/m^3)	2.01E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.2E-13	1.17E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.5E-10**					**2.2E-04**
		Exposure Point Total									**1.5E-10**					**2.2E-04**
	Exposure Medium Total										**1.5E-10**					**2.2E-04**
Soil Total											**1.0E-06**					**2.1E-01**
										Total of Receptor Risks Across All Media	**1.0E-06**				Total of Receptor Hazards Across All Media	**2.1E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 286
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU19	Ingestion	**Inorganics**												
				ALUMINUM	2.77E+04	(mg/kg)	1.83E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.13E-03	(mg/kg-day)	1.00E+00	(mg/kg-day)	2.1E-03
				ARSENIC	9.40E+00	(mg/kg)	3.72E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.6E-08	4.34E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-03
				COBALT	2.01E+01	(mg/kg)	1.32E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.55E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.2E-03
				IRON	4.04E+04	(mg/kg)	2.66E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	3.11E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	4.4E-03
				MANGANESE	3.98E+02	(mg/kg)	2.62E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	3.06E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.2E-04
				VANADIUM	5.82E+01	(mg/kg)	3.84E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	4.48E-06	(mg/kg-day)	5.00E-03	(mg/kg-day)	9.0E-04
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.80E+00	(mg/kg)	3.56E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.6E-09	1.38E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.40E+00	(mg/kg)	4.75E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	4.7E-09	1.85E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.30E+00	(mg/kg)	2.57E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.6E-08	1.00E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.3E-04
				DIBENZ(A,H)ANTHRACENE	2.60E-01	(mg/kg)	5.14E-09	(mg/kg-day)	1.00E+00	per (mg/kg-day)	5.1E-09	2.00E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.00E+00	(mg/kg)	1.98E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.0E-09	7.69E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**9.7E-08**					**1.5E-02**
			Dermal[1]	**Inorganics**												
				ALUMINUM	2.77E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E+00	(mg/kg-day)	--
				ARSENIC	9.40E+00	(mg/kg)	1.73E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.6E-08	2.01E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.7E-04
				COBALT	2.01E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	4.04E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.98E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				VANADIUM	5.82E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.30E-04	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.80E+00	(mg/kg)	4.30E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	4.3E-09	1.67E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.40E+00	(mg/kg)	5.73E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	5.7E-09	2.23E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.30E+00	(mg/kg)	3.10E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	3.1E-08	1.21E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.0E-04
				DIBENZ(A,H)ANTHRACENE	2.60E-01	(mg/kg)	6.21E-09	(mg/kg-day)	1.00E+00	per (mg/kg-day)	6.2E-09	2.41E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.00E+00	(mg/kg)	2.39E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.4E-09	9.29E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**7.6E-08**					**1.1E-03**
		Exposure Point Total									**1.7E-07**					**1.6E-02**
	Exposure Medium Total										**1.7E-07**					**1.6E-02**

TABLE 286
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU19	Inhalation	**Inorganics**												
				ALUMINUM	2.29E-05	(mg/m^3)	1.44E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.68E-07	(mg/m^3)	5.00E-03	(mg/m^3)	3.4E-05
				ARSENIC	7.77E-09	(mg/m^3)	4.86E-09	(ug/m^3)	4.30E-03	per (ug/m^3)	2.1E-11	5.68E-11	(mg/m^3)	1.50E-05	(mg/m^3)	3.8E-06
				COBALT	1.66E-08	(mg/m^3)	1.04E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	9.4E-11	1.21E-10	(mg/m^3)	6.00E-06	(mg/m^3)	2.0E-05
				IRON	3.34E-05	(mg/m^3)	2.09E-05	(ug/m^3)	NA	per (ug/m^3)	--	2.44E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.29E-07	(mg/m^3)	2.06E-07	(ug/m^3)	NA	per (ug/m^3)	--	2.40E-09	(mg/m^3)	5.00E-05	(mg/m^3)	4.8E-05
				VANADIUM	4.81E-08	(mg/m^3)	3.01E-08	(ug/m^3)	NA	per (ug/m^3)	--	3.51E-10	(mg/m^3)	1.00E-04	(mg/m^3)	3.5E-06
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.49E-09	(mg/m^3)	2.79E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.7E-13	1.09E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.98E-09	(mg/m^3)	3.73E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.2E-13	1.45E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.07E-09	(mg/m^3)	2.02E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	1.2E-12	7.85E-12	(mg/m^3)	2.00E-06	(mg/m^3)	3.9E-06
				DIBENZ(A,H)ANTHRACENE	2.15E-10	(mg/m^3)	4.04E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	2.4E-13	1.57E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	8.26E-10	(mg/m^3)	1.55E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	9.3E-14	6.04E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.2E-10**					**1.1E-04**
		Exposure Point Total									**1.2E-10**					**1.1E-04**
	Exposure Medium Total										**1.2E-10**					**1.1E-04**
Soil Total											**1.7E-07**					**1.6E-02**
										Total of Receptor Risks Across All Media	**1.7E-07**				Total of Receptor Hazards Across All Media	**1.6E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 287
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU19	Ingestion	**Inorganics**												
				ALUMINUM	2.77E+04	(mg/kg)	1.25E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	6.76E-03	(mg/kg-day)	1.00E+00	(mg/kg-day)	6.8E-03
				ARSENIC	9.40E+00	(mg/kg)	2.55E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.8E-07	1.37E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.6E-03
				COBALT	2.01E+01	(mg/kg)	9.09E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	4.89E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.6E-02
				IRON	4.04E+04	(mg/kg)	1.83E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	9.84E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.4E-02
				MANGANESE	3.98E+02	(mg/kg)	1.80E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	9.69E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	6.9E-04
				VANADIUM	5.82E+01	(mg/kg)	2.63E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.42E-05	(mg/kg-day)	5.00E-03	(mg/kg-day)	2.8E-03
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.80E+00	(mg/kg)	2.44E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.4E-08	4.38E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.40E+00	(mg/kg)	3.26E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.3E-08	5.84E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.30E+00	(mg/kg)	1.76E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.8E-07	3.17E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.1E-03
				DIBENZ(A,H)ANTHRACENE	2.60E-01	(mg/kg)	3.53E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	3.5E-08	6.33E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.00E+00	(mg/kg)	1.36E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.4E-08	2.44E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**6.6E-07**					**4.6E-02**
			Dermal[1]	**Inorganics**												
				ALUMINUM	2.77E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E+00	(mg/kg-day)	--
				ARSENIC	9.40E+00	(mg/kg)	5.03E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.6E-08	2.71E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.0E-04
				COBALT	2.01E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	4.04E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.98E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				VANADIUM	5.82E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.30E-04	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.80E+00	(mg/kg)	1.25E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.3E-08	2.25E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.40E+00	(mg/kg)	1.67E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.7E-08	3.00E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.30E+00	(mg/kg)	9.05E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	9.1E-08	1.62E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.4E-04
				DIBENZ(A,H)ANTHRACENE	2.60E-01	(mg/kg)	1.81E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.8E-08	3.25E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.00E+00	(mg/kg)	6.96E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	7.0E-09	1.25E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.2E-07**					**1.4E-03**
		Exposure Point Total									**8.9E-07**					**4.8E-02**
	Exposure Medium Total										**8.9E-07**					**4.8E-02**

TABLE 287
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	DU19	Inhalation	**Inorganics**												
				ALUMINUM	2.29E-05	(mg/m^3)	2.33E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.26E-06	(mg/m^3)	5.00E-03	(mg/m^3)	2.5E-04
				ARSENIC	7.77E-09	(mg/m^3)	7.91E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	3.4E-10	4.26E-10	(mg/m^3)	1.50E-05	(mg/m^3)	2.8E-05
				COBALT	1.66E-08	(mg/m^3)	1.69E-07	(ug/m^3)	9.00E-03	per (ug/m^3)	1.5E-09	9.10E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.5E-04
				IRON	3.34E-05	(mg/m^3)	3.40E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.83E-06	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.29E-07	(mg/m^3)	3.35E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.80E-08	(mg/m^3)	5.00E-05	(mg/m^3)	3.6E-04
				VANADIUM	4.81E-08	(mg/m^3)	4.89E-07	(ug/m^3)	NA	per (ug/m^3)	--	2.64E-09	(mg/m^3)	1.00E-04	(mg/m^3)	2.6E-05
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.49E-09	(mg/m^3)	4.54E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	2.7E-12	8.15E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.98E-09	(mg/m^3)	6.06E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	3.6E-12	1.09E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.07E-09	(mg/m^3)	3.28E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	2.0E-11	5.89E-11	(mg/m^3)	2.00E-06	(mg/m^3)	2.9E-05
				DIBENZ(A,H)ANTHRACENE	2.15E-10	(mg/m^3)	6.56E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	3.9E-12	1.18E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	8.26E-10	(mg/m^3)	2.52E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	1.5E-12	4.53E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.9E-09**					**8.5E-04**
		Exposure Point Total									**1.9E-09**					**8.5E-04**
	Exposure Medium Total										**1.9E-09**					**8.5E-04**
Soil Total											**8.9E-07**					**4.9E-02**
										Total of Receptor Risks Across All Media	**8.9E-07**				Total of Receptor Hazards Across All Media	**4.9E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 288
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU19	**Inorganics**					**Inorganics**					
			ALUMINUM	--	--	--	NA	ALUMINUM	Neurological	1.5E-02	--	6.7E-04	1.6E-02
			ARSENIC	1.7E-06	3.5E-07	1.7E-09	2.0E-06	ARSENIC	Skin, Cardiovascular	1.0E-02	2.2E-03	7.6E-05	1.3E-02
			COBALT	--	--	7.8E-09	7.8E-09	COBALT	Thyroid	3.7E-02	--	4.0E-04	3.7E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	3.2E-02	--	--	3.2E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.6E-03	--	9.6E-04	2.5E-03
			VANADIUM	--	--	--	NA	VANADIUM	Skin	6.4E-03	--	7.0E-05	6.4E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZ(A)ANTHRACENE	3.5E-08	1.9E-08	4.7E-12	5.5E-08	BENZ(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	4.7E-08	2.6E-08	6.2E-12	7.3E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	2.5E-07	1.4E-07	3.4E-11	3.9E-07	BENZO(A)PYRENE	Developmental System	2.4E-03	1.3E-03	7.8E-05	3.8E-03
			DIBENZ(A,H)ANTHRACENE	5.1E-08	2.8E-08	6.7E-12	7.9E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.0E-08	1.1E-08	2.6E-12	3.0E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	2.1E-06	5.7E-07	9.6E-09	2.6E-06		(Total)	1.0E-01	3.5E-03	2.3E-03	1.1E-01
						Total Risk Across Surface Soil	**2.6E-06**					**Total Hazard Index Across Surface Soil**	**1.1E-01**
						Total Risk Across All Media and All Exposure Routes	**3E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.1**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 289
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Researcher

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU19	**Inorganics**					**Inorganics**					
			ALUMINUM	--	--	--	NA	ALUMINUM	Neurological	4.9E-03	--	2.2E-04	5.2E-03
			ARSENIC	6.5E-08	3.4E-08	6.8E-11	9.9E-08	ARSENIC	Skin, Cardiovascular	3.3E-03	1.8E-03	2.5E-05	5.1E-03
			COBALT	--	--	3.0E-10	3.0E-10	COBALT	Thyroid	1.2E-02	--	1.3E-04	1.2E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.0E-02	--	--	1.0E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	5.1E-04	--	3.1E-04	8.2E-04
			VANADIUM	--	--	--	NA	VANADIUM	Skin	2.1E-03	--	2.3E-05	2.1E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZ(A)ANTHRACENE	1.4E-09	1.9E-09	1.8E-13	3.3E-09	BENZ(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.8E-09	2.5E-09	2.4E-13	4.4E-09	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	9.9E-09	1.4E-08	1.3E-12	2.4E-08	BENZO(A)PYRENE	Developmental System	7.7E-04	1.1E-03	2.6E-05	1.9E-03
			DIBENZ(A,H)ANTHRACENE	2.0E-09	2.7E-09	2.6E-13	4.7E-09	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	7.6E-10	1.0E-09	1.0E-13	1.8E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	8.0E-08	5.6E-08	3.7E-10	1.4E-07		(Total)	3.4E-02	2.8E-03	7.3E-04	3.7E-02
							Total Risk Across Surface Soil	**1.4E-07**					**Total Hazard Index Across Surface Soil**	**3.7E-02**
							Total Risk Across All Media and All Exposure Routes	**1E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.04**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 290
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Location: Iona Island
Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU19	**Inorganics**					**Inorganics**					
			ALUMINUM	--	--	--	NA	ALUMINUM	Neurological	8.6E-02	--	9.7E-02	1.8E-01
			ARSENIC	3.8E-07	6.0E-08	1.0E-08	4.5E-07	ARSENIC	Skin, Cardiovascular	5.8E-02	9.4E-03	1.1E-02	7.9E-02
			COBALT	--	--	4.5E-08	4.5E-08	COBALT	Thyroid	2.1E-01	--	5.9E-02	2.7E-01
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.8E-01	--	--	1.8E-01
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	8.8E-03	--	1.4E-01	1.5E-01
			VANADIUM	--	--	--	NA	VANADIUM	Skin	3.6E-02	--	1.7E-04	3.6E-02
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZ(A)ANTHRACENE	8.0E-09	3.3E-09	2.7E-11	1.1E-08	BENZ(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.1E-08	4.4E-09	3.6E-11	1.5E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	5.8E-08	2.4E-08	2.0E-10	8.2E-08	BENZO(A)PYRENE	Developmental System	1.3E-02	5.6E-03	1.1E-02	3.0E-02
			DIBENZ(A,H)ANTHRACENE	1.2E-08	4.8E-09	3.9E-11	1.6E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	4.4E-09	1.9E-09	1.5E-11	6.3E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	4.7E-07	9.9E-08	5.6E-08	6.2E-07		(Total)	5.9E-01	1.5E-02	3.2E-01	9.2E-01
							Total Risk Across Surface Soil	**6.2E-07**					**Total Hazard Index Across Surface Soil**	**9.2E-01**
							Total Risk Across All Media and All Exposure Routes	**6E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.9**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 291
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU19	**Inorganics**					**Inorganics**					
			ALUMINUM	--	--	--	NA	ALUMINUM	Neurological	2.9E-03	--	6.5E-05	3.0E-03
			ARSENIC	2.6E-07	5.4E-08	1.4E-10	3.1E-07	ARSENIC	Skin, Cardiovascular	2.0E-03	4.2E-04	7.3E-06	2.4E-03
			COBALT	--	--	6.0E-10	6.0E-10	COBALT	Thyroid	7.1E-03	--	3.9E-05	7.2E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	6.1E-03	--	--	6.1E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.0E-04	--	9.3E-05	3.9E-04
			VANADIUM	--	--	--	NA	VANADIUM	Skin	1.2E-03	--	6.8E-06	1.2E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZ(A)ANTHRACENE	5.5E-09	3.0E-09	3.6E-13	8.5E-09	BENZ(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	7.3E-09	4.0E-09	4.8E-13	1.1E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	3.9E-08	2.2E-08	2.6E-12	6.1E-08	BENZO(A)PYRENE	Developmental System	4.6E-04	2.5E-04	7.6E-06	7.2E-04
			DIBENZ(A,H)ANTHRACENE	7.9E-09	4.3E-09	5.2E-13	1.2E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	3.0E-09	1.7E-09	2.0E-13	4.7E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	3.2E-07	8.9E-08	7.4E-10	4.1E-07		(Total)	2.0E-02	6.7E-04	2.2E-04	2.1E-02
							Total Risk Across Surface Soil	**4.1E-07**					**Total Hazard Index Across Surface Soil**	**2.1E-02**
							Total Risk Across All Media and All Exposure Routes	**4E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 292
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU19	**Inorganics**					**Inorganics**					
			ALUMINUM	--	--	--	NA	ALUMINUM	Neurological	1.4E-02	--	1.1E-04	1.4E-02
			ARSENIC	3.6E-07	8.4E-08	6.8E-11	4.5E-07	ARSENIC	Skin, Cardiovascular	9.4E-03	2.2E-03	1.2E-05	1.2E-02
			COBALT	--	--	3.0E-10	3.0E-10	COBALT	Thyroid	3.3E-02	--	6.5E-05	3.3E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	2.9E-02	--	--	2.9E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.4E-03	--	1.6E-04	1.6E-03
			VANADIUM	--	--	--	NA	VANADIUM	Skin	5.8E-03	--	1.1E-05	5.8E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZ(A)ANTHRACENE	2.3E-08	1.4E-08	5.4E-13	3.7E-08	BENZ(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	3.1E-08	1.9E-08	7.2E-13	4.9E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.7E-07	1.0E-07	3.9E-12	2.7E-07	BENZO(A)PYRENE	Developmental System	2.2E-03	1.3E-03	1.3E-05	3.5E-03
			DIBENZ(A,H)ANTHRACENE	3.3E-08	2.0E-08	7.8E-13	5.3E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	1.3E-08	7.7E-09	3.0E-13	2.1E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	6.3E-07	2.4E-07	3.8E-10	8.7E-07		(Total)	9.5E-02	3.5E-03	3.6E-04	9.9E-02
			Total Risk Across Surface Soil				**8.7E-07**		**Total Hazard Index Across Surface Soil**				**9.9E-02**
			Total Risk Across All Media and All Exposure Routes				**9E-07**		**Total Hazard Index Across All Media and All Exposure Routes**				**0.1**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 293
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU19	**Inorganics**					**Inorganics**					
			ALUMINUM	--	--	--	NA	ALUMINUM	Neurological	2.9E-02	--	6.5E-05	3.0E-02
			ARSENIC	5.1E-07	5.4E-08	2.7E-11	5.7E-07	ARSENIC	Skin, Cardiovascular	2.0E-02	2.1E-03	7.3E-06	2.2E-02
			COBALT	--	--	1.2E-10	1.2E-10	COBALT	Thyroid	7.1E-02	--	3.9E-05	7.1E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	6.1E-02	--	--	6.1E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.0E-03	--	9.3E-05	3.1E-03
			VANADIUM	--	--	--	NA	VANADIUM	Skin	1.2E-02	--	6.8E-06	1.2E-02
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZ(A)ANTHRACENE	3.3E-08	9.0E-09	2.2E-13	4.2E-08	BENZ(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	4.4E-08	1.2E-08	2.9E-13	5.6E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	2.4E-07	6.5E-08	1.6E-12	3.0E-07	BENZO(A)PYRENE	Developmental System	4.6E-03	1.3E-03	7.6E-06	5.9E-03
			DIBENZ(A,H)ANTHRACENE	4.7E-08	1.3E-08	3.1E-13	6.0E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	1.8E-08	5.0E-09	1.2E-13	2.3E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	8.9E-07	1.6E-07	1.5E-10	1.0E-06		(Total)	2.0E-01	3.4E-03	2.2E-04	2.1E-01
			Total Risk Across Surface Soil				**1.0E-06**		**Total Hazard Index Across Surface Soil**				**2.1E-01**
			Total Risk Across All Media and All Exposure Routes				**1E-06**		**Total Hazard Index Across All Media and All Exposure Routes**				**0.2**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 294
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU19	**Inorganics**					**Inorganics**					
			ALUMINUM	--	--	--	NA	ALUMINUM	Neurological	2.1E-03	--	3.4E-05	2.2E-03
			ARSENIC	5.6E-08	2.6E-08	2.1E-11	8.2E-08	ARSENIC	Skin, Cardiovascular	1.4E-03	6.7E-04	3.8E-06	2.1E-03
			COBALT	--	--	9.4E-11	9.4E-11	COBALT	Thyroid	5.2E-03	--	2.0E-05	5.2E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	4.4E-03	--	--	4.4E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.2E-04	--	4.8E-05	2.7E-04
			VANADIUM	--	--	--	NA	VANADIUM	Skin	9.0E-04	--	3.5E-06	9.0E-04
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZ(A)ANTHRACENE	3.6E-09	4.3E-09	1.7E-13	7.9E-09	BENZ(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	4.7E-09	5.7E-09	2.2E-13	1.0E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	2.6E-08	3.1E-08	1.2E-12	5.7E-08	BENZO(A)PYRENE	Developmental System	3.3E-04	4.0E-04	3.9E-06	7.4E-04
			DIBENZ(A,H)ANTHRACENE	5.1E-09	6.2E-09	2.4E-13	1.1E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.0E-09	2.4E-09	9.3E-14	4.4E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	9.7E-08	7.6E-08	1.2E-10	1.7E-07		(Total)	1.5E-02	1.1E-03	1.1E-04	1.6E-02
							Total Risk Across Surface Soil	**1.7E-07**					**Total Hazard Index Across Surface Soil**	**1.6E-02**
							Total Risk Across All Media and All Exposure Routes	**2E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 295
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA - DU19

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Camper
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DU19	**Inorganics**					**Inorganics**					
			ALUMINUM	--	--	--	NA	ALUMINUM	Neurological	6.8E-03	--	2.5E-04	7.0E-03
			ARSENIC	3.8E-07	7.6E-08	3.4E-10	4.6E-07	ARSENIC	Skin, Cardiovascular	4.6E-03	9.0E-04	2.8E-05	5.5E-03
			COBALT	--	--	1.5E-09	1.5E-09	COBALT	Thyroid	1.6E-02	--	1.5E-04	1.6E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.4E-02	--	--	1.4E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	6.9E-04	--	3.6E-04	1.1E-03
			LEAD	--	--	--	NA	LEAD	NA	--	--	--	NA
			VANADIUM	--	--	--	NA	VANADIUM	Skin	2.8E-03	--	2.6E-05	2.9E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZ(A)ANTHRACENE	2.4E-08	1.3E-08	2.7E-12	3.7E-08	BENZ(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	3.3E-08	1.7E-08	3.6E-12	4.9E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.8E-07	9.1E-08	2.0E-11	2.7E-07	BENZO(A)PYRENE	Developmental System	1.1E-03	5.4E-04	2.9E-05	1.6E-03
			DIBENZ(A,H)ANTHRACENE	3.5E-08	1.8E-08	3.9E-12	5.3E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	1.4E-08	7.0E-09	1.5E-12	2.1E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	6.6E-07	2.2E-07	1.9E-09	8.9E-07		(Total)	4.6E-02	1.4E-03	8.5E-04	4.9E-02
							Total Risk Across Surface Soil	**8.9E-07**					**Total Hazard Index Across Surface Soil**	**4.9E-02**
							Total Risk Across All Media and All Exposure Routes	**9E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.05**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 296
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU22

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU22	Ingestion	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.60E+00	(mg/kg)	5.09E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	5.1E-08	1.42E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	4.09E+00	(mg/kg)	8.00E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	8.0E-08	2.24E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.48E+00	(mg/kg)	4.85E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.9E-07	1.36E-06	(mg/kg-day)	3.0E-04	(mg/kg-day)	4.5E-03
				DIBENZ(A,H)ANTHRACENE	5.13E-01	(mg/kg)	1.00E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.0E-07	2.81E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.55E+00	(mg/kg)	3.03E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.0E-08	8.49E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**7.5E-07**					**4.5E-03**
			Dermal[1]	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.60E+00	(mg/kg)	2.80E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.8E-08	7.84E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	4.09E+00	(mg/kg)	4.40E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.4E-08	1.23E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.48E+00	(mg/kg)	2.67E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.7E-07	7.48E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	2.5E-03
				DIBENZ(A,H)ANTHRACENE	5.13E-01	(mg/kg)	5.52E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	5.5E-08	1.55E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.55E+00	(mg/kg)	1.67E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.7E-08	4.67E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**4.1E-07**					**2.5E-03**
		Exposure Point Total									**1.2E-06**					**7.0E-03**
	Exposure Medium Total										**1.2E-06**					**7.0E-03**
	Air	DU22	Inhalation	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.15E-09	(mg/m^3)	1.12E-07	(ug/m^3)	6.00E-05	per (ug/m^3)	6.7E-12	3.14E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	3.38E-09	(mg/m^3)	1.76E-07	(ug/m^3)	6.00E-05	per (ug/m^3)	1.1E-11	4.94E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	2.05E-09	(mg/m^3)	1.07E-07	(ug/m^3)	6.00E-04	per (ug/m^3)	6.4E-11	2.99E-10	(mg/m^3)	2.00E-06	(mg/m^3)	1.5E-04
				DIBENZ(A,H)ANTHRACENE	4.24E-10	(mg/m^3)	2.21E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	1.3E-11	6.19E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.28E-09	(mg/m^3)	6.68E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	4.0E-12	1.87E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**9.9E-11**					**1.5E-04**
		Exposure Point Total									**9.9E-11**					**1.5E-04**
	Exposure Medium Total										**9.9E-11**					**1.5E-04**
Soil Total											**1.2E-06**					**7.2E-03**
										Total of Receptor Risks Across All Media	**1.2E-06**			Total of Receptor Hazards Across All Media		**7.2E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 297
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU22

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU22	Ingestion	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.60E+00	(mg/kg)	1.98E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.0E-09	4.63E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	4.09E+00	(mg/kg)	3.12E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.1E-09	7.28E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.48E+00	(mg/kg)	1.89E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.9E-08	4.42E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.5E-03
				DIBENZ(A,H)ANTHRACENE	5.13E-01	(mg/kg)	3.92E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.9E-09	9.14E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.55E+00	(mg/kg)	1.18E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.2E-09	2.76E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.9E-08**					**1.5E-03**
			Dermal[1]	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.60E+00	(mg/kg)	2.73E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.7E-09	6.37E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	4.09E+00	(mg/kg)	4.29E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.3E-09	1.00E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.48E+00	(mg/kg)	2.60E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.6E-08	6.07E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	2.0E-03
				DIBENZ(A,H)ANTHRACENE	5.13E-01	(mg/kg)	5.39E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	5.4E-09	1.26E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.55E+00	(mg/kg)	1.63E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.6E-09	3.80E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**4.0E-08**					**2.0E-03**
		Exposure Point Total									**6.9E-08**					**3.5E-03**
	Exposure Medium Total										**6.9E-08**					**3.5E-03**
	Air	DU22	Inhalation	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.15E-09	(mg/m^3)	4.37E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.6E-13	1.02E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	3.38E-09	(mg/m^3)	6.88E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	4.1E-13	1.61E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	2.05E-09	(mg/m^3)	4.17E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	2.5E-12	9.73E-11	(mg/m^3)	2.00E-06	(mg/m^3)	4.9E-05
				DIBENZ(A,H)ANTHRACENE	4.24E-10	(mg/m^3)	8.63E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	5.2E-13	2.01E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.28E-09	(mg/m^3)	2.61E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.6E-13	6.08E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**3.9E-12**					**4.9E-05**
		Exposure Point Total									**3.9E-12**					**4.9E-05**
	Exposure Medium Total										**3.9E-12**					**4.9E-05**
Soil Total											**6.9E-08**					**3.5E-03**
											Total of Receptor Risks Across All Media **6.9E-08**				Total of Receptor Hazards Across All Media	**3.5E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 298
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU22

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU22	Ingestion	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.60E+00	(mg/kg)	1.15E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.2E-08	8.08E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	4.09E+00	(mg/kg)	1.82E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.8E-08	1.27E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.48E+00	(mg/kg)	1.10E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.1E-07	7.71E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.6E-02
				DIBENZ(A,H)ANTHRACENE	5.13E-01	(mg/kg)	2.28E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.3E-08	1.59E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.55E+00	(mg/kg)	6.88E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	6.9E-09	4.82E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.7E-07**					**2.6E-02**
			Dermal[1]	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.60E+00	(mg/kg)	4.81E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.8E-09	3.37E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	4.09E+00	(mg/kg)	7.57E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	7.6E-09	5.30E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.48E+00	(mg/kg)	4.59E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.6E-08	3.21E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.1E-02
				DIBENZ(A,H)ANTHRACENE	5.13E-01	(mg/kg)	9.49E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	9.5E-09	6.65E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.55E+00	(mg/kg)	2.87E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.9E-09	2.01E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**7.1E-08**					**1.1E-02**
		Exposure Point Total									**2.4E-07**					**3.6E-02**
	Exposure Medium Total										**2.4E-07**					**3.6E-02**
	Air	DU22	Inhalation	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	1.26E-07	(mg/m^3)	6.51E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	3.9E-11	4.56E-08	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.99E-07	(mg/m^3)	1.02E-06	(ug/m^3)	6.0E-05	per (ug/m^3)	6.1E-11	7.17E-08	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.20E-07	(mg/m^3)	6.21E-07	(ug/m^3)	6.0E-04	per (ug/m^3)	3.7E-10	4.35E-08	(mg/m^3)	2.00E-06	(mg/m^3)	2.2E-02
				DIBENZ(A,H)ANTHRACENE	2.49E-08	(mg/m^3)	1.28E-07	(ug/m^3)	6.0E-04	per (ug/m^3)	7.7E-11	8.99E-09	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	7.52E-08	(mg/m^3)	3.88E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	2.3E-11	2.72E-08	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**5.7E-10**					**2.2E-02**
		Exposure Point Total									**5.7E-10**					**2.2E-02**
	Exposure Medium Total										**5.7E-10**					**2.2E-02**
Soil Total											**2.4E-07**					**5.8E-02**
										Total of Receptor Risks Across All Media	**2.4E-07**			Total of Receptor Hazards Across All Media		**5.8E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 299
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU22

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU22	Ingestion	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.60E+00	(mg/kg)	7.89E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	7.9E-09	2.76E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	4.09E+00	(mg/kg)	1.24E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.2E-08	4.34E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.48E+00	(mg/kg)	7.52E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	7.5E-08	2.63E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	8.8E-04
				DIBENZ(A,H)ANTHRACENE	5.13E-01	(mg/kg)	1.56E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.6E-08	5.45E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.55E+00	(mg/kg)	4.70E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.7E-09	1.65E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.2E-07**					**8.8E-04**
			Dermal[1]	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.60E+00	(mg/kg)	4.33E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.3E-09	1.52E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	4.09E+00	(mg/kg)	6.81E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	6.8E-09	2.38E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.48E+00	(mg/kg)	4.13E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.1E-08	1.45E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	4.8E-04
				DIBENZ(A,H)ANTHRACENE	5.13E-01	(mg/kg)	8.54E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	8.5E-09	2.99E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.55E+00	(mg/kg)	2.58E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.6E-09	9.03E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**6.4E-08**					**4.8E-04**
		Exposure Point Total									**1.8E-07**					**1.4E-03**
	Exposure Medium Total										**1.8E-07**					**1.4E-03**
	Air	DU22	Inhalation	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.15E-09	(mg/m^3)	8.69E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	5.2E-13	3.04E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	3.38E-09	(mg/m^3)	1.37E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	8.2E-13	4.78E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	2.05E-09	(mg/m^3)	8.29E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	5.0E-12	2.90E-11	(mg/m^3)	2.00E-06	(mg/m^3)	1.5E-05
				DIBENZ(A,H)ANTHRACENE	4.24E-10	(mg/m^3)	1.71E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	1.0E-12	6.00E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.28E-09	(mg/m^3)	5.18E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	3.1E-13	1.81E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**7.7E-12**					**1.5E-05**
		Exposure Point Total									**7.7E-12**					**1.5E-05**
	Exposure Medium Total										**7.7E-12**					**1.5E-05**
Soil Total											**1.8E-07**					**1.4E-03**
										Total of Receptor Risks Across All Media	**1.8E-07**			Total of Receptor Hazards Across All Media		**1.4E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 300
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU22

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU22	Ingestion	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.60E+00	(mg/kg)	3.33E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.3E-08	1.30E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	4.09E+00	(mg/kg)	5.24E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	5.2E-08	2.04E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.48E+00	(mg/kg)	3.18E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	3.2E-07	1.24E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.1E-03
				DIBENZ(A,H)ANTHRACENE	5.13E-01	(mg/kg)	6.57E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	6.6E-08	2.56E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.55E+00	(mg/kg)	1.99E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.0E-08	7.73E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**4.9E-07**					**4.1E-03**
			Dermal[1]	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.60E+00	(mg/kg)	2.01E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.0E-08	7.83E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	4.09E+00	(mg/kg)	3.17E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.2E-08	1.23E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.48E+00	(mg/kg)	1.92E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.9E-07	7.46E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.5E-03
				DIBENZ(A,H)ANTHRACENE	5.13E-01	(mg/kg)	3.97E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	4.0E-08	1.54E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.55E+00	(mg/kg)	1.20E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.2E-08	4.67E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.0E-07**					**2.5E-03**
		Exposure Point Total									**7.8E-07**					**6.6E-03**
	Exposure Medium Total										**7.8E-07**					**6.6E-03**
	Air	DU22	Inhalation	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.15E-09	(mg/m^3)	1.30E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	7.8E-13	5.07E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	3.38E-09	(mg/m^3)	2.05E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	1.2E-12	7.97E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	2.05E-09	(mg/m^3)	1.24E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	7.5E-12	4.84E-11	(mg/m^3)	2.00E-06	(mg/m^3)	2.4E-05
				DIBENZ(A,H)ANTHRACENE	4.24E-10	(mg/m^3)	2.57E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	1.5E-12	1.00E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.28E-09	(mg/m^3)	7.77E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	4.7E-13	3.02E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.1E-11**					**2.4E-05**
		Exposure Point Total									**1.1E-11**					**2.4E-05**
	Exposure Medium Total										**1.1E-11**					**2.4E-05**
Soil Total											**7.8E-07**					**6.6E-03**
										Total of Receptor Risks Across All Media	**7.8E-07**			Total of Receptor Hazards Across All Media		**6.6E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 301
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU22

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU22	Ingestion	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.60E+00	(mg/kg)	4.73E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.7E-08	2.76E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	4.09E+00	(mg/kg)	7.44E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	7.4E-08	4.34E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.48E+00	(mg/kg)	4.51E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.5E-07	2.63E-06	(mg/kg-day)	3.0E-04	(mg/kg-day)	8.8E-03
				DIBENZ(A,H)ANTHRACENE	5.13E-01	(mg/kg)	9.34E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	9.3E-08	5.45E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.55E+00	(mg/kg)	2.82E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.8E-08	1.65E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**6.9E-07**					**8.8E-03**
			Dermal[1]	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.60E+00	(mg/kg)	1.30E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.3E-08	7.56E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	4.09E+00	(mg/kg)	2.04E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.0E-08	1.19E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.48E+00	(mg/kg)	1.24E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.2E-07	7.21E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	2.4E-03
				DIBENZ(A,H)ANTHRACENE	5.13E-01	(mg/kg)	2.56E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.6E-08	1.49E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.55E+00	(mg/kg)	7.73E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	7.7E-09	4.51E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.9E-07**					**2.4E-03**
		Exposure Point Total									**8.8E-07**					**1.1E-02**
	Exposure Medium Total										**8.8E-07**					**1.1E-02**
	Air	DU22	Inhalation	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.15E-09	(mg/m^3)	5.21E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	3.1E-13	3.04E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	3.38E-09	(mg/m^3)	8.20E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	4.9E-13	4.78E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	2.05E-09	(mg/m^3)	4.97E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	3.0E-12	2.90E-11	(mg/m^3)	2.00E-06	(mg/m^3)	1.5E-05
				DIBENZ(A,H)ANTHRACENE	4.24E-10	(mg/m^3)	1.03E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	6.2E-13	6.00E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.28E-09	(mg/m^3)	3.11E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.9E-13	1.81E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**4.6E-12**					**1.5E-05**
		Exposure Point Total									**4.6E-12**					**1.5E-05**
	Exposure Medium Total										**4.6E-12**					**1.5E-05**
Soil Total											**8.8E-07**					**1.1E-02**
										Total of Receptor Risks Across All Media	**8.8E-07**				Total of Receptor Hazards Across All Media	**1.1E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 302
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU22

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU22	Ingestion	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.60E+00	(mg/kg)	5.14E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	5.1E-09	2.00E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	4.09E+00	(mg/kg)	8.09E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	8.1E-09	3.15E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.48E+00	(mg/kg)	4.90E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	4.9E-08	1.91E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.4E-04
				DIBENZ(A,H)ANTHRACENE	5.13E-01	(mg/kg)	1.01E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.0E-08	3.95E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.55E+00	(mg/kg)	3.07E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.1E-09	1.19E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**7.5E-08**					**6.4E-04**
			Dermal[1]	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.60E+00	(mg/kg)	6.21E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	6.2E-09	2.41E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	4.09E+00	(mg/kg)	9.77E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	9.8E-09	3.80E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.48E+00	(mg/kg)	5.92E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	5.9E-08	2.30E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.7E-04
				DIBENZ(A,H)ANTHRACENE	5.13E-01	(mg/kg)	1.23E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.2E-08	4.76E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.55E+00	(mg/kg)	3.70E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.7E-09	1.44E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**9.1E-08**					**7.7E-04**
		Exposure Point Total									**1.7E-07**					**1.4E-03**
	Exposure Medium Total										**1.7E-07**					**1.4E-03**
	Air	DU22	Inhalation	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.15E-09	(mg/m^3)	4.04E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.4E-13	1.57E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	3.38E-09	(mg/m^3)	6.35E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	3.8E-13	2.47E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	2.05E-09	(mg/m^3)	3.85E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	2.3E-12	1.50E-11	(mg/m^3)	2.00E-06	(mg/m^3)	7.5E-06
				DIBENZ(A,H)ANTHRACENE	4.24E-10	(mg/m^3)	7.96E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	4.8E-13	3.10E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.28E-09	(mg/m^3)	2.41E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.4E-13	9.36E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**3.6E-12**					**7.5E-06**
		Exposure Point Total									**3.6E-12**					**7.5E-06**
	Exposure Medium Total										**3.6E-12**					**7.5E-06**
Soil Total											**1.7E-07**					**1.4E-03**
										Total of Receptor Risks Across All Media	**1.7E-07**			Total of Receptor Hazards Across All Media		**1.4E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 303
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU22

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DU22	Ingestion	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.60E+00	(mg/kg)	3.53E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.5E-08	6.33E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	4.09E+00	(mg/kg)	5.55E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	5.5E-08	9.96E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.48E+00	(mg/kg)	3.36E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	3.4E-07	6.04E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.0E-03
				DIBENZ(A,H)ANTHRACENE	5.13E-01	(mg/kg)	6.96E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	7.0E-08	1.25E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.55E+00	(mg/kg)	2.10E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.1E-08	3.77E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**5.2E-07**					**2.0E-03**
			Dermal[1]	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.60E+00	(mg/kg)	1.81E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.8E-08	3.25E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	4.09E+00	(mg/kg)	2.85E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.8E-08	5.11E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	2.48E+00	(mg/kg)	1.73E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.7E-07	3.10E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.0E-03
				DIBENZ(A,H)ANTHRACENE	5.13E-01	(mg/kg)	3.57E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	3.6E-08	6.41E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.55E+00	(mg/kg)	1.08E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.1E-08	1.94E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.7E-07**					**1.0E-03**
		Exposure Point Total									**7.8E-07**					**3.0E-03**
	Exposure Medium Total										**7.8E-07**					**3.0E-03**
	Air	DU22	Inhalation	**Polyaromatic Hydrocarbons**												
				BENZO(A)ANTHRACENE	2.15E-09	(mg/m^3)	6.56E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	3.9E-12	1.18E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	3.38E-09	(mg/m^3)	1.03E-07	(ug/m^3)	6.00E-05	per (ug/m^3)	6.2E-12	1.85E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	2.05E-09	(mg/m^3)	6.26E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	3.8E-11	1.12E-10	(mg/m^3)	2.00E-06	(mg/m^3)	5.6E-05
				DIBENZ(A,H)ANTHRACENE	4.24E-10	(mg/m^3)	1.29E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	7.8E-12	2.32E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	1.28E-09	(mg/m^3)	3.91E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	2.3E-12	7.02E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**5.8E-11**					**5.6E-05**
		Exposure Point Total									**5.8E-11**					**5.6E-05**
	Exposure Medium Total										**5.8E-11**					**5.6E-05**
Soil Total											**7.8E-07**					**3.1E-03**
										Total of Receptor Risks Across All Media	**7.8E-07**			Total of Receptor Hazards Across All Media		**3.1E-03**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 304
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU22

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Polyaromatic Hydrocarbons**					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	5.1E-08	2.8E-08	6.7E-12	7.9E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	8.0E-08	4.4E-08	1.1E-11	1.2E-07	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	4.9E-07	2.7E-07	6.4E-11	7.5E-07	BENZO(A)PYRENE	Developmental System	4.5E-03	2.5E-03	1.5E-04	7.2E-03
			DIBENZ(A,H)ANTHRACENE	1.0E-07	5.5E-08	1.3E-11	1.6E-07	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	3.0E-08	1.7E-08	4.0E-12	4.7E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	7.5E-07	4.1E-07	9.9E-11	1.2E-06		(Total)	4.5E-03	2.5E-03	1.5E-04	7.2E-03
			Total Risk Across Surface Soil				**1.2E-06**		**Total Hazard Index Across Surface Soil**				**7.2E-03**
			Total Risk Across All Media and All Exposure Routes				**1E-06**		**Total Hazard Index Across All Media and All Exposure Routes**				**0.01**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 305
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU22

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Polyaromatic Hydrocarbons**					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	2.0E-09	2.7E-09	2.6E-13	4.7E-09	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	3.1E-09	4.3E-09	4.1E-13	7.4E-09	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.9E-08	2.6E-08	2.5E-12	4.5E-08	BENZO(A)PYRENE	Developmental System	1.5E-03	2.0E-03	4.9E-05	3.5E-03
			DIBENZ(A,H)ANTHRACENE	3.9E-09	5.4E-09	5.2E-13	9.3E-09	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	1.2E-09	1.6E-09	1.6E-13	2.8E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	2.9E-08	4.0E-08	3.9E-12	6.9E-08		(Total)	1.5E-03	2.0E-03	4.9E-05	3.5E-03
							Total Risk Across Surface Soil	**6.9E-08**					**Total Hazard Index Across Surface Soil**	**3.5E-03**
							Total Risk Across All Media and All Exposure Routes	**7E-08**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.004**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 306
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU22

Location: Iona Island
Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Polyaromatic Hydrocarbons**					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	1.2E-08	4.8E-09	3.9E-11	1.6E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.8E-08	7.6E-09	6.1E-11	2.6E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.1E-07	4.6E-08	3.7E-10	1.6E-07	BENZO(A)PYRENE	Developmental System	2.6E-02	1.1E-02	2.2E-02	5.8E-02
			DIBENZ(A,H)ANTHRACENE	2.3E-08	9.5E-09	7.7E-11	3.2E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	6.9E-09	2.9E-09	2.3E-11	9.8E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	1.7E-07	7.1E-08	5.7E-10	2.4E-07		(Total)	2.6E-02	1.1E-02	2.2E-02	5.8E-02
							Total Risk Across Surface Soil	**2.4E-07**					**Total Hazard Index Across Surface Soil**	**5.8E-02**
							Total Risk Across All Media and All Exposure Routes	**2E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.1**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 307
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU22

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Polyaromatic Hydrocarbons**					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	7.9E-09	4.3E-09	5.2E-13	1.2E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.2E-08	6.8E-09	8.2E-13	1.9E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	7.5E-08	4.1E-08	5.0E-12	1.2E-07	BENZO(A)PYRENE	Developmental System	8.8E-04	4.8E-04	1.5E-05	1.4E-03
			DIBENZ(A,H)ANTHRACENE	1.6E-08	8.5E-09	1.0E-12	2.4E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	4.7E-09	2.6E-09	3.1E-13	7.3E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	1.2E-07	6.4E-08	7.7E-12	1.8E-07		(Total)	8.8E-04	4.8E-04	1.5E-05	1.4E-03
							Total Risk Across Surface Soil	**1.8E-07**					**Total Hazard Index Across Surface Soil**	**1.4E-03**
							Total Risk Across All Media and All Exposure Routes	**2E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.001**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 308
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU22

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Polyaromatic Hydrocarbons**					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	3.3E-08	2.0E-08	7.8E-13	5.3E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	5.2E-08	3.2E-08	1.2E-12	8.4E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	3.2E-07	1.9E-07	7.5E-12	5.1E-07	BENZO(A)PYRENE	Developmental System	4.1E-03	2.5E-03	2.4E-05	6.6E-03
			DIBENZ(A,H)ANTHRACENE	6.6E-08	4.0E-08	1.5E-12	1.1E-07	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.0E-08	1.2E-08	4.7E-13	3.2E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	4.9E-07	3.0E-07	1.1E-11	7.8E-07		(Total)	4.1E-03	2.5E-03	2.4E-05	6.6E-03
							Total Risk Across Surface Soil	**7.8E-07**					**Total Hazard Index Across Surface Soil**	**6.6E-03**
							Total Risk Across All Media and All Exposure Routes	**8E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.007**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 309
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU22

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Polyaromatic Hydrocarbons**					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	4.7E-08	1.3E-08	3.1E-13	6.0E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	7.4E-08	2.0E-08	4.9E-13	9.5E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	4.5E-07	1.2E-07	3.0E-12	5.7E-07	BENZO(A)PYRENE	Developmental System	8.8E-03	2.4E-03	1.5E-05	1.1E-02
			DIBENZ(A,H)ANTHRACENE	9.3E-08	2.6E-08	6.2E-13	1.2E-07	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.8E-08	7.7E-09	1.9E-13	3.6E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	6.9E-07	1.9E-07	4.6E-12	8.8E-07		(Total)	8.8E-03	2.4E-03	1.5E-05	1.1E-02
							Total Risk Across Surface Soil	**8.8E-07**					**Total Hazard Index Across Surface Soil**	**1.1E-02**
							Total Risk Across All Media and All Exposure Routes	**9E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.01**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 310
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU22

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Polyaromatic Hydrocarbons**					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	5.1E-09	6.2E-09	2.4E-13	1.1E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	8.1E-09	9.8E-09	3.8E-13	1.8E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	4.9E-08	5.9E-08	2.3E-12	1.1E-07	BENZO(A)PYRENE	Developmental System	6.4E-04	7.7E-04	7.5E-06	1.4E-03
			DIBENZ(A,H)ANTHRACENE	1.0E-08	1.2E-08	4.8E-13	2.2E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	3.1E-09	3.7E-09	1.4E-13	6.8E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	7.5E-08	9.1E-08	3.6E-12	1.7E-07		(Total)	6.4E-04	7.7E-04	7.5E-06	1.4E-03
Total Risk Across Surface Soil							**1.7E-07**	**Total Hazard Index Across Surface Soil**					**1.4E-03**
Total Risk Across All Media and All Exposure Routes							**2E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.001**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 311
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA - DU22

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Camper
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Polyaromatic Hydrocarbons**					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	3.5E-08	1.8E-08	3.9E-12	5.3E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	5.5E-08	2.8E-08	6.2E-12	8.4E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	3.4E-07	1.7E-07	3.8E-11	5.1E-07	BENZO(A)PYRENE	Developmental System	2.0E-03	1.0E-03	5.6E-05	3.1E-03
			DIBENZ(A,H)ANTHRACENE	7.0E-08	3.6E-08	7.8E-12	1.1E-07	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.1E-08	1.1E-08	2.3E-12	3.2E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	5.2E-07	2.7E-07	5.8E-11	7.8E-07		(Total)	2.0E-03	1.0E-03	5.6E-05	3.1E-03
							Total Risk Across Surface Soil	**7.8E-07**					**Total Hazard Index Across Surface Soil**	**3.1E-03**
							Total Risk Across All Media and All Exposure Routes	**8E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.003**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 312
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Dump Area	Ingestion	**Inorganics**												
				ALUMINUM	1.40E+04	(mg/kg)	2.73E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	7.65E-03	(mg/kg-day)	1.00E+00	(mg/kg-day)	7.7E-03
				ANTIMONY	6.70E+00	(mg/kg)	1.31E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	3.67E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	9.2E-03
				ARSENIC	1.47E+01	(mg/kg)	1.73E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.6E-06	4.83E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.6E-02
				CADMIUM	1.12E+01	(mg/kg)	2.19E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	6.14E-06	(mg/kg-day)	1.00E-04	(mg/kg-day)	6.1E-02
				COBALT	1.05E+01	(mg/kg)	2.05E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	5.75E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.9E-02
				COPPER	1.54E+03	(mg/kg)	3.01E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	8.43E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	2.1E-02
				IRON	3.35E+04	(mg/kg)	6.55E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.83E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	2.6E-02
				MANGANESE	3.94E+02	(mg/kg)	7.71E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.16E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.5E-03
				MERCURY	1.70E+00	(mg/kg)	3.33E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	9.32E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.1E-03
				THALLIUM	3.00E-01	(mg/kg)	5.87E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.64E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	1.6E-02
				VANADIUM	3.28E+01	(mg/kg)	6.42E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.80E-05	(mg/kg-day)	5.00E-03	(mg/kg-day)	3.6E-03
				ZINC	3.41E+03	(mg/kg)	6.68E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	1.87E-03	(mg/kg-day)	3.0E-01	(mg/kg-day)	6.2E-03
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.00E+00	(mg/kg)	1.96E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.0E-08	5.48E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.50E+00	(mg/kg)	2.94E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.9E-08	8.22E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	8.20E-01	(mg/kg)	1.60E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.6E-07	4.49E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.5E-03
				DIBENZ(A,H)ANTHRACENE	1.90E-01	(mg/kg)	3.72E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.7E-08	1.04E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	6.20E-01	(mg/kg)	1.21E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.2E-08	3.40E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	1.00E-01	(mg/kg)	1.96E-08	(mg/kg-day)	2.0E+00	per (mg/kg-day)	3.9E-08	5.48E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.9E-06**					**1.9E-01**
			Dermal[1]	**Inorganics**												
				ALUMINUM	1.40E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E+00	(mg/kg-day)	--
				ANTIMONY	6.70E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.47E+01	(mg/kg)	3.65E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.5E-07	1.02E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.4E-03
				CADMIUM	1.12E+01	(mg/kg)	9.28E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	2.60E-08	(mg/kg-day)	2.50E-06	(mg/kg-day)	1.0E-02
				COBALT	1.05E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	1.54E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	3.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.94E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				MERCURY	1.70E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	2.10E-05	(mg/kg-day)	--
				THALLIUM	3.00E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				VANADIUM	3.28E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.30E-04	(mg/kg-day)	--
				ZINC	3.41E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.0E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.00E+00	(mg/kg)	1.08E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.1E-08	3.01E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.50E+00	(mg/kg)	1.62E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.6E-08	4.52E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	8.20E-01	(mg/kg)	8.83E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	8.8E-08	2.47E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	8.2E-04
				DIBENZ(A,H)ANTHRACENE	1.90E-01	(mg/kg)	2.05E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.0E-08	5.73E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	6.20E-01	(mg/kg)	6.68E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	6.7E-09	1.87E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	1.00E-01	(mg/kg)	1.16E-08	(mg/kg-day)	2.0E+00	per (mg/kg-day)	2.3E-08	3.25E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**7.1E-07**					**1.5E-02**
		Exposure Point Total									**3.6E-06**					**2.1E-01**
	Exposure Medium Total										**3.6E-06**					**2.1E-01**

TABLE 312
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	Dump Area	Inhalation	**Inorganics**												
				ALUMINUM	1.15E-05	(mg/m^3)	6.02E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.69E-06	(mg/m^3)	5.00E-03	(mg/m^3)	3.4E-04
				ANTIMONY	5.54E-09	(mg/m^3)	2.89E-07	(ug/m^3)	NA	per (ug/m^3)	--	8.09E-10	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.21E-08	(mg/m^3)	6.34E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	2.7E-09	1.78E-09	(mg/m^3)	1.50E-05	(mg/m^3)	1.2E-04
				CADMIUM	9.26E-09	(mg/m^3)	4.83E-07	(ug/m^3)	1.80E-03	per (ug/m^3)	8.7E-10	1.35E-09	(mg/m^3)	1.00E-05	(mg/m^3)	1.4E-04
				COBALT	8.68E-09	(mg/m^3)	4.53E-07	(ug/m^3)	9.00E-03	per (ug/m^3)	4.1E-09	1.27E-09	(mg/m^3)	6.00E-06	(mg/m^3)	2.1E-04
				COPPER	1.27E-06	(mg/m^3)	6.63E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.86E-07	(mg/m^3)	NA	(mg/m^3)	--
				IRON	2.76E-05	(mg/m^3)	1.44E-03	(ug/m^3)	NA	per (ug/m^3)	--	4.04E-06	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.26E-07	(mg/m^3)	1.70E-05	(ug/m^3)	NA	per (ug/m^3)	--	4.76E-08	(mg/m^3)	5.00E-05	(mg/m^3)	9.5E-04
				MERCURY	1.40E-09	(mg/m^3)	7.33E-08	(ug/m^3)	NA	per (ug/m^3)	--	2.05E-10	(mg/m^3)	3.00E-04	(mg/m^3)	6.8E-07
				THALLIUM	2.48E-10	(mg/m^3)	1.29E-08	(ug/m^3)	NA	per (ug/m^3)	--	3.62E-11	(mg/m^3)	NA	(mg/m^3)	--
				VANADIUM	2.71E-08	(mg/m^3)	1.41E-06	(ug/m^3)	NA	per (ug/m^3)	--	3.96E-09	(mg/m^3)	1.00E-04	(mg/m^3)	4.0E-05
				ZINC	2.82E-06	(mg/m^3)	1.47E-04	(ug/m3)	NA	per (ug/m3)	--	4.12E-07	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	8.26E-10	(mg/m^3)	4.31E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	2.6E-12	1.21E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.24E-09	(mg/m^3)	6.47E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	3.9E-12	1.81E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	6.78E-10	(mg/m^3)	3.54E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	2.1E-11	9.90E-11	(mg/m^3)	2.00E-06	(mg/m^3)	5.0E-05
				DIBENZ(A,H)ANTHRACENE	1.57E-10	(mg/m^3)	8.19E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	4.9E-12	2.29E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	5.12E-10	(mg/m^3)	2.67E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	1.6E-12	7.49E-11	(mg/m^3)	NA	(mg/m^3)	--
				Pesticides/PCBs												
				AROCLOR-1260	8.26E-11	(mg/m^3)	4.31E-09	(ug/m3)	1.00E-04	per (ug/m3)	4.3E-13	1.21E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**7.7E-09**					**1.8E-03**
		Exposure Point Total									**7.7E-09**					**1.8E-03**
	Exposure Medium Total										**7.7E-09**					**1.8E-03**
Soil Total											**3.6E-06**					**2.1E-01**
										Total of Receptor Risks Across All Media	**3.6E-06**			Total of Receptor Hazards Across All Media		**2.1E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 313
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Dump Area	Ingestion	**Inorganics**												
				ALUMINUM	1.40E+04	(mg/kg)	1.07E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.49E-03	(mg/kg-day)	1.00E+00	(mg/kg-day)	2.5E-03
				ANTIMONY	6.70E+00	(mg/kg)	5.11E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.19E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	3.0E-03
				ARSENIC	1.47E+01	(mg/kg)	6.73E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.0E-07	1.57E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.2E-03
				CADMIUM	1.12E+01	(mg/kg)	8.55E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.99E-06	(mg/kg-day)	1.00E-04	(mg/kg-day)	2.0E-02
				COBALT	1.05E+01	(mg/kg)	8.01E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.87E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.2E-03
				COPPER	1.54E+03	(mg/kg)	1.17E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.74E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	6.8E-03
				IRON	3.35E+04	(mg/kg)	2.55E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	5.96E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	8.5E-03
				MANGANESE	3.94E+02	(mg/kg)	3.01E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	7.02E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	5.0E-04
				MERCURY	1.70E+00	(mg/kg)	1.30E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	3.03E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.0E-03
				THALLIUM	3.00E-01	(mg/kg)	2.29E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	5.34E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	5.3E-03
				VANADIUM	3.28E+01	(mg/kg)	2.50E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	5.84E-06	(mg/kg-day)	5.00E-03	(mg/kg-day)	1.2E-03
				ZINC	3.41E+03	(mg/kg)	2.60E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	6.08E-04	(mg/kg-day)	3.0E-01	(mg/kg-day)	2.0E-03
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.00E+00	(mg/kg)	7.63E-09	(mg/kg-day)	1.0E-01	per (mg/kg-day)	7.6E-10	1.78E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.50E+00	(mg/kg)	1.14E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.1E-09	2.67E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	8.20E-01	(mg/kg)	6.26E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	6.3E-09	1.46E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	4.9E-04
				DIBENZ(A,H)ANTHRACENE	1.90E-01	(mg/kg)	1.45E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.5E-09	3.38E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	6.20E-01	(mg/kg)	4.73E-09	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.7E-10	1.10E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	1.00E-01	(mg/kg)	7.63E-10	(mg/kg-day)	2.0E+00	per (mg/kg-day)	1.5E-09	1.78E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.1E-07**					**6.3E-02**
			Dermal[1]	**Inorganics**												
				ALUMINUM	1.40E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E+00	(mg/kg-day)	--
				ANTIMONY	6.70E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.47E+01	(mg/kg)	3.56E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.3E-08	8.31E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.8E-03
				CADMIUM	1.12E+01	(mg/kg)	9.04E-10	(mg/kg-day)	NA	per (mg/kg-day)	--	2.11E-08	(mg/kg-day)	2.50E-06	(mg/kg-day)	8.4E-03
				COBALT	1.05E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	1.54E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	3.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.94E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				MERCURY	1.70E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	2.10E-05	(mg/kg-day)	--
				THALLIUM	3.00E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				VANADIUM	3.28E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.30E-04	(mg/kg-day)	--
				ZINC	3.41E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.0E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.00E+00	(mg/kg)	1.05E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.0E-09	2.45E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.50E+00	(mg/kg)	1.57E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.6E-09	3.67E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	8.20E-01	(mg/kg)	8.61E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	8.6E-09	2.01E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	6.7E-04
				DIBENZ(A,H)ANTHRACENE	1.90E-01	(mg/kg)	1.99E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.0E-09	4.65E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	6.20E-01	(mg/kg)	6.51E-09	(mg/kg-day)	1.0E-01	per (mg/kg-day)	6.5E-10	1.52E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	1.00E-01	(mg/kg)	1.13E-09	(mg/kg-day)	2.0E+00	per (mg/kg-day)	2.3E-09	2.64E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**7.0E-08**					**1.2E-02**
		Exposure Point Total									**1.8E-07**					**7.5E-02**
	Exposure Medium Total										**1.8E-07**					**7.5E-02**

TABLE 313
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	Dump Area	Inhalation	**Inorganics**												
				ALUMINUM	1.15E-05	(mg/m^3)	2.35E-05	(ug/m^3)	NA	per (ug/m^3)	--	5.48E-07	(mg/m^3)	5.00E-03	(mg/m^3)	1.1E-04
				ANTIMONY	5.54E-09	(mg/m^3)	1.13E-08	(ug/m^3)	NA	per (ug/m^3)	--	2.63E-10	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.21E-08	(mg/m^3)	2.47E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.1E-10	5.77E-10	(mg/m^3)	1.50E-05	(mg/m^3)	3.8E-05
				CADMIUM	9.26E-09	(mg/m^3)	1.88E-08	(ug/m^3)	1.80E-03	per (ug/m^3)	3.4E-11	4.40E-10	(mg/m^3)	1.00E-05	(mg/m^3)	4.4E-05
				COBALT	8.68E-09	(mg/m^3)	1.77E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.6E-10	4.12E-10	(mg/m^3)	6.00E-06	(mg/m^3)	6.9E-05
				COPPER	1.27E-06	(mg/m^3)	2.59E-06	(ug/m^3)	NA	per (ug/m^3)	--	6.04E-08	(mg/m^3)	NA	(mg/m^3)	--
				IRON	2.76E-05	(mg/m^3)	5.63E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.31E-06	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.26E-07	(mg/m^3)	6.63E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.55E-08	(mg/m^3)	5.00E-05	(mg/m^3)	3.1E-04
				MERCURY	1.40E-09	(mg/m^3)	2.86E-09	(ug/m^3)	NA	per (ug/m^3)	--	6.67E-11	(mg/m^3)	3.00E-04	(mg/m^3)	2.2E-07
				THALLIUM	2.48E-10	(mg/m^3)	5.05E-10	(ug/m^3)	NA	per (ug/m^3)	--	1.18E-11	(mg/m^3)	NA	(mg/m^3)	--
				VANADIUM	2.71E-08	(mg/m^3)	5.52E-08	(ug/m^3)	NA	per (ug/m^3)	--	1.29E-09	(mg/m^3)	1.00E-04	(mg/m^3)	1.3E-05
				ZINC	2.82E-06	(mg/m^3)	4.13E-05	(ug/m3)	NA	per (ug/m3)	--	1.34E-07	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	8.26E-10	(mg/m^3)	1.68E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.0E-13	3.92E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.24E-09	(mg/m^3)	2.52E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.5E-13	5.89E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	6.78E-10	(mg/m^3)	1.38E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	8.3E-13	3.22E-11	(mg/m^3)	2.00E-06	(mg/m^3)	1.6E-05
				DIBENZ(A,H)ANTHRACENE	1.57E-10	(mg/m^3)	3.20E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	1.9E-13	7.46E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	5.12E-10	(mg/m^3)	1.04E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	6.3E-14	2.43E-11	(mg/m^3)	NA	(mg/m^3)	--
				Pesticides/PCBs												
				AROCLOR-1260	8.26E-11	(mg/m^3)	1.68E-10	(ug/m3)	1.00E-04	per (ug/m3)	1.7E-14	3.92E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**3.0E-10**					**6.0E-04**
		Exposure Point Total									**3.0E-10**					**6.0E-04**
	Exposure Medium Total										**3.0E-10**					**6.0E-04**
Soil Total											**1.8E-07**					**7.5E-02**
										Total of Receptor Risks Across All Media	**1.8E-07**				Total of Receptor Hazards Across All Media	**7.5E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 314
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Dump Area	Ingestion	**Inorganics**												
				ALUMINUM	1.40E+04	(mg/kg)	6.20E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	4.34E-02	(mg/kg-day)	1.00E+00	(mg/kg-day)	4.3E-02
				ANTIMONY	6.70E+00	(mg/kg)	1.31E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	3.67E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	9.2E-03
				ARSENIC	1.47E+01	(mg/kg)	3.92E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.9E-07	2.74E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.1E-02
				CADMIUM	1.12E+01	(mg/kg)	4.97E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	3.48E-05	(mg/kg-day)	1.00E-04	(mg/kg-day)	3.5E-01
				COBALT	1.05E+01	(mg/kg)	4.66E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	3.26E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.1E-01
				COPPER	1.54E+03	(mg/kg)	6.83E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	4.78E-03	(mg/kg-day)	4.00E-02	(mg/kg-day)	1.2E-01
				IRON	3.35E+04	(mg/kg)	1.49E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.04E-01	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.5E-01
				MANGANESE	3.94E+02	(mg/kg)	1.75E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.22E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	8.7E-03
				MERCURY	1.70E+00	(mg/kg)	7.55E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	5.28E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.8E-02
				THALLIUM	3.00E-01	(mg/kg)	1.33E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	5.00E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	5.0E-02
				VANADIUM	3.28E+01	(mg/kg)	1.46E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.02E-04	(mg/kg-day)	5.00E-03	(mg/kg-day)	2.0E-02
				ZINC	3.41E+03	(mg/kg)	1.52E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	5.69E-03	(mg/kg-day)	3.00E-01	(mg/kg-day)	1.90E-02
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.00E+00	(mg/kg)	4.44E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.4E-09	3.11E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.50E+00	(mg/kg)	6.66E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	6.7E-09	4.66E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	8.20E-01	(mg/kg)	3.64E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.6E-08	2.55E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.5E-03
				DIBENZ(A,H)ANTHRACENE	1.90E-01	(mg/kg)	8.44E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	8.4E-09	5.90E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	6.20E-01	(mg/kg)	2.75E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.8E-09	1.93E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs								0.00E+00				
				AROCLOR-1260	1.00E-01	(mg/kg)	4.44E-09	(mg/kg-day)	2.00E+00	per (mg/kg-day)	8.9E-09	3.11E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**6.5E-07**					**9.9E-01**
			Dermal[1]	**Inorganics**												
				ALUMINUM	1.40E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E+00	(mg/kg-day)	--
				ANTIMONY	6.70E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.47E+01	(mg/kg)	6.28E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.4E-08	4.39E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				CADMIUM	1.12E+01	(mg/kg)	1.59E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	1.12E-07	(mg/kg-day)	2.50E-06	(mg/kg-day)	4.5E-02
				COBALT	1.05E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	1.54E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	3.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.94E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				MERCURY	1.70E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	2.10E-05	(mg/kg-day)	--
				THALLIUM	3.00E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				VANADIUM	3.28E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.30E-04	(mg/kg-day)	--
				ZINC	3.41E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.00E+00	(mg/kg)	1.85E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.9E-09	1.30E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.50E+00	(mg/kg)	2.78E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.8E-09	1.94E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	8.20E-01	(mg/kg)	1.52E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.5E-08	1.06E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.5E-03
				DIBENZ(A,H)ANTHRACENE	1.90E-01	(mg/kg)	3.52E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.5E-09	2.46E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	6.20E-01	(mg/kg)	1.15E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.1E-09	8.03E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	1.00E-01	(mg/kg)	1.99E-09	(mg/kg-day)	2.00E+00	per (mg/kg-day)	4.0E-09	1.40E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.2E-07**					**6.3E-02**
		Exposure Point Total									**7.8E-07**					**1.1E+00**
	Exposure Medium Total										**7.8E-07**					**1.1E+00**

TABLE 314
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	Dump Area	Inhalation	**Inorganics**												
				ALUMINUM	6.78E-04	(mg/m^3)	3.50E-03	(ug/m^3)	NA	per (ug/m^3)	--	2.45E-04	(mg/m^3)	5.00E-03	(mg/m^3)	4.9E-02
				ANTIMONY	5.54E-09	(mg/m^3)	2.86E-08	(ug/m^3)	NA	per (ug/m^3)	--	2.00E-09	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	7.14E-07	(mg/m^3)	3.68E-06	(ug/m^3)	4.3E-03	per (ug/m^3)	1.6E-08	2.58E-07	(mg/m^3)	1.50E-05	(mg/m^3)	1.7E-02
				CADMIUM	5.44E-07	(mg/m^3)	2.80E-06	(ug/m^3)	1.8E-03	per (ug/m^3)	5.0E-09	1.96E-07	(mg/m^3)	1.00E-05	(mg/m^3)	2.0E-02
				COBALT	5.10E-07	(mg/m^3)	2.63E-06	(ug/m^3)	9.0E-03	per (ug/m^3)	2.4E-08	1.84E-07	(mg/m^3)	6.00E-06	(mg/m^3)	3.1E-02
				COPPER	7.47E-05	(mg/m^3)	3.85E-04	(ug/m^3)	NA	per (ug/m^3)	--	2.70E-05	(mg/m^3)	NA	(mg/m^3)	--
				IRON	1.62E-03	(mg/m^3)	8.37E-03	(ug/m^3)	NA	per (ug/m^3)	--	5.86E-04	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	1.91E-05	(mg/m^3)	9.86E-05	(ug/m^3)	NA	per (ug/m^3)	--	6.90E-06	(mg/m^3)	5.00E-05	(mg/m^3)	1.4E-01
				MERCURY	8.25E-08	(mg/m^3)	4.26E-07	(ug/m^3)	NA	per (ug/m^3)	--	2.98E-08	(mg/m^3)	3.00E-04	(mg/m^3)	9.9E-05
				THALLIUM	2.48E-10	(mg/m^3)	1.28E-09	(ug/m^3)	NA	per (ug/m^3)	--	8.95E-11	(mg/m^3)	NA	(mg/m^3)	--
				VANADIUM	2.71E-08	(mg/m^3)	1.40E-07	(ug/m^3)	NA	per (ug/m^3)	--	9.79E-09	(mg/m^3)	1.00E-04	(mg/m^3)	9.8E-05
				ZINC	2.82E-06	(mg/m^3)	9.67E-05	(ug/m^3)	NA	per (ug/m^3)	--	4.70E-05	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	4.85E-08	(mg/m^3)	2.50E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	1.5E-11	1.75E-08	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	7.28E-08	(mg/m^3)	3.76E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	2.3E-11	2.63E-08	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	3.98E-08	(mg/m^3)	2.05E-07	(ug/m^3)	6.0E-04	per (ug/m^3)	1.2E-10	1.44E-08	(mg/m^3)	2.00E-06	(mg/m^3)	7.2E-03
				DIBENZ(A,H)ANTHRACENE	9.22E-09	(mg/m^3)	4.76E-08	(ug/m^3)	6.0E-04	per (ug/m^3)	2.9E-11	3.33E-09	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	3.01E-08	(mg/m^3)	1.55E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	9.3E-12	1.09E-08	(mg/m^3)	NA	(mg/m^3)	--
				Pesticides/PCBs												
				AROCLOR-1260	8.26E-11	(mg/m^3)	4.26E-10	(ug/m^3)	1.00E-04	per (ug/m^3)	4.3E-14	2.98E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**4.5E-08**					**2.6E-01**
		Exposure Point Total									**4.5E-08**					**2.6E-01**
	Exposure Medium Total										**4.5E-08**					**2.6E-01**
Soil Total											**8.2E-07**					**1.3E+00**
										Total of Receptor Risks Across All Media	**8.2E-07**			Total of Receptor Hazards Across All Media		**1.3E+00**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 315
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Dump Area	Ingestion	**Inorganics**												
				ALUMINUM	1.40E+04	(mg/kg)	4.24E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	1.48E-03	(mg/kg-day)	1.00E+00	(mg/kg-day)	1.5E-03
				ANTIMONY	6.70E+00	(mg/kg)	2.03E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	7.11E-07	(mg/kg-day)	4.00E-04	(mg/kg-day)	1.8E-03
				ARSENIC	1.47E+01	(mg/kg)	2.68E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.0E-07	9.36E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.1E-03
				CADMIUM	1.12E+01	(mg/kg)	3.40E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.19E-06	(mg/kg-day)	1.00E-04	(mg/kg-day)	1.2E-02
				COBALT	1.05E+01	(mg/kg)	3.18E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.11E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.7E-03
				COPPER	1.54E+03	(mg/kg)	4.67E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.63E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	4.1E-03
				IRON	3.35E+04	(mg/kg)	1.01E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	3.55E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	5.1E-03
				MANGANESE	3.94E+02	(mg/kg)	1.20E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	4.18E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.0E-04
				MERCURY	1.70E+00	(mg/kg)	5.16E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.80E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.0E-04
				THALLIUM	3.00E-01	(mg/kg)	9.10E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	3.18E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	3.2E-03
				VANADIUM	3.28E+01	(mg/kg)	9.95E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	3.48E-06	(mg/kg-day)	5.00E-03	(mg/kg-day)	7.0E-04
				ZINC	3.41E+03	(mg/kg)	1.04E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	3.62E-04	(mg/kg-day)	3.0E-01	(mg/kg-day)	1.2E-03
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.00E+00	(mg/kg)	3.03E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.0E-09	1.06E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.50E+00	(mg/kg)	4.55E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.5E-09	1.59E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	8.20E-01	(mg/kg)	2.49E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.5E-08	8.71E-08	(mg/kg-day)	3.0E-04	(mg/kg-day)	2.9E-04
				DIBENZ(A,H)ANTHRACENE	1.90E-01	(mg/kg)	5.76E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	5.8E-09	2.02E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	6.20E-01	(mg/kg)	1.88E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.9E-09	6.58E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	1.00E-01	(mg/kg)	3.03E-09	(mg/kg-day)	2.0E+00	per (mg/kg-day)	6.1E-09	1.06E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**4.5E-07**					**3.7E-02**
			Dermal[1]	**Inorganics**												
				ALUMINUM	1.40E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E+00	(mg/kg-day)	--
				ANTIMONY	6.70E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.47E+01	(mg/kg)	5.65E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.5E-08	1.98E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.6E-04
				CADMIUM	1.12E+01	(mg/kg)	1.43E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	5.02E-09	(mg/kg-day)	2.50E-06	(mg/kg-day)	2.0E-03
				COBALT	1.05E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	1.54E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	3.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.94E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				MERCURY	1.70E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	2.10E-05	(mg/kg-day)	--
				THALLIUM	3.00E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				VANADIUM	3.28E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.30E-04	(mg/kg-day)	--
				ZINC	3.41E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.0E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.00E+00	(mg/kg)	1.66E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.7E-09	5.83E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.50E+00	(mg/kg)	2.50E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.5E-09	8.74E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	8.20E-01	(mg/kg)	1.37E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.4E-08	4.78E-08	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.6E-04
				DIBENZ(A,H)ANTHRACENE	1.90E-01	(mg/kg)	3.16E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.2E-09	1.11E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	6.20E-01	(mg/kg)	1.03E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.0E-09	3.61E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	1.00E-01	(mg/kg)	1.79E-09	(mg/kg-day)	2.0E+00	per (mg/kg-day)	3.6E-09	6.28E-09	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.1E-07**					**2.8E-03**
		Exposure Point Total									**5.6E-07**					**4.0E-02**
	Exposure Medium Total										**5.6E-07**					**4.0E-02**

TABLE 315
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	Dump Area	Inhalation	**Inorganics**												
				ALUMINUM	1.15E-05	(mg/m^3)	4.67E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.63E-07	(mg/m^3)	5.00E-03	(mg/m^3)	3.3E-05
				ANTIMONY	5.54E-09	(mg/m^3)	2.24E-08	(ug/m^3)	NA	per (ug/m^3)	--	7.84E-11	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.21E-08	(mg/m^3)	4.91E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	2.1E-10	1.72E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.1E-05
				CADMIUM	9.26E-09	(mg/m^3)	3.74E-08	(ug/m^3)	1.80E-03	per (ug/m^3)	6.7E-11	1.31E-10	(mg/m^3)	1.00E-05	(mg/m^3)	1.3E-05
				COBALT	8.68E-09	(mg/m^3)	3.51E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	3.2E-10	1.23E-10	(mg/m^3)	6.00E-06	(mg/m^3)	2.0E-05
				COPPER	1.27E-06	(mg/m^3)	5.14E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.80E-08	(mg/m^3)	NA	(mg/m^3)	--
				IRON	2.76E-05	(mg/m^3)	1.12E-04	(ug/m^3)	NA	per (ug/m^3)	--	3.91E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.26E-07	(mg/m^3)	1.32E-06	(ug/m^3)	NA	per (ug/m^3)	--	4.61E-09	(mg/m^3)	5.00E-05	(mg/m^3)	9.2E-05
				MERCURY	1.40E-09	(mg/m^3)	5.68E-09	(ug/m^3)	NA	per (ug/m^3)	--	1.99E-11	(mg/m^3)	3.00E-04	(mg/m^3)	6.6E-08
				THALLIUM	2.48E-10	(mg/m^3)	1.00E-09	(ug/m^3)	NA	per (ug/m^3)	--	3.51E-12	(mg/m^3)	NA	(mg/m^3)	--
				VANADIUM	2.71E-08	(mg/m^3)	1.10E-07	(ug/m^3)	NA	per (ug/m^3)	--	3.84E-10	(mg/m^3)	1.00E-04	(mg/m^3)	3.8E-06
				ZINC	2.82E-06	(mg/m^3)	1.14E-05	(ug/m3)	NA	per (ug/m3)	--	3.99E-08	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	8.26E-10	(mg/m^3)	3.34E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.0E-13	1.17E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.24E-09	(mg/m^3)	5.01E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	3.0E-13	1.75E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	6.78E-10	(mg/m^3)	2.74E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	1.6E-12	9.59E-12	(mg/m^3)	2.00E-06	(mg/m^3)	4.8E-06
				DIBENZ(A,H)ANTHRACENE	1.57E-10	(mg/m^3)	6.35E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	3.8E-13	2.22E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	5.12E-10	(mg/m^3)	2.07E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.2E-13	7.25E-12	(mg/m^3)	NA	(mg/m^3)	--
				Pesticides/PCBs												
				AROCLOR-1260	8.26E-11	(mg/m^3)	3.34E-10	(ug/m3)	1.00E-04	per (ug/m3)	3.3E-14	1.17E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**6.0E-10**					**1.8E-04**
		Exposure Point Total									**6.0E-10**					**1.8E-04**
	Exposure Medium Total										**6.0E-10**					**1.8E-04**
Soil Total											**5.6E-07**					**4.0E-02**
										Total of Receptor Risks Across All Media	**5.6E-07**			Total of Receptor Hazards Across All Media		**4.0E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 316
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Dump Area	Ingestion	**Inorganics**												
				ALUMINUM	1.40E+04	(mg/kg)	5.97E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	6.96E-03	(mg/kg-day)	1.00E+00	(mg/kg-day)	7.0E-03
				ANTIMONY	6.70E+00	(mg/kg)	2.86E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	3.34E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	8.3E-03
				ARSENIC	1.47E+01	(mg/kg)	3.77E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.7E-07	4.40E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				CADMIUM	1.12E+01	(mg/kg)	4.78E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	5.58E-06	(mg/kg-day)	1.00E-04	(mg/kg-day)	5.6E-02
				COBALT	1.05E+01	(mg/kg)	4.49E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	5.23E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.7E-02
				COPPER	1.54E+03	(mg/kg)	6.57E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	7.67E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	1.9E-02
				IRON	3.35E+04	(mg/kg)	1.43E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.67E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	2.4E-02
				MANGANESE	3.94E+02	(mg/kg)	1.68E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.96E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.4E-03
				MERCURY	1.70E+00	(mg/kg)	7.26E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	8.47E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.8E-03
				THALLIUM	3.00E-01	(mg/kg)	1.28E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.50E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	1.5E-02
				VANADIUM	3.28E+01	(mg/kg)	1.40E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.63E-05	(mg/kg-day)	5.00E-03	(mg/kg-day)	3.3E-03
				ZINC	3.41E+03	(mg/kg)	1.46E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	1.70E-03	(mg/kg-day)	3.00E-01	(mg/kg-day)	5.7E-03
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.00E+00	(mg/kg)	1.28E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.3E-08	4.98E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.50E+00	(mg/kg)	1.92E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.9E-08	7.48E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	8.20E-01	(mg/kg)	1.05E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.1E-07	4.09E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-03
				DIBENZ(A,H)ANTHRACENE	1.90E-01	(mg/kg)	2.44E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.4E-08	9.47E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	6.20E-01	(mg/kg)	7.95E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	7.9E-09	3.09E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	1.00E-01	(mg/kg)	4.27E-09	(mg/kg-day)	2.00E+00	per (mg/kg-day)	8.5E-09	4.98E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**7.4E-07**					**1.8E-01**
			Dermal[1]	**Inorganics**												
				ALUMINUM	1.40E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E+00	(mg/kg-day)	--
				ANTIMONY	6.70E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.47E+01	(mg/kg)	8.75E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.3E-07	1.02E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.4E-03
				CADMIUM	1.12E+01	(mg/kg)	2.22E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	2.59E-08	(mg/kg-day)	2.50E-06	(mg/kg-day)	1.0E-02
				COBALT	1.05E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	1.54E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	3.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.94E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				MERCURY	1.70E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	2.10E-05	(mg/kg-day)	--
				THALLIUM	3.00E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				VANADIUM	3.28E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.30E-04	(mg/kg-day)	--
				ZINC	3.41E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.00E+00	(mg/kg)	7.74E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	7.7E-09	3.01E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.50E+00	(mg/kg)	1.16E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.2E-08	4.51E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	8.20E-01	(mg/kg)	6.35E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	6.3E-08	2.47E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.2E-04
				DIBENZ(A,H)ANTHRACENE	1.90E-01	(mg/kg)	1.47E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.5E-08	5.72E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	6.20E-01	(mg/kg)	4.80E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	4.8E-09	1.87E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	1.00E-01	(mg/kg)	2.78E-09	(mg/kg-day)	2.00E+00	per (mg/kg-day)	5.6E-09	3.24E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.4E-07**					**1.5E-02**
		Exposure Point Total									**9.8E-07**					**1.9E-01**
	Exposure Medium Total										**9.8E-07**					**1.9E-01**

TABLE 316
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	Dump Area	Inhalation	**Inorganics**												
				ALUMINUM	1.15E-05	(mg/m^3)	2.33E-05	(ug/m^3)	NA	per (ug/m^3)	--	2.72E-07	(mg/m^3)	5.00E-03	(mg/m^3)	5.4E-05
				ANTIMONY	5.54E-09	(mg/m^3)	1.12E-08	(ug/m^3)	NA	per (ug/m^3)	--	1.31E-10	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.21E-08	(mg/m^3)	2.46E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.1E-10	2.87E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.9E-05
				CADMIUM	9.26E-09	(mg/m^3)	1.87E-08	(ug/m^3)	1.80E-03	per (ug/m^3)	3.4E-11	2.18E-10	(mg/m^3)	1.00E-05	(mg/m^3)	2.2E-05
				COBALT	8.68E-09	(mg/m^3)	1.75E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.6E-10	2.05E-10	(mg/m^3)	6.00E-06	(mg/m^3)	3.4E-05
				COPPER	1.27E-06	(mg/m^3)	2.57E-06	(ug/m^3)	NA	per (ug/m^3)	--	3.00E-08	(mg/m^3)	NA	(mg/m^3)	--
				IRON	2.76E-05	(mg/m^3)	5.59E-05	(ug/m^3)	NA	per (ug/m^3)	--	6.52E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.26E-07	(mg/m^3)	6.58E-07	(ug/m^3)	NA	per (ug/m^3)	--	7.68E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.5E-04
				MERCURY	1.40E-09	(mg/m^3)	2.84E-09	(ug/m^3)	NA	per (ug/m^3)	--	3.31E-11	(mg/m^3)	3.00E-04	(mg/m^3)	1.1E-07
				THALLIUM	2.48E-10	(mg/m^3)	5.01E-10	(ug/m^3)	NA	per (ug/m^3)	--	5.85E-12	(mg/m^3)	NA	(mg/m^3)	--
				VANADIUM	2.71E-08	(mg/m^3)	5.48E-08	(ug/m^3)	NA	per (ug/m^3)	--	6.40E-10	(mg/m^3)	1.00E-04	(mg/m^3)	6.4E-06
				ZINC	2.82E-06	(mg/m^3)	5.70E-06	(ug/m^3)	NA	per (ug/m^3)	--	6.65E-08	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	8.26E-10	(mg/m^3)	5.01E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	3.0E-13	1.95E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.24E-09	(mg/m^3)	7.52E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	4.5E-13	2.92E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	6.78E-10	(mg/m^3)	4.11E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	2.5E-12	1.60E-11	(mg/m^3)	2.00E-06	(mg/m^3)	8.0E-06
				DIBENZ(A,H)ANTHRACENE	1.57E-10	(mg/m^3)	9.53E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	5.7E-13	3.70E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	5.12E-10	(mg/m^3)	3.11E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.9E-13	1.21E-11	(mg/m^3)	NA	(mg/m^3)	--
				Pesticides/PCBs												
				AROCLOR-1260	8.26E-11	(mg/m^3)	1.67E-10	(ug/m^3)	1.00E-04	per (ug/m^3)	1.7E-14	1.95E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**3.0E-10**					**3.0E-04**
		Exposure Point Total									**3.0E-10**					**3.0E-04**
	Exposure Medium Total										**3.0E-10**					**3.0E-04**
Soil Total											**9.8E-07**					**1.9E-01**
										Total of Receptor Risks Across All Media	**9.8E-07**				Total of Receptor Hazards Across All Media	**1.9E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 317
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Dump Area	Ingestion	**Inorganics**												
				ALUMINUM	1.40E+04	(mg/kg)	8.47E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	1.48E-02	(mg/kg-day)	1.00E+00	(mg/kg-day)	1.5E-02
				ANTIMONY	6.70E+00	(mg/kg)	4.06E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	7.11E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	1.8E-02
				ARSENIC	1.47E+01	(mg/kg)	5.35E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.0E-07	9.36E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.1E-02
				CADMIUM	1.12E+01	(mg/kg)	6.79E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.19E-05	(mg/kg-day)	1.00E-04	(mg/kg-day)	1.2E-01
				COBALT	1.05E+01	(mg/kg)	6.37E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.11E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.7E-02
				COPPER	1.54E+03	(mg/kg)	9.33E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.63E-03	(mg/kg-day)	4.00E-02	(mg/kg-day)	4.1E-02
				IRON	3.35E+04	(mg/kg)	2.03E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	3.55E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	5.1E-02
				MANGANESE	3.94E+02	(mg/kg)	2.39E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	4.18E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.0E-03
				MERCURY	1.70E+00	(mg/kg)	1.03E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.80E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.0E-03
				THALLIUM	3.00E-01	(mg/kg)	1.82E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	3.18E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	3.2E-02
				VANADIUM	3.28E+01	(mg/kg)	1.99E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	3.48E-05	(mg/kg-day)	5.00E-03	(mg/kg-day)	7.0E-03
				ZINC	3.41E+03	(mg/kg)	2.07E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	3.62E-03	(mg/kg-day)	3.0E-01	(mg/kg-day)	1.2E-02
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.00E+00	(mg/kg)	1.82E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.8E-08	1.06E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.50E+00	(mg/kg)	2.73E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.7E-08	1.59E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	8.20E-01	(mg/kg)	1.49E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.5E-07	8.71E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	2.9E-03
				DIBENZ(A,H)ANTHRACENE	1.90E-01	(mg/kg)	3.46E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.5E-08	2.02E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	6.20E-01	(mg/kg)	1.13E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.1E-08	6.58E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	1.00E-01	(mg/kg)	6.07E-09	(mg/kg-day)	2.0E+00	per (mg/kg-day)	1.2E-08	1.06E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.1E-06**					**3.7E-01**
			Dermal[1]	**Inorganics**												
				ALUMINUM	1.40E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E+00	(mg/kg-day)	--
				ANTIMONY	6.70E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.47E+01	(mg/kg)	5.64E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.5E-08	9.86E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.3E-03
				CADMIUM	1.12E+01	(mg/kg)	1.43E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	2.51E-08	(mg/kg-day)	2.50E-06	(mg/kg-day)	1.0E-02
				COBALT	1.05E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	1.54E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	3.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.94E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				MERCURY	1.70E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	2.10E-05	(mg/kg-day)	--
				THALLIUM	3.00E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				VANADIUM	3.28E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.30E-04	(mg/kg-day)	--
				ZINC	3.41E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.0E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.00E+00	(mg/kg)	4.99E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	5.0E-09	2.91E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.50E+00	(mg/kg)	7.48E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	7.5E-09	4.36E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	8.20E-01	(mg/kg)	4.09E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	4.1E-08	2.38E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	7.9E-04
				DIBENZ(A,H)ANTHRACENE	1.90E-01	(mg/kg)	9.47E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	9.5E-09	5.53E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	6.20E-01	(mg/kg)	3.09E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.1E-09	1.80E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	1.00E-01	(mg/kg)	1.79E-09	(mg/kg-day)	2.0E+00	per (mg/kg-day)	3.6E-09	3.13E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.5E-07**					**1.4E-02**
		Exposure Point Total									**1.2E-06**					**3.9E-01**
	Exposure Medium Total										**1.2E-06**					**3.9E-01**

[1] Dermal Absorption Factor = 0.01

TABLE 317
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	Dump Area	Inhalation	**Inorganics**												
				ALUMINUM	1.15E-05	(mg/m^3)	9.34E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.63E-07	(mg/m^3)	5.00E-03	(mg/m^3)	3.3E-05
				ANTIMONY	5.54E-09	(mg/m^3)	4.48E-09	(ug/m^3)	NA	per (ug/m^3)	--	7.84E-11	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.21E-08	(mg/m^3)	9.83E-09	(ug/m^3)	4.30E-03	per (ug/m^3)	4.2E-11	1.72E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.1E-05
				CADMIUM	9.26E-09	(mg/m^3)	7.49E-09	(ug/m^3)	1.80E-03	per (ug/m^3)	1.3E-11	1.31E-10	(mg/m^3)	1.00E-05	(mg/m^3)	1.3E-05
				COBALT	8.68E-09	(mg/m^3)	7.02E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	6.3E-11	1.23E-10	(mg/m^3)	6.00E-06	(mg/m^3)	2.0E-05
				COPPER	1.27E-06	(mg/m^3)	1.03E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.80E-08	(mg/m^3)	NA	(mg/m^3)	--
				IRON	2.76E-05	(mg/m^3)	2.24E-05	(ug/m^3)	NA	per (ug/m^3)	--	3.91E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.26E-07	(mg/m^3)	2.63E-07	(ug/m^3)	NA	per (ug/m^3)	--	4.61E-09	(mg/m^3)	5.00E-05	(mg/m^3)	9.2E-05
				MERCURY	1.40E-09	(mg/m^3)	1.14E-09	(ug/m^3)	NA	per (ug/m^3)	--	1.99E-11	(mg/m^3)	3.00E-04	(mg/m^3)	6.6E-08
				THALLIUM	2.48E-10	(mg/m^3)	2.01E-10	(ug/m^3)	NA	per (ug/m^3)	--	3.51E-12	(mg/m^3)	NA	(mg/m^3)	--
				VANADIUM	2.71E-08	(mg/m^3)	2.19E-08	(ug/m^3)	NA	per (ug/m^3)	--	3.84E-10	(mg/m^3)	1.00E-04	(mg/m^3)	3.8E-06
				ZINC	2.82E-06	(mg/m^3)	2.28E-06	(ug/m3)	NA	per (ug/m3)	--	3.99E-08	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	8.26E-10	(mg/m^3)	2.01E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.2E-13	1.17E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.24E-09	(mg/m^3)	3.01E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.8E-13	1.75E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	6.78E-10	(mg/m^3)	1.64E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	9.9E-13	9.59E-12	(mg/m^3)	2.00E-06	(mg/m^3)	4.8E-06
				DIBENZ(A,H)ANTHRACENE	1.57E-10	(mg/m^3)	3.81E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	2.3E-13	2.22E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	5.12E-10	(mg/m^3)	1.24E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	7.5E-14	7.25E-12	(mg/m^3)	NA	(mg/m^3)	--
				Pesticides/PCBs												
				AROCLOR-1260	8.26E-11	(mg/m^3)	6.68E-11	(ug/m3)	1.00E-04	per (ug/m3)	6.7E-15	1.17E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.2E-10**					**1.8E-04**
		Exposure Point Total									**1.2E-10**					**1.8E-04**
	Exposure Medium Total										**1.2E-10**					**1.8E-04**
Soil Total											**1.2E-06**					**3.9E-01**
										Total of Receptor Risks Across All Media	**1.2E-06**				Total of Receptor Hazards Across All Media	**3.9E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 318
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Dump Area	Ingestion	**Inorganics**												
				ALUMINUM	1.40E+04	(mg/kg)	9.21E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.07E-03	(mg/kg-day)	1.00E+00	(mg/kg-day)	1.1E-03
				ANTIMONY	6.70E+00	(mg/kg)	4.42E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	5.15E-07	(mg/kg-day)	4.00E-04	(mg/kg-day)	1.3E-03
				ARSENIC	1.47E+01	(mg/kg)	5.81E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.7E-08	6.78E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.3E-03
				CADMIUM	1.12E+01	(mg/kg)	7.38E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	8.61E-07	(mg/kg-day)	1.00E-04	(mg/kg-day)	8.6E-03
				COBALT	1.05E+01	(mg/kg)	6.92E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	8.07E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.7E-03
				COPPER	1.54E+03	(mg/kg)	1.01E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.18E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	3.0E-03
				IRON	3.35E+04	(mg/kg)	2.21E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.57E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	3.7E-03
				MANGANESE	3.94E+02	(mg/kg)	2.60E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	3.03E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.2E-04
				MERCURY	1.70E+00	(mg/kg)	1.12E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.31E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.4E-04
				THALLIUM	3.00E-01	(mg/kg)	1.98E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	2.31E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	2.3E-03
				VANADIUM	3.28E+01	(mg/kg)	2.16E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.52E-06	(mg/kg-day)	5.00E-03	(mg/kg-day)	5.0E-04
				ZINC	3.41E+03	(mg/kg)	2.25E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.62E-04	(mg/kg-day)	3.00E-01	(mg/kg-day)	8.7E-04
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.00E+00	(mg/kg)	1.98E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.0E-09	7.69E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.50E+00	(mg/kg)	2.97E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.0E-09	1.15E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	8.20E-01	(mg/kg)	1.62E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.6E-08	6.31E-08	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.1E-04
				DIBENZ(A,H)ANTHRACENE	1.90E-01	(mg/kg)	3.76E-09	(mg/kg-day)	1.00E+00	per (mg/kg-day)	3.8E-09	1.46E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	6.20E-01	(mg/kg)	1.23E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.2E-09	4.77E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	1.00E-01	(mg/kg)	6.59E-10	(mg/kg-day)	2.00E+00	per (mg/kg-day)	1.3E-09	7.69E-09	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.1E-07**					**2.7E-02**
			Dermal[1]	**Inorganics**												
				ALUMINUM	1.40E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E+00	(mg/kg-day)	--
				ANTIMONY	6.70E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.47E+01	(mg/kg)	2.70E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.1E-08	3.15E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.1E-03
				CADMIUM	1.12E+01	(mg/kg)	6.86E-10	(mg/kg-day)	NA	per (mg/kg-day)	--	8.00E-09	(mg/kg-day)	2.50E-06	(mg/kg-day)	3.2E-03
				COBALT	1.05E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	1.54E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	3.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.94E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				MERCURY	1.70E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	2.10E-05	(mg/kg-day)	--
				THALLIUM	3.00E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				VANADIUM	3.28E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.30E-04	(mg/kg-day)	--
				ZINC	3.41E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.00E+00	(mg/kg)	2.39E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.4E-09	9.29E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.50E+00	(mg/kg)	3.58E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.6E-09	1.39E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	8.20E-01	(mg/kg)	1.96E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.0E-08	7.62E-08	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.5E-04
				DIBENZ(A,H)ANTHRACENE	1.90E-01	(mg/kg)	4.54E-09	(mg/kg-day)	1.00E+00	per (mg/kg-day)	4.5E-09	1.76E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	6.20E-01	(mg/kg)	1.48E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.5E-09	5.76E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	1.00E-01	(mg/kg)	8.57E-10	(mg/kg-day)	2.00E+00	per (mg/kg-day)	1.7E-09	1.00E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**7.4E-08**					**4.5E-03**
		Exposure Point Total									**1.9E-07**					**3.2E-02**
	Exposure Medium Total										**1.9E-07**					**3.2E-02**

TABLE 318
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	Dump Area	Inhalation	**Inorganics**												
				ALUMINUM	1.15E-05	(mg/m^3)	7.23E-06	(ug/m^3)	NA	per (ug/m^3)	--	8.43E-08	(mg/m^3)	5.00E-03	(mg/m^3)	1.7E-05
				ANTIMONY	5.54E-09	(mg/m^3)	3.47E-09	(ug/m^3)	NA	per (ug/m^3)	--	4.05E-11	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.21E-08	(mg/m^3)	7.61E-09	(ug/m^3)	4.30E-03	per (ug/m^3)	3.3E-11	8.88E-11	(mg/m^3)	1.50E-05	(mg/m^3)	5.9E-06
				CADMIUM	9.26E-09	(mg/m^3)	5.80E-09	(ug/m^3)	1.80E-03	per (ug/m^3)	1.0E-11	6.76E-11	(mg/m^3)	1.00E-05	(mg/m^3)	6.8E-06
				COBALT	8.68E-09	(mg/m^3)	5.43E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	4.9E-11	6.34E-11	(mg/m^3)	6.00E-06	(mg/m^3)	1.1E-05
				COPPER	1.27E-06	(mg/m^3)	7.96E-07	(ug/m^3)	NA	per (ug/m^3)	--	9.29E-09	(mg/m^3)	NA	(mg/m^3)	--
				IRON	2.76E-05	(mg/m^3)	1.73E-05	(ug/m^3)	NA	per (ug/m^3)	--	2.02E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.26E-07	(mg/m^3)	2.04E-07	(ug/m^3)	NA	per (ug/m^3)	--	2.38E-09	(mg/m^3)	5.00E-05	(mg/m^3)	4.8E-05
				MERCURY	1.40E-09	(mg/m^3)	8.80E-10	(ug/m^3)	NA	per (ug/m^3)	--	1.03E-11	(mg/m^3)	3.00E-04	(mg/m^3)	3.4E-08
				THALLIUM	2.48E-10	(mg/m^3)	1.55E-10	(ug/m^3)	NA	per (ug/m^3)	--	1.81E-12	(mg/m^3)	NA	(mg/m^3)	--
				VANADIUM	2.71E-08	(mg/m^3)	1.70E-08	(ug/m^3)	NA	per (ug/m^3)	--	1.98E-10	(mg/m^3)	1.00E-04	(mg/m^3)	2.0E-06
				ZINC	2.82E-06	(mg/m^3)	1.77E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.06E-08	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	8.26E-10	(mg/m^3)	1.55E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	9.3E-14	6.04E-12	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.24E-09	(mg/m^3)	2.33E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.4E-13	9.06E-12	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	6.78E-10	(mg/m^3)	1.27E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	7.6E-13	4.95E-12	(mg/m^3)	2.00E-06	(mg/m^3)	2.5E-06
				DIBENZ(A,H)ANTHRACENE	1.57E-10	(mg/m^3)	2.95E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	1.8E-13	1.15E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	5.12E-10	(mg/m^3)	9.63E-10	(ug/m^3)	6.00E-05	per (ug/m^3)	5.8E-14	3.74E-12	(mg/m^3)	NA	(mg/m^3)	--
				Pesticides/PCBs												
				AROCLOR-1260	8.26E-11	(mg/m^3)	5.18E-11	(ug/m^3)	1.00E-04	per (ug/m^3)	5.2E-15	6.04E-13	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**9.3E-11**					**9.2E-05**
		Exposure Point Total									**9.3E-11**					**9.2E-05**
	Exposure Medium Total										**9.3E-11**					**9.2E-05**
Soil Total											**1.9E-07**					**3.2E-02**
										Total of Receptor Risks Across All Media	**1.9E-07**			Total of Receptor Hazards Across All Media		**3.2E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 319
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Iona Island	Ingestion	**Inorganics**												
				ALUMINUM	1.40E+04	(mg/kg)	6.32E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	3.40E-03	(mg/kg-day)	1.00E+00	(mg/kg-day)	3.4E-03
				ANTIMONY	6.70E+00	(mg/kg)	3.03E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.63E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	4.1E-03
				ARSENIC	1.47E+01	(mg/kg)	3.99E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	6.0E-07	2.15E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.2E-03
				CADMIUM	1.12E+01	(mg/kg)	5.07E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.73E-06	(mg/kg-day)	1.00E-04	(mg/kg-day)	2.7E-02
				COBALT	1.05E+01	(mg/kg)	4.75E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.56E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.5E-03
				COPPER	1.54E+03	(mg/kg)	6.96E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.75E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	9.4E-03
				IRON	3.35E+04	(mg/kg)	1.51E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	8.15E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.2E-02
				MANGANESE	3.94E+02	(mg/kg)	1.78E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	9.60E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	6.9E-04
				MERCURY	1.70E+00	(mg/kg)	7.69E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	4.14E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-03
				THALLIUM	3.00E-01	(mg/kg)	1.36E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	7.31E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	7.3E-03
				VANADIUM	3.28E+01	(mg/kg)	1.48E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	7.99E-06	(mg/kg-day)	5.00E-03	(mg/kg-day)	1.6E-03
				ZINC	3.41E+03	(mg/kg)	1.54E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	8.31E-04	(mg/kg-day)	3.00E-01	(mg/kg-day)	2.8E-03
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.00E+00	(mg/kg)	1.36E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.4E-08	2.44E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.50E+00	(mg/kg)	2.04E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.0E-08	3.65E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	8.20E-01	(mg/kg)	1.11E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.1E-07	2.00E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.7E-04
				DIBENZ(A,H)ANTHRACENE	1.90E-01	(mg/kg)	2.58E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.6E-08	4.63E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	6.20E-01	(mg/kg)	8.41E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	8.4E-09	1.51E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	1.00E-01	(mg/kg)	4.52E-09	(mg/kg-day)	2.00E+00	per (mg/kg-day)	9.0E-09	2.44E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**7.9E-07**					**8.6E-02**
			Dermal[1]	**Inorganics**												
				ALUMINUM	1.40E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E+00	(mg/kg-day)	--
				ANTIMONY	6.70E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	1.47E+01	(mg/kg)	7.87E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.2E-07	4.24E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-03
				CADMIUM	1.12E+01	(mg/kg)	2.00E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	1.08E-08	(mg/kg-day)	2.50E-06	(mg/kg-day)	4.3E-03
				COBALT	1.05E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	1.54E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	3.35E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	3.94E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				MERCURY	1.70E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	2.10E-05	(mg/kg-day)	--
				THALLIUM	3.00E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				VANADIUM	3.28E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.30E-04	(mg/kg-day)	--
				ZINC	3.41E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-01	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	1.00E+00	(mg/kg)	6.96E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	7.0E-09	1.25E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	1.50E+00	(mg/kg)	1.04E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.0E-08	1.87E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	8.20E-01	(mg/kg)	5.71E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	5.7E-08	1.02E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.4E-04
				DIBENZ(A,H)ANTHRACENE	1.90E-01	(mg/kg)	1.32E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.3E-08	2.37E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	6.20E-01	(mg/kg)	4.32E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	4.3E-09	7.75E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				Pesticides/PCBs												
				AROCLOR-1260	1.00E-01	(mg/kg)	2.50E-09	(mg/kg-day)	2.00E+00	per (mg/kg-day)	5.0E-09	1.35E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.2E-07**					**6.1E-03**
		Exposure Point Total									**1.0E-06**					**9.2E-02**

TABLE 319
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
	Exposure Medium Total										**1.0E-06**					**9.2E-02**

TABLE 319
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	Iona Island	Inhalation	**Inorganics**												
				ALUMINUM	1.15E-05	(mg/m^3)	1.17E-04	(ug/m^3)	NA	per (ug/m^3)	--	6.32E-07	(mg/m^3)	5.00E-03	(mg/m^3)	1.3E-04
				ANTIMONY	5.54E-09	(mg/m^3)	5.63E-08	(ug/m^3)	NA	per (ug/m^3)	--	3.03E-10	(mg/m^3)	NA	(mg/m^3)	--
				ARSENIC	1.21E-08	(mg/m^3)	1.24E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	5.3E-10	6.66E-10	(mg/m^3)	1.50E-05	(mg/m^3)	4.4E-05
				CADMIUM	9.26E-09	(mg/m^3)	9.42E-08	(ug/m^3)	1.80E-03	per (ug/m^3)	1.7E-10	5.07E-10	(mg/m^3)	1.00E-05	(mg/m^3)	5.1E-05
				COBALT	8.68E-09	(mg/m^3)	8.83E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	7.9E-10	4.75E-10	(mg/m^3)	6.00E-06	(mg/m^3)	7.9E-05
				COPPER	1.27E-06	(mg/m^3)	1.29E-05	(ug/m^3)	NA	per (ug/m^3)	--	6.96E-08	(mg/m^3)	NA	(mg/m^3)	--
				IRON	2.76E-05	(mg/m^3)	2.81E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.51E-06	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.26E-07	(mg/m^3)	3.31E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.78E-08	(mg/m^3)	5.00E-05	(mg/m^3)	3.6E-04
				MERCURY	1.40E-09	(mg/m^3)	1.43E-08	(ug/m^3)	NA	per (ug/m^3)	--	7.70E-11	(mg/m^3)	3.00E-04	(mg/m^3)	2.6E-07
				THALLIUM	2.48E-10	(mg/m^3)	2.52E-09	(ug/m^3)	NA	per (ug/m^3)	--	1.36E-11	(mg/m^3)	NA	(mg/m^3)	--
				VANADIUM	2.71E-08	(mg/m^3)	2.76E-07	(ug/m^3)	NA	per (ug/m^3)	--	1.49E-09	(mg/m^3)	1.00E-04	(mg/m^3)	1.5E-05
				ZINC	2.82E-06	(mg/m^3)	2.87E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.55E-07	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZ(A)ANTHRACENE	8.26E-10	(mg/m^3)	2.52E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	1.5E-12	4.53E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.24E-09	(mg/m^3)	3.78E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	2.3E-12	6.79E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	6.78E-10	(mg/m^3)	2.07E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	1.2E-11	3.71E-11	(mg/m^3)	2.00E-06	(mg/m^3)	1.9E-05
				DIBENZ(A,H)ANTHRACENE	1.57E-10	(mg/m^3)	4.79E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	2.9E-12	8.60E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	5.12E-10	(mg/m^3)	1.56E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	9.4E-13	2.81E-11	(mg/m^3)	NA	(mg/m^3)	--
				Pesticides/PCBs												
				AROCLOR-1260	8.26E-11	(mg/m^3)	8.41E-10	(ug/m^3)	1.00E-04	per (ug/m^3)	8.4E-14	4.53E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.5E-09**					**6.9E-04**
		Exposure Point Total									**1.5E-09**					**6.9E-04**
	Exposure Medium Total										**1.5E-09**					**6.9E-04**
Soil Total											**1.0E-06**					**9.3E-02**
										Total of Receptor Risks Across All Media	**1.0E-06**				Total of Receptor Hazards Across All Media	**9.3E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 320
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Dump Area	**Inorganics**					**Inorganics**					
			ALUMINUM	--	--	--	NA	ALUMINUM	Neurological	7.7E-03	--	3.4E-04	8.0E-03
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	9.2E-03	--	--	9.2E-03
			ARSENIC	2.6E-06	5.5E-07	2.7E-09	3.1E-06	ARSENIC	Skin, Cardiovascular	1.6E-02	3.4E-03	1.2E-04	2.0E-02
			CADMIUM	--	--	8.7E-10	8.7E-10	CADMIUM	Kidneys, Urinary	6.1E-02	1.0E-02	1.4E-04	7.2E-02
			COBALT	--	--	4.1E-09	4.1E-09	COBALT	Thyroid	1.9E-02	--	2.1E-04	1.9E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	2.1E-02	--	--	2.1E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	2.6E-02	--	--	2.6E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.5E-03	--	9.5E-04	2.5E-03
			MERCURY	--	--	--	NA	MERCURY	Nervous System, Developmenta	3.1E-03	--	6.8E-07	3.1E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	1.6E-02	--	--	1.6E-02
			VANADIUM	--	--	--	NA	VANADIUM	Skin	3.6E-03	--	4.0E-05	3.6E-03
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	6.2E-03	--	--	6.2E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZ(A)ANTHRACENE	2.0E-08	1.1E-08	2.6E-12	3.0E-08	BENZ(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	2.9E-08	1.6E-08	3.9E-12	4.6E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.6E-07	8.8E-08	2.1E-11	2.5E-07	BENZO(A)PYRENE	Developmental System	1.5E-03	8.2E-04	5.0E-05	2.4E-03
			DIBENZ(A,H)ANTHRACENE	3.7E-08	2.0E-08	4.9E-12	5.8E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	1.2E-08	6.7E-09	1.6E-12	1.9E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			Pesticides/PCBs					**Pesticides/PCBs**					
			AROCLOR-1260	3.9E-08	2.3E-08	4.3E-13	6.2E-08	AROCLOR-1260	NA	--	--	--	NA
			(Total)	2.9E-06	7.1E-07	7.7E-09	3.6E-06		(Total)	1.9E-01	1.5E-02	1.8E-03	2.1E-01
							Total Risk Across Surface Soil	**3.6E-06**					**Total Hazard Index Across Surface Soil**	**2.1E-01**
							Total Risk Across All Media and All Exposure Routes	**4E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.2**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 321
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Researcher

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Dump Area	**Inorganics**					**Inorganics**					
			ALUMINUM	--	--	--	NA	ALUMINUM	Neurological	2.5E-03	--	1.1E-04	2.6E-03
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	3.0E-03	--	--	3.0E-03
			ARSENIC	1.0E-07	5.3E-08	1.1E-10	1.5E-07	ARSENIC	Skin, Cardiovascular	5.2E-03	2.8E-03	3.8E-05	8.0E-03
			CADMIUM	--	--	3.4E-11	3.4E-11	CADMIUM	Kidneys, Urinary	2.0E-02	8.4E-03	4.4E-05	2.8E-02
			COBALT	--	--	1.6E-10	1.6E-10	COBALT	Thyroid	6.2E-03	--	6.9E-05	6.3E-03
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	6.8E-03	--	--	6.8E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	8.5E-03	--	--	8.5E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	5.0E-04	--	3.1E-04	8.1E-04
			MERCURY	--	--	--	NA	MERCURY	Nervous System, Developmenta	1.0E-03	--	2.2E-07	1.0E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	5.3E-03	--	--	5.3E-03
			VANADIUM	--	--	--	NA	VANADIUM	Skin	1.2E-03	--	1.3E-05	1.2E-03
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	2.0E-03	--	--	2.0E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZ(A)ANTHRACENE	7.6E-10	1.0E-09	1.0E-13	1.8E-09	BENZ(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.1E-09	1.6E-09	1.5E-13	2.7E-09	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	6.3E-09	8.6E-09	8.3E-13	1.5E-08	BENZO(A)PYRENE	Developmental System	4.9E-04	6.7E-04	1.6E-05	1.2E-03
			DIBENZ(A,H)ANTHRACENE	1.5E-09	2.0E-09	1.9E-13	3.4E-09	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	4.7E-10	6.5E-10	6.3E-14	1.1E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			Pesticides/PCBs					**Pesticides/PCBs**					NA
			AROCLOR-1260	1.5E-09	2.3E-09	1.7E-14	3.8E-09	AROCLOR-1260	NA	--	--	--	NA
			(Total)	1.1E-07	7.0E-08	3.0E-10	1.8E-07		(Total)	6.3E-02	1.2E-02	6.0E-04	7.5E-02
							Total Risk Across Surface Soil	**1.8E-07**					**Total Hazard Index Across Surface Soil**	**7.5E-02**
							Total Risk Across All Media and All Exposure Routes	**2E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.08**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 322
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Location: Iona Island
Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Dump Area	**Inorganics**					**Inorganics**					
			ALUMINUM	--	--	--	NA	ALUMINUM	Neurological	4.3E-02	--	4.9E-02	9.2E-02
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	9.2E-03	--	--	9.2E-03
			ARSENIC	5.9E-07	9.4E-08	1.6E-08	7.0E-07	ARSENIC	Skin, Cardiovascular	9.1E-02	1.5E-02	1.7E-02	1.2E-01
			CADMIUM	--	--	5.0E-09	5.0E-09	CADMIUM	Kidneys, Urinary	3.5E-01	4.5E-02	2.0E-02	4.1E-01
			COBALT	--	--	2.4E-08	2.4E-08	COBALT	Thyroid	1.1E-01	--	3.1E-02	1.4E-01
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	1.2E-01	--	--	1.2E-01
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.5E-01	--	--	1.5E-01
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	8.7E-03	--	1.4E-01	1.5E-01
			MERCURY	--	--	--	NA	MERCURY	Nervous System, Developmental	1.8E-02	--	9.9E-05	1.8E-02
			THALLIUM	--	--	--	NA	THALLIUM	Hair	5.0E-02	--	--	5.0E-02
			VANADIUM	--	--	--	NA	VANADIUM	Skin	2.0E-02	--	9.8E-05	2.0E-02
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	1.9E-02	--	--	1.9E-02
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZ(A)ANTHRACENE	4.4E-09	1.9E-09	1.5E-11	6.3E-09	BENZ(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	6.7E-09	2.8E-09	2.3E-11	9.5E-09	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	3.6E-08	1.5E-08	1.2E-10	5.2E-08	BENZO(A)PYRENE	Developmental System	8.5E-03	3.5E-03	7.2E-03	1.9E-02
			DIBENZ(A,H)ANTHRACENE	8.4E-09	3.5E-09	2.9E-11	1.2E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.8E-09	1.1E-09	9.3E-12	3.9E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			Pesticides/PCBs					**Pesticides/PCBs**					
			AROCLOR-1260	8.9E-09	4.0E-09	4.3E-14	1.3E-08	AROCLOR-1260	NA	--	--	--	NA
			(Total)	6.5E-07	1.2E-07	4.5E-08	8.2E-07		(Total)	9.9E-01	6.3E-02	2.6E-01	1.3E+00
						Total Risk Across Surface Soil	**8.2E-07**					**Total Hazard Index Across Surface Soil**	**1.3E+00**
						Total Risk Across All Media and All Exposure Routes	**8E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**1**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 323
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Dump Area	**Inorganics**					**Inorganics**					
			ALUMINUM	--	--	--	NA	ALUMINUM	Neurological	1.5E-03	--	3.3E-05	1.5E-03
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	1.8E-03	--	--	1.8E-03
			ARSENIC	4.0E-07	8.5E-08	2.1E-10	4.9E-07	ARSENIC	Skin, Cardiovascular	3.1E-03	6.6E-04	1.1E-05	3.8E-03
			CADMIUM	--	--	6.7E-11	6.7E-11	CADMIUM	Kidneys, Urinary	1.2E-02	2.0E-03	1.3E-05	1.4E-02
			COBALT	--	--	3.2E-10	3.2E-10	COBALT	Thyroid	3.7E-03	--	2.0E-05	3.7E-03
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	4.1E-03	--	--	4.1E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	5.1E-03	--	--	5.1E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.0E-04	--	9.2E-05	3.9E-04
			MERCURY	--	--	--	NA	MERCURY	Nervous System, Developmental	6.0E-04	--	6.6E-08	6.0E-04
			THALLIUM	--	--	--	NA	THALLIUM	Hair	3.2E-03	--	--	3.2E-03
			VANADIUM	--	--	--	NA	VANADIUM	Skin	7.0E-04	--	3.8E-06	7.0E-04
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	1.2E-03	--	--	1.2E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZ(A)ANTHRACENE	3.0E-09	1.7E-09	2.0E-13	4.7E-09	BENZ(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	4.5E-09	2.5E-09	3.0E-13	7.0E-09	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	2.5E-08	1.4E-08	1.6E-12	3.9E-08	BENZO(A)PYRENE	Developmental System	2.9E-04	1.6E-04	4.8E-06	4.5E-04
			DIBENZ(A,H)ANTHRACENE	5.8E-09	3.2E-09	3.8E-13	8.9E-09	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	1.9E-09	1.0E-09	1.2E-13	2.9E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			Pesticides/PCBs					**Pesticides/PCBs**					
			AROCLOR-1260	6.1E-09	3.6E-09	3.3E-14	9.7E-09	AROCLOR-1260	NA	--	--	--	NA
			(Total)	4.5E-07	1.1E-07	6.0E-10	5.6E-07		(Total)	3.7E-02	2.8E-03	1.8E-04	4.0E-02
Total Risk Across Surface Soil							**5.6E-07**	**Total Hazard Index Across Surface Soil**					**4.0E-02**
Total Risk Across All Media and All Exposure Routes							**6E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.04**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 324
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Dump Area	**Inorganics**					**Inorganics**					
			ALUMINUM	--	--	--	NA	ALUMINUM	Neurological	7.0E-03	--	5.4E-05	7.0E-03
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	8.3E-03	--	--	8.3E-03
			ARSENIC	5.7E-07	1.3E-07	1.1E-10	7.0E-07	ARSENIC	Skin, Cardiovascular	1.5E-02	3.4E-03	1.9E-05	1.8E-02
			CADMIUM	--	--	3.4E-11	3.4E-11	CADMIUM	Kidneys, Urinary	5.6E-02	1.0E-02	2.2E-05	6.6E-02
			COBALT	--	--	1.6E-10	1.6E-10	COBALT	Thyroid	1.7E-02	--	3.4E-05	1.7E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	1.9E-02	--	--	1.9E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	2.4E-02	--	--	2.4E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.4E-03	--	1.5E-04	1.6E-03
			MERCURY	--	--	--	NA	MERCURY	Nervous System, Developmenta	2.8E-03	--	1.1E-07	2.8E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	1.5E-02	--	--	1.5E-02
			VANADIUM	--	--	--	NA	VANADIUM	Skin	3.3E-03	--	6.4E-06	3.3E-03
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	5.7E-03	--	--	5.7E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZ(A)ANTHRACENE	1.3E-08	7.7E-09	3.0E-13	2.1E-08	BENZ(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.9E-08	1.2E-08	4.5E-13	3.1E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.1E-07	6.3E-08	2.5E-12	1.7E-07	BENZO(A)PYRENE	Developmental System	1.4E-03	8.2E-04	8.0E-06	2.2E-03
			DIBENZ(A,H)ANTHRACENE	2.4E-08	1.5E-08	5.7E-13	3.9E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	7.9E-09	4.8E-09	1.9E-13	1.3E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			Pesticides/PCBs					**Pesticides/PCBs**					
			AROCLOR-1260	8.5E-09	5.6E-09	1.7E-14	1.4E-08	AROCLOR-1260	NA	--	--	--	NA
			(Total)	7.4E-07	2.4E-07	3.0E-10	9.8E-07		(Total)	1.8E-01	1.5E-02	3.0E-04	1.9E-01
							Total Risk Across Surface Soil	**9.8E-07**					**Total Hazard Index Across Surface Soil**	**1.9E-01**
							Total Risk Across All Media and All Exposure Routes	**1E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.2**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 325
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Dump Area	**Inorganics**					**Inorganics**					
			ALUMINUM	--	--	--	NA	ALUMINUM	Neurological	1.5E-02	--	3.3E-05	1.5E-02
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	1.8E-02	--	--	1.8E-02
			ARSENIC	8.0E-07	8.5E-08	4.2E-11	8.9E-07	ARSENIC	Skin, Cardiovascular	3.1E-02	3.3E-03	1.1E-05	3.5E-02
			CADMIUM	--	--	1.3E-11	1.3E-11	CADMIUM	Kidneys, Urinary	1.2E-01	1.0E-02	1.3E-05	1.3E-01
			COBALT	--	--	6.3E-11	6.3E-11	COBALT	Thyroid	3.7E-02	--	2.0E-05	3.7E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	4.1E-02	--	--	4.1E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	5.1E-02	--	--	5.1E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.0E-03	--	9.2E-05	3.1E-03
			MERCURY	--	--	--	NA	MERCURY	Nervous System, Developmenta	6.0E-03	--	6.6E-08	6.0E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	3.2E-02	--	--	3.2E-02
			VANADIUM	--	--	--	NA	VANADIUM	Skin	7.0E-03	--	3.8E-06	7.0E-03
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	1.2E-02	--	--	1.2E-02
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZ(A)ANTHRACENE	1.8E-08	5.0E-09	1.2E-13	2.3E-08	BENZ(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	2.7E-08	7.5E-09	1.8E-13	3.5E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.5E-07	4.1E-08	9.9E-13	1.9E-07	BENZO(A)PYRENE	Developmental System	2.9E-03	7.9E-04	4.8E-06	3.7E-03
			DIBENZ(A,H)ANTHRACENE	3.5E-08	9.5E-09	2.3E-13	4.4E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	1.1E-08	3.1E-09	7.5E-14	1.4E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			Pesticides/PCBs					**Pesticides/PCBs**					
			AROCLOR-1260	1.2E-08	3.6E-09	6.7E-15	1.6E-08	AROCLOR-1260	NA	--	--	--	NA
			(Total)	1.1E-06	1.5E-07	1.2E-10	1.2E-06		(Total)	3.7E-01	1.4E-02	1.8E-04	3.9E-01
						Total Risk Across Surface Soil	**1.2E-06**					**Total Hazard Index Across Surface Soil**	**3.9E-01**
						Total Risk Across All Media and All Exposure Routes	**1E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.4**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 326
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
IONA ISLAND NAVAL AMMUNITION DEPOT FORMERLY USED DEFENSE SITE
STONY POINT, ROCKLAND COUNTY, NEW YORK
DUMP AREA EXPOSURE AREA

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Dump Area	**Inorganics**					**Inorganics**					
			ALUMINUM	--	--	--	NA	ALUMINUM	Neurological	1.1E-03	--	1.7E-05	1.1E-03
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	1.3E-03	--	--	1.3E-03
			ARSENIC	8.7E-08	4.1E-08	3.3E-11	1.3E-07	ARSENIC	Skin, Cardiovascular	2.3E-03	1.1E-03	5.9E-06	3.3E-03
			CADMIUM	--	--	1.0E-11	1.0E-11	CADMIUM	Kidneys, Urinary	8.6E-03	3.2E-03	6.8E-06	1.2E-02
			COBALT	--	--	4.9E-11	4.9E-11	COBALT	Thyroid	2.7E-03	--	1.1E-05	2.7E-03
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	3.0E-03	--	--	3.0E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	3.7E-03	--	--	3.7E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.2E-04	--	4.8E-05	2.6E-04
			MERCURY	--	--	--	NA	MERCURY	Nervous System, Developmenta	4.4E-04	--	3.4E-08	4.4E-04
			THALLIUM	--	--	--	NA	THALLIUM	Hair	2.3E-03	--	--	2.3E-03
			VANADIUM	--	--	--	NA	VANADIUM	Skin	5.0E-04	--	2.0E-06	5.1E-04
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	8.7E-04	--	--	8.7E-04
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZ(A)ANTHRACENE	2.0E-09	2.4E-09	9.3E-14	4.4E-09	BENZ(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	3.0E-09	3.6E-09	1.4E-13	6.5E-09	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.6E-08	2.0E-08	7.6E-13	3.6E-08	BENZO(A)PYRENE	Developmental System	2.1E-04	2.5E-04	2.5E-06	4.7E-04
			DIBENZ(A,H)ANTHRACENE	3.8E-09	4.5E-09	1.8E-13	8.3E-09	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	1.2E-09	1.5E-09	5.8E-14	2.7E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			Pesticides/PCBs					**Pesticides/PCBs**					
			AROCLOR-1260	1.3E-09	1.7E-09	5.2E-15	3.0E-09	AROCLOR-1260	NA	--	--	--	NA
			(Total)	1.1E-07	7.4E-08	9.3E-11	1.9E-07		(Total)	2.7E-02	4.5E-03	9.2E-05	3.2E-02
							Total Risk Across Surface Soil	**1.9E-07**					**Total Hazard Index Across Surface Soil**	**3.2E-02**
							Total Risk Across All Media and All Exposure Routes	**2E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.03**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 327
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
DUMP AREA EXPOSURE AREA

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Camper
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Dump Area	**Inorganics**					**Inorganics**					
			ALUMINUM	--	--	--	NA	ALUMINUM	Neurological	3.4E-03	--	1.3E-04	3.5E-03
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	4.1E-03	--	--	4.1E-03
			ARSENIC	6.0E-07	1.2E-07	5.3E-10	7.2E-07	ARSENIC	Skin, Cardiovascular	7.2E-03	1.4E-03	4.4E-05	8.6E-03
			CADMIUM	--	--	1.7E-10	1.7E-10	CADMIUM	Kidneys, Urinary	2.7E-02	4.3E-03	5.1E-05	3.2E-02
			COBALT	--	--	7.9E-10	7.9E-10	COBALT	Thyroid	8.5E-03	--	7.9E-05	8.6E-03
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	9.4E-03	--	--	9.4E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.2E-02	--	--	1.2E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	6.9E-04	--	3.6E-04	1.0E-03
			MERCURY	--	--	--	NA	MERCURY	Nervous System, Developmenta	1.4E-03	--	2.6E-07	1.4E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	7.3E-03	--	--	7.3E-03
			VANADIUM	--	--	--	NA	VANADIUM	Skin	1.6E-03	--	1.5E-05	1.6E-03
			ZINC	--	--	--	NA	ZINC	Immune System, Blood	2.8E-03	--	--	2.8E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZ(A)ANTHRACENE	1.4E-08	7.0E-09	1.5E-12	2.1E-08	BENZ(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	2.0E-08	1.0E-08	2.3E-12	3.1E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.1E-07	5.7E-08	1.2E-11	1.7E-07	BENZO(A)PYRENE	Developmental System	6.7E-04	3.4E-04	1.9E-05	1.0E-03
			DIBENZ(A,H)ANTHRACENE	2.6E-08	1.3E-08	2.9E-12	3.9E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	8.4E-09	4.3E-09	9.4E-13	1.3E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			Pesticides/PCBs					**Pesticides/PCBs**					
			AROCLOR-1260	9.0E-09	5.0E-09	8.4E-14	1.4E-08	AROCLOR-1260	NA	--	--	--	NA
			(Total)	7.9E-07	2.2E-07	1.5E-09	1.0E-06		(Total)	8.6E-02	6.1E-03	6.9E-04	9.3E-02
							Total Risk Across Surface Soil	**1.0E-06**					**Total Hazard Index Across Surface Soil**	**9.3E-02**
							Total Risk Across All Media and All Exposure Routes	**1E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.09**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 328
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Iona Island	Ingestion	**Inorganics**												
				ARSENIC	1.60E+01	(mg/kg)	1.88E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.8E-06	5.26E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.8E-02
				COBALT	9.20E+00	(mg/kg)	1.80E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	5.04E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.7E-02
				COPPER	5.74E+01	(mg/kg)	1.12E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.15E-05	(mg/kg-day)	4.00E-02	(mg/kg-day)	7.9E-04
				IRON	1.82E+04	(mg/kg)	3.57E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	9.98E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.4E-02
				MANGANESE	6.50E+02	(mg/kg)	1.27E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	3.56E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.5E-03
				THALLIUM	1.50E-01	(mg/kg)	2.94E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	8.22E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	8.2E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.10E+00	(mg/kg)	4.11E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.1E-08	1.15E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.50E+00	(mg/kg)	4.89E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.9E-08	1.37E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.70E+00	(mg/kg)	3.33E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.3E-07	9.32E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	3.1E-03
				DIBENZ(A,H)ANTHRACENE	3.00E-01	(mg/kg)	5.87E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	5.9E-08	1.64E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.20E+00	(mg/kg)	2.35E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.3E-08	6.58E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				Exp. Route Total							**3.3E-06**					**6.3E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.60E+01	(mg/kg)	3.98E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	6.0E-07	1.11E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.7E-03
				COBALT	9.20E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	5.74E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.82E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	6.50E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	1.50E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.10E+00	(mg/kg)	2.26E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.3E-08	6.33E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.50E+00	(mg/kg)	2.69E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.7E-08	7.54E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.70E+00	(mg/kg)	1.83E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.8E-07	5.13E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.7E-03
				DIBENZ(A,H)ANTHRACENE	3.00E-01	(mg/kg)	3.23E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.2E-08	9.04E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.20E+00	(mg/kg)	1.29E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.3E-08	3.62E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				Exp. Route Total							**8.7E-07**					**5.4E-03**
		Exposure Point Total									**4.2E-06**					**6.9E-02**
	Exposure Medium Total										**4.2E-06**					**6.9E-02**

TABLE 328
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	Iona Island	Inhalation	**Inorganics**												
				ARSENIC	1.32E-08	(mg/m^3)	6.90E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	3.0E-09	1.93E-09	(mg/m^3)	1.50E-05	(mg/m^3)	1.3E-04
				COBALT	7.60E-09	(mg/m^3)	3.97E-07	(ug/m^3)	9.00E-03	per (ug/m^3)	3.6E-09	1.11E-09	(mg/m^3)	6.00E-06	(mg/m^3)	1.9E-04
				COPPER	4.74E-08	(mg/m^3)	2.48E-06	(ug/m^3)	NA	per (ug/m^3)	--	6.93E-09	(mg/m^3)	NA	(mg/m^3)	--
				IRON	1.51E-05	(mg/m^3)	7.86E-04	(ug/m^3)	NA	per (ug/m^3)	--	2.20E-06	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	5.37E-07	(mg/m^3)	2.80E-05	(ug/m^3)	NA	per (ug/m^3)	--	7.85E-08	(mg/m^3)	5.00E-05	(mg/m^3)	1.6E-03
				THALLIUM	1.24E-10	(mg/m^3)	6.47E-09	(ug/m^3)	NA	per (ug/m^3)	--	1.81E-11	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.74E-09	(mg/m^3)	9.06E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	5.4E-12	2.54E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.07E-09	(mg/m^3)	1.08E-07	(ug/m^3)	6.00E-05	per (ug/m^3)	6.5E-12	3.02E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.40E-09	(mg/m^3)	7.33E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	4.4E-11	2.05E-10	(mg/m^3)	2.00E-06	(mg/m^3)	1.0E-04
				DIBENZ(A,H)ANTHRACENE	2.48E-10	(mg/m^3)	1.29E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	7.8E-12	3.62E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	9.92E-10	(mg/m^3)	5.18E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	3.1E-12	1.45E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**6.6E-09**					**2.0E-03**
		Exposure Point Total									**6.6E-09**					**2.0E-03**
	Exposure Medium Total										**6.6E-09**					**2.0E-03**
Soil Total											**4.2E-06**					**7.1E-02**
										Total of Receptor Risks Across All Media	**4.2E-06**				Total of Receptor Hazards Across All Media	**7.1E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 329
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Iona Island	Ingestion	**Inorganics**												
				ARSENIC	1.60E+01	(mg/kg)	7.33E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.1E-07	1.71E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.7E-03
				COBALT	9.20E+00	(mg/kg)	7.02E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.64E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.5E-03
				COPPER	5.74E+01	(mg/kg)	4.38E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.02E-05	(mg/kg-day)	4.00E-02	(mg/kg-day)	2.6E-04
				IRON	1.82E+04	(mg/kg)	1.39E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	3.25E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	4.6E-03
				MANGANESE	6.50E+02	(mg/kg)	4.96E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.16E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	8.3E-04
				THALLIUM	1.50E-01	(mg/kg)	1.14E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	2.67E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	2.7E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.10E+00	(mg/kg)	1.60E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.6E-09	3.74E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.50E+00	(mg/kg)	1.91E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.9E-09	4.45E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.70E+00	(mg/kg)	1.30E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.3E-08	3.03E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.0E-03
				DIBENZ(A,H)ANTHRACENE	3.00E-01	(mg/kg)	2.29E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.3E-09	5.34E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.20E+00	(mg/kg)	9.16E-09	(mg/kg-day)	1.0E-01	per (mg/kg-day)	9.2E-10	2.14E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.3E-07**					**2.1E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.60E+01	(mg/kg)	3.88E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.8E-08	9.04E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.0E-03
				COBALT	9.20E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	5.74E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.82E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	6.50E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	1.50E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.10E+00	(mg/kg)	2.20E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.2E-09	5.14E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.50E+00	(mg/kg)	2.62E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.6E-09	6.12E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.70E+00	(mg/kg)	1.78E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.8E-08	4.16E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.4E-03
				DIBENZ(A,H)ANTHRACENE	3.00E-01	(mg/kg)	3.15E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.1E-09	7.35E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.20E+00	(mg/kg)	1.26E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.3E-09	2.94E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**8.5E-08**					**4.4E-03**
		Exposure Point Total									**2.1E-07**					**2.5E-02**
	Exposure Medium Total										**2.1E-07**					**2.5E-02**

TABLE 329
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	Iona Island	Inhalation	**Inorganics**												
				ARSENIC	1.32E-08	(mg/m^3)	2.69E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.2E-10	6.28E-10	(mg/m^3)	1.50E-05	(mg/m^3)	4.2E-05
				COBALT	7.60E-09	(mg/m^3)	1.55E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.4E-10	3.61E-10	(mg/m^3)	6.00E-06	(mg/m^3)	6.0E-05
				IRON	1.51E-05	(mg/m^3)	3.06E-05	(ug/m^3)	NA	per (ug/m^3)	--	7.15E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	5.37E-07	(mg/m^3)	1.09E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.55E-08	(mg/m^3)	5.00E-05	(mg/m^3)	5.1E-04
				THALLIUM	1.24E-10	(mg/m^3)	2.52E-10	(ug/m^3)	NA	per (ug/m^3)	--	5.89E-12	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.74E-09	(mg/m^3)	3.53E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.1E-13	8.24E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.07E-09	(mg/m^3)	4.21E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.5E-13	9.81E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.40E-09	(mg/m^3)	2.86E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	1.7E-12	6.67E-11	(mg/m^3)	2.00E-06	(mg/m^3)	3.3E-05
				DIBENZ(A,H)ANTHRACENE	2.48E-10	(mg/m^3)	5.05E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	3.0E-13	1.18E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	9.92E-10	(mg/m^3)	2.02E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.2E-13	4.71E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**2.6E-10**					**6.5E-04**
		Exposure Point Total									**2.6E-10**					**6.5E-04**
	Exposure Medium Total										**2.6E-10**					**6.5E-04**
Soil Total											**2.2E-07**					**2.6E-02**
										Total of Receptor Risks Across All Media	**2.2E-07**			Total of Receptor Hazards Across All Media		**2.6E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 330
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Iona Island	Ingestion	**Inorganics**												
				ARSENIC	1.60E+01	(mg/kg)	4.26E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	6.4E-07	2.98E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.9E-02
				COBALT	9.20E+00	(mg/kg)	4.08E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.86E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.5E-02
				COPPER	5.74E+01	(mg/kg)	2.55E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.78E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	4.5E-03
				IRON	1.82E+04	(mg/kg)	8.09E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	5.66E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	8.1E-02
				MANGANESE	6.50E+02	(mg/kg)	2.89E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.02E-03	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.4E-02
				THALLIUM	1.50E-01	(mg/kg)	6.66E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	2.50E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	2.5E-02
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.10E+00	(mg/kg)	9.32E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	9.3E-09	6.53E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.50E+00	(mg/kg)	1.11E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.1E-08	7.77E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.70E+00	(mg/kg)	7.55E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	7.5E-08	5.28E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.8E-02
				DIBENZ(A,H)ANTHRACENE	3.00E-01	(mg/kg)	1.33E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.3E-08	9.32E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.20E+00	(mg/kg)	5.33E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	5.3E-09	3.73E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				Exp. Route Total							**7.5E-07**					**3.4E-01**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.60E+01	(mg/kg)	6.83E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.0E-07	4.78E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.6E-02
				COBALT	9.20E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	5.74E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.82E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	6.50E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	1.50E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.10E+00	(mg/kg)	3.89E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.9E-09	2.72E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.50E+00	(mg/kg)	4.63E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.6E-09	3.24E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.70E+00	(mg/kg)	3.15E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.1E-08	2.20E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.3E-03
				DIBENZ(A,H)ANTHRACENE	3.00E-01	(mg/kg)	5.55E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	5.6E-09	3.89E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.20E+00	(mg/kg)	2.22E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.2E-09	1.55E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				Exp. Route Total							**1.5E-07**					**2.3E-02**
		Exposure Point Total									**9.0E-07**					**3.6E-01**
	Exposure Medium Total										**9.0E-07**					**3.6E-01**

TABLE 330
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	Iona Island	Inhalation	**Inorganics**												
				ARSENIC	7.77E-07	(mg/m^3)	4.01E-06	(ug/m^3)	4.3E-03	per (ug/m^3)	1.7E-08	2.80E-07	(mg/m^3)	1.50E-05	(mg/m^3)	1.9E-02
				COBALT	4.47E-07	(mg/m^3)	2.30E-06	(ug/m^3)	9.0E-03	per (ug/m^3)	2.1E-08	1.61E-07	(mg/m^3)	6.00E-06	(mg/m^3)	2.7E-02
				COPPER	2.79E-06	(mg/m^3)	1.44E-05	(ug/m^3)	NA	per (ug/m^3)	--	1.01E-06	(mg/m^3)	NA	(mg/m^3)	--
				IRON	8.85E-04	(mg/m^3)	4.56E-03	(ug/m^3)	NA	per (ug/m^3)	--	3.19E-04	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	3.16E-05	(mg/m^3)	1.63E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.14E-05	(mg/m^3)	5.00E-05	(mg/m^3)	2.3E-01
				THALLIUM	1.24E-10	(mg/m^3)	6.39E-10	(ug/m^3)	NA	per (ug/m^3)	--	4.48E-11	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.02E-07	(mg/m^3)	5.26E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	3.2E-11	3.68E-08	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	1.21E-07	(mg/m^3)	6.26E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	3.8E-11	4.38E-08	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	8.25E-08	(mg/m^3)	4.26E-07	(ug/m^3)	6.0E-04	per (ug/m^3)	2.6E-10	2.98E-08	(mg/m^3)	2.00E-06	(mg/m^3)	1.5E-02
				DIBENZ(A,H)ANTHRACENE	1.46E-08	(mg/m^3)	7.51E-08	(ug/m^3)	6.0E-04	per (ug/m^3)	4.5E-11	5.26E-09	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	5.83E-08	(mg/m^3)	3.00E-07	(ug/m^3)	6.0E-05	per (ug/m^3)	1.8E-11	2.10E-08	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**3.8E-08**					**2.9E-01**
		Exposure Point Total									**3.8E-08**					**2.9E-01**
	Exposure Medium Total										**3.8E-08**					**2.9E-01**
Soil Total											**9.4E-07**					**6.5E-01**
										Total of Receptor Risks Across All Media	**9.4E-07**				Total of Receptor Hazards Across All Media	**6.5E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 331
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Iona Island	Ingestion	**Inorganics**												
				ARSENIC	1.60E+01	(mg/kg)	2.91E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.4E-07	1.02E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.4E-03
				COBALT	9.20E+00	(mg/kg)	2.79E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	9.77E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.3E-03
				COPPER	5.74E+01	(mg/kg)	1.74E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	6.09E-06	(mg/kg-day)	4.00E-02	(mg/kg-day)	1.5E-04
				IRON	1.82E+04	(mg/kg)	5.53E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	1.93E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	2.8E-03
				MANGANESE	6.50E+02	(mg/kg)	1.97E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	6.90E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.9E-04
				THALLIUM	1.50E-01	(mg/kg)	4.55E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	1.59E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	1.6E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.10E+00	(mg/kg)	6.37E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	6.4E-09	2.23E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.50E+00	(mg/kg)	7.58E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	7.6E-09	2.65E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.70E+00	(mg/kg)	5.16E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	5.2E-08	1.80E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	6.0E-04
				DIBENZ(A,H)ANTHRACENE	3.00E-01	(mg/kg)	9.10E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	9.1E-09	3.18E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.20E+00	(mg/kg)	3.64E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.6E-09	1.27E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**5.2E-07**					**1.2E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.60E+01	(mg/kg)	6.15E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.2E-08	2.15E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.2E-04
				COBALT	9.20E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	5.74E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.82E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	6.50E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	1.50E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.10E+00	(mg/kg)	3.50E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.5E-09	1.22E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.50E+00	(mg/kg)	4.16E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.2E-09	1.46E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.70E+00	(mg/kg)	2.83E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	2.8E-08	9.91E-08	(mg/kg-day)	3.0E-04	(mg/kg-day)	3.3E-04
				DIBENZ(A,H)ANTHRACENE	3.00E-01	(mg/kg)	4.99E-09	(mg/kg-day)	1.0E+00	per (mg/kg-day)	5.0E-09	1.75E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.20E+00	(mg/kg)	2.00E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.0E-09	6.99E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.4E-07**					**1.0E-03**
		Exposure Point Total									**6.5E-07**					**1.3E-02**
	Exposure Medium Total										**6.5E-07**					**1.3E-02**

TABLE 331
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	Iona Island	Inhalation	**Inorganics**												
				ARSENIC	1.32E-08	(mg/m^3)	5.35E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	2.3E-10	1.87E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.2E-05
				COBALT	7.60E-09	(mg/m^3)	3.08E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	2.8E-10	1.08E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.8E-05
				COPPER	4.74E-08	(mg/m^3)	1.92E-07	(ug/m^3)	NA	per (ug/m^3)	--	6.71E-10	(mg/m^3)	NA	(mg/m^3)	--
				IRON	1.51E-05	(mg/m^3)	6.09E-05	(ug/m^3)	NA	per (ug/m^3)	--	2.13E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	5.37E-07	(mg/m^3)	2.17E-06	(ug/m^3)	NA	per (ug/m^3)	--	7.60E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.5E-04
				THALLIUM	1.24E-10	(mg/m^3)	5.01E-10	(ug/m^3)	NA	per (ug/m^3)	--	1.75E-12	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.74E-09	(mg/m^3)	7.02E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	4.2E-13	2.46E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.07E-09	(mg/m^3)	8.36E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	5.0E-13	2.92E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.40E-09	(mg/m^3)	5.68E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	3.4E-12	1.99E-11	(mg/m^3)	2.00E-06	(mg/m^3)	9.9E-06
				DIBENZ(A,H)ANTHRACENE	2.48E-10	(mg/m^3)	1.00E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	6.0E-13	3.51E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	9.92E-10	(mg/m^3)	4.01E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.4E-13	1.40E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**5.1E-10**					**1.9E-04**
		Exposure Point Total									**5.1E-10**					**1.9E-04**
	Exposure Medium Total										**5.1E-10**					**1.9E-04**
Soil Total											**6.5E-07**					**1.3E-02**
										Total of Receptor Risks Across All Media	**6.5E-07**				Total of Receptor Hazards Across All Media	**1.3E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 332
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Iona Island	Ingestion	**Inorganics**												
				ARSENIC	1.60E+01	(mg/kg)	4.10E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	6.2E-07	4.78E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.6E-02
				COBALT	9.20E+00	(mg/kg)	3.93E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	4.59E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				COPPER	5.74E+01	(mg/kg)	2.45E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	2.86E-05	(mg/kg-day)	4.00E-02	(mg/kg-day)	7.2E-04
				IRON	1.82E+04	(mg/kg)	7.78E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	9.08E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.3E-02
				MANGANESE	6.50E+02	(mg/kg)	2.78E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.24E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.3E-03
				THALLIUM	1.50E-01	(mg/kg)	6.41E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	7.48E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	7.5E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.10E+00	(mg/kg)	2.69E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.7E-08	1.05E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.50E+00	(mg/kg)	3.20E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.2E-08	1.25E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.70E+00	(mg/kg)	2.18E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.2E-07	8.47E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.8E-03
				DIBENZ(A,H)ANTHRACENE	3.00E-01	(mg/kg)	3.84E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	3.8E-08	1.50E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.20E+00	(mg/kg)	1.54E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.5E-08	5.98E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**9.5E-07**					**5.8E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.60E+01	(mg/kg)	9.53E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.4E-07	1.11E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.7E-03
				COBALT	9.20E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	5.74E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.82E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	6.50E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	1.50E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.10E+00	(mg/kg)	1.63E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.6E-08	6.32E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.50E+00	(mg/kg)	1.93E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.9E-08	7.52E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.70E+00	(mg/kg)	1.32E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.3E-07	5.12E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.7E-03
				DIBENZ(A,H)ANTHRACENE	3.00E-01	(mg/kg)	2.32E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.3E-08	9.03E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.20E+00	(mg/kg)	9.29E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	9.3E-09	3.61E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.4E-07**					**5.4E-03**
		Exposure Point Total									**1.3E-06**					**6.3E-02**
	Exposure Medium Total										**1.3E-06**					**6.3E-02**

TABLE 332
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	Iona Island	Inhalation	**Inorganics**												
				ARSENIC	1.32E-08	(mg/m^3)	2.67E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	1.1E-10	3.12E-10	(mg/m^3)	1.50E-05	(mg/m^3)	2.1E-05
				COBALT	7.60E-09	(mg/m^3)	1.54E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	1.4E-10	1.79E-10	(mg/m^3)	6.00E-06	(mg/m^3)	3.0E-05
				COPPER	4.74E-08	(mg/m^3)	9.59E-08	(ug/m^3)	NA	per (ug/m^3)	--	1.12E-09	(mg/m^3)	NA	(mg/m^3)	--
				IRON	1.51E-05	(mg/m^3)	3.05E-05	(ug/m^3)	NA	per (ug/m^3)	--	3.55E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	5.37E-07	(mg/m^3)	1.09E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.27E-08	(mg/m^3)	5.00E-05	(mg/m^3)	2.5E-04
				THALLIUM	1.24E-10	(mg/m^3)	2.51E-10	(ug/m^3)	NA	per (ug/m^3)	--	2.92E-12	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.74E-09	(mg/m^3)	1.05E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	6.3E-13	4.09E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.07E-09	(mg/m^3)	1.25E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	7.5E-13	4.87E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.40E-09	(mg/m^3)	8.52E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	5.1E-12	3.31E-11	(mg/m^3)	2.00E-06	(mg/m^3)	1.7E-05
				DIBENZ(A,H)ANTHRACENE	2.48E-10	(mg/m^3)	1.50E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	9.0E-13	5.85E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	9.92E-10	(mg/m^3)	6.02E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	3.6E-13	2.34E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**2.6E-10**					**3.2E-04**
		Exposure Point Total									**2.6E-10**					**3.2E-04**
	Exposure Medium Total										**2.6E-10**					**3.2E-04**
Soil Total											**1.3E-06**					**6.3E-02**
										Total of Receptor Risks Across All Media	**1.3E-06**			Total of Receptor Hazards Across All Media		**6.3E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 333
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Iona Island	Ingestion	**Inorganics**												
				ARSENIC	1.60E+01	(mg/kg)	5.82E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.7E-07	1.02E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.4E-02
				COBALT	9.20E+00	(mg/kg)	5.58E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	9.77E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.3E-02
				COPPER	5.74E+01	(mg/kg)	3.48E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	6.09E-05	(mg/kg-day)	4.00E-02	(mg/kg-day)	1.5E-03
				IRON	1.82E+04	(mg/kg)	1.11E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.93E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	2.8E-02
				MANGANESE	6.50E+02	(mg/kg)	3.94E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	6.90E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.9E-03
				THALLIUM	1.50E-01	(mg/kg)	9.10E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	1.59E-07	(mg/kg-day)	1.00E-05	(mg/kg-day)	1.6E-02
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.10E+00	(mg/kg)	3.82E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	3.8E-08	2.23E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.50E+00	(mg/kg)	4.55E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	4.5E-08	2.65E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.70E+00	(mg/kg)	3.09E-07	(mg/kg-day)	1.0E+00	per (mg/kg-day)	3.1E-07	1.80E-06	(mg/kg-day)	3.0E-04	(mg/kg-day)	6.0E-03
				DIBENZ(A,H)ANTHRACENE	3.00E-01	(mg/kg)	5.46E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	5.5E-08	3.18E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.20E+00	(mg/kg)	2.18E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	2.2E-08	1.27E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.3E-06**					**1.2E-01**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.60E+01	(mg/kg)	6.14E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.2E-08	1.07E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.6E-03
				COBALT	9.20E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	5.74E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.82E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	6.50E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	1.50E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.10E+00	(mg/kg)	1.05E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.0E-08	6.11E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.50E+00	(mg/kg)	1.25E-07	(mg/kg-day)	1.0E-01	per (mg/kg-day)	1.2E-08	7.27E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.70E+00	(mg/kg)	8.47E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	8.5E-08	4.94E-07	(mg/kg-day)	3.0E-04	(mg/kg-day)	1.6E-03
				DIBENZ(A,H)ANTHRACENE	3.00E-01	(mg/kg)	1.50E-08	(mg/kg-day)	1.0E+00	per (mg/kg-day)	1.5E-08	8.72E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.20E+00	(mg/kg)	5.98E-08	(mg/kg-day)	1.0E-01	per (mg/kg-day)	6.0E-09	3.49E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.2E-07**					**5.2E-03**
		Exposure Point Total									**1.6E-06**					**1.3E-01**
	Exposure Medium Total										**1.6E-06**					**1.3E-01**

TABLE 333
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	Quotient
Soil	Air	Iona Island	Inhalation	**Inorganics**												
				ARSENIC	1.32E-08	(mg/m^3)	1.07E-08	(ug/m^3)	4.30E-03	per (ug/m^3)	4.6E-11	1.87E-10	(mg/m^3)	1.50E-05	(mg/m^3)	1.2E-05
				COBALT	7.60E-09	(mg/m^3)	6.15E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	5.5E-11	1.08E-10	(mg/m^3)	6.00E-06	(mg/m^3)	1.8E-05
				COPPER	4.74E-08	(mg/m^3)	3.84E-08	(ug/m^3)	NA	per (ug/m^3)	--	6.71E-10	(mg/m^3)	NA	(mg/m^3)	--
				IRON	1.51E-05	(mg/m^3)	1.22E-05	(ug/m^3)	NA	per (ug/m^3)	--	2.13E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	5.37E-07	(mg/m^3)	4.35E-07	(ug/m^3)	NA	per (ug/m^3)	--	7.60E-09	(mg/m^3)	5.00E-05	(mg/m^3)	1.5E-04
				THALLIUM	1.24E-10	(mg/m^3)	1.00E-10	(ug/m^3)	NA	per (ug/m^3)	--	1.75E-12	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.74E-09	(mg/m^3)	4.21E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.5E-13	2.46E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.07E-09	(mg/m^3)	5.01E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	3.0E-13	2.92E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.40E-09	(mg/m^3)	3.41E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	2.0E-12	1.99E-11	(mg/m^3)	2.00E-06	(mg/m^3)	9.9E-06
				DIBENZ(A,H)ANTHRACENE	2.48E-10	(mg/m^3)	6.02E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	3.6E-13	3.51E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	9.92E-10	(mg/m^3)	2.41E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.4E-13	1.40E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.0E-10**					**1.9E-04**
		Exposure Point Total									**1.0E-10**					**1.9E-04**
	Exposure Medium Total										**1.0E-10**					**1.9E-04**
Soil Total											**1.6E-06**					**1.3E-01**
										Total of Receptor Risks Across All Media	**1.6E-06**				Total of Receptor Hazards Across All Media	**1.3E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 334
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Iona Island	Ingestion	**Inorganics**												
				ARSENIC	1.60E+01	(mg/kg)	6.33E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.5E-08	7.38E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.5E-03
				COBALT	9.20E+00	(mg/kg)	6.06E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	7.08E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.4E-03
				COPPER	5.74E+01	(mg/kg)	3.78E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	4.41E-06	(mg/kg-day)	4.00E-02	(mg/kg-day)	1.1E-04
				IRON	1.82E+04	(mg/kg)	1.20E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	1.40E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	2.0E-03
				MANGANESE	6.50E+02	(mg/kg)	4.28E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	5.00E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.6E-04
				THALLIUM	1.50E-01	(mg/kg)	9.89E-10	(mg/kg-day)	NA	per (mg/kg-day)	--	1.15E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	1.2E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.10E+00	(mg/kg)	4.15E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	4.2E-09	1.61E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.50E+00	(mg/kg)	4.94E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	4.9E-09	1.92E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.70E+00	(mg/kg)	3.36E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	3.4E-08	1.31E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.4E-04
				DIBENZ(A,H)ANTHRACENE	3.00E-01	(mg/kg)	5.93E-09	(mg/kg-day)	1.00E+00	per (mg/kg-day)	5.9E-09	2.31E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.20E+00	(mg/kg)	2.37E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.4E-09	9.23E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.5E-07**					**8.9E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.60E+01	(mg/kg)	2.94E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.4E-08	3.43E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.1E-03
				COBALT	9.20E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	5.74E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.82E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	6.50E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	1.50E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.10E+00	(mg/kg)	5.02E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	5.0E-09	1.95E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.50E+00	(mg/kg)	5.97E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	6.0E-09	2.32E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.70E+00	(mg/kg)	4.06E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	4.1E-08	1.58E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.3E-04
				DIBENZ(A,H)ANTHRACENE	3.00E-01	(mg/kg)	7.16E-09	(mg/kg-day)	1.00E+00	per (mg/kg-day)	7.2E-09	2.79E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.20E+00	(mg/kg)	2.87E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.9E-09	1.11E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.1E-07**					**1.7E-03**
		Exposure Point Total									**2.5E-07**					**1.1E-02**
	Exposure Medium Total										**2.5E-07**					**1.1E-02**

TABLE 334
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	Iona Island	Inhalation	**Inorganics**												
				ARSENIC	1.32E-08	(mg/m^3)	8.28E-09	(ug/m^3)	4.30E-03	per (ug/m^3)	3.6E-11	9.66E-11	(mg/m^3)	1.50E-05	(mg/m^3)	6.4E-06
				COBALT	7.60E-09	(mg/m^3)	4.76E-09	(ug/m^3)	9.00E-03	per (ug/m^3)	4.3E-11	5.55E-11	(mg/m^3)	6.00E-06	(mg/m^3)	9.3E-06
				COPPER	4.74E-08	(mg/m^3)	2.97E-08	(ug/m^3)	NA	per (ug/m^3)	--	3.47E-10	(mg/m^3)	NA	(mg/m^3)	--
				IRON	1.51E-05	(mg/m^3)	9.43E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.10E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	5.37E-07	(mg/m^3)	3.36E-07	(ug/m^3)	NA	per (ug/m^3)	--	3.92E-09	(mg/m^3)	5.00E-05	(mg/m^3)	7.8E-05
				THALLIUM	1.24E-10	(mg/m^3)	7.76E-11	(ug/m^3)	NA	per (ug/m^3)	--	9.06E-13	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.74E-09	(mg/m^3)	3.26E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.0E-13	1.27E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.07E-09	(mg/m^3)	3.88E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	2.3E-13	1.51E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.40E-09	(mg/m^3)	2.64E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	1.6E-12	1.03E-11	(mg/m^3)	2.00E-06	(mg/m^3)	5.1E-06
				DIBENZ(A,H)ANTHRACENE	2.48E-10	(mg/m^3)	4.66E-10	(ug/m^3)	6.00E-04	per (ug/m^3)	2.8E-13	1.81E-12	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	9.92E-10	(mg/m^3)	1.86E-09	(ug/m^3)	6.00E-05	per (ug/m^3)	1.1E-13	7.25E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**8.1E-11**					**9.9E-05**
		Exposure Point Total									**8.1E-11**					**9.9E-05**
	Exposure Medium Total										**8.1E-11**					**9.9E-05**
Soil Total											**2.5E-07**					**1.1E-02**
										Total of Receptor Risks Across All Media	**2.5E-07**				Total of Receptor Hazards Across All Media	**1.1E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 335
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Iona Island	Ingestion	**Inorganics**												
				ARSENIC	1.60E+01	(mg/kg)	4.34E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	6.5E-07	2.34E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.8E-03
				COBALT	9.20E+00	(mg/kg)	4.16E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.24E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.5E-03
				COPPER	5.74E+01	(mg/kg)	2.60E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.40E-05	(mg/kg-day)	4.00E-02	(mg/kg-day)	3.5E-04
				IRON	1.82E+04	(mg/kg)	8.24E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	4.44E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	6.3E-03
				MANGANESE	6.50E+02	(mg/kg)	2.94E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.58E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.1E-03
				THALLIUM	1.50E-01	(mg/kg)	6.78E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	3.65E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	3.7E-03
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.10E+00	(mg/kg)	2.85E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	2.8E-08	5.11E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.50E+00	(mg/kg)	3.39E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	3.4E-08	6.09E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.70E+00	(mg/kg)	2.31E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.3E-07	4.14E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-03
				DIBENZ(A,H)ANTHRACENE	3.00E-01	(mg/kg)	4.07E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	4.1E-08	7.31E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.20E+00	(mg/kg)	1.63E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.6E-08	2.92E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.0E-06**					**2.8E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	1.60E+01	(mg/kg)	8.57E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.3E-07	4.61E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-03
				COBALT	9.20E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				COPPER	5.74E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.82E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	6.50E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
				THALLIUM	1.50E-01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	2.10E+00	(mg/kg)	1.46E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.5E-08	2.62E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	2.50E+00	(mg/kg)	1.74E-07	(mg/kg-day)	1.00E-01	per (mg/kg-day)	1.7E-08	3.12E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.70E+00	(mg/kg)	1.18E-07	(mg/kg-day)	1.00E+00	per (mg/kg-day)	1.2E-07	2.12E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.1E-04
				DIBENZ(A,H)ANTHRACENE	3.00E-01	(mg/kg)	2.09E-08	(mg/kg-day)	1.00E+00	per (mg/kg-day)	2.1E-08	3.75E-08	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	1.20E+00	(mg/kg)	8.35E-08	(mg/kg-day)	1.00E-01	per (mg/kg-day)	8.4E-09	1.50E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.1E-07**					**2.2E-03**
		Exposure Point Total									**1.3E-06**					**3.0E-02**
	Exposure Medium Total										**1.3E-06**					**3.0E-02**

TABLE 335
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Air	Iona Island	Inhalation	**Inorganics**												
				ARSENIC	1.32E-08	(mg/m^3)	1.35E-07	(ug/m^3)	4.30E-03	per (ug/m^3)	5.8E-10	7.25E-10	(mg/m^3)	1.50E-05	(mg/m^3)	4.8E-05
				COBALT	7.60E-09	(mg/m^3)	7.74E-08	(ug/m^3)	9.00E-03	per (ug/m^3)	7.0E-10	4.17E-10	(mg/m^3)	6.00E-06	(mg/m^3)	6.9E-05
				COPPER	4.74E-08	(mg/m^3)	4.83E-07	(ug/m^3)	NA	per (ug/m^3)	--	2.60E-09	(mg/m^3)	NA	(mg/m^3)	--
				IRON	1.51E-05	(mg/m^3)	1.53E-04	(ug/m^3)	NA	per (ug/m^3)	--	8.25E-07	(mg/m^3)	NA	(mg/m^3)	--
				MANGANESE	5.37E-07	(mg/m^3)	5.47E-06	(ug/m^3)	NA	per (ug/m^3)	--	2.94E-08	(mg/m^3)	5.00E-05	(mg/m^3)	5.9E-04
				THALLIUM	1.24E-10	(mg/m^3)	1.26E-09	(ug/m^3)	NA	per (ug/m^3)	--	6.79E-12	(mg/m^3)	NA	(mg/m^3)	--
				Polyaromatic Hydrocarbons												
				BENZO(A)ANTHRACENE	1.74E-09	(mg/m^3)	5.30E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	3.2E-12	9.51E-11	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(B)FLUORANTHENE	2.07E-09	(mg/m^3)	6.31E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	3.8E-12	1.13E-10	(mg/m^3)	NA	(mg/m^3)	--
				BENZO(A)PYRENE	1.40E-09	(mg/m^3)	4.29E-08	(ug/m^3)	6.00E-04	per (ug/m^3)	2.6E-11	7.70E-11	(mg/m^3)	2.00E-06	(mg/m^3)	3.8E-05
				DIBENZ(A,H)ANTHRACENE	2.48E-10	(mg/m^3)	7.57E-09	(ug/m^3)	6.00E-04	per (ug/m^3)	4.5E-12	1.36E-11	(mg/m^3)	NA	(mg/m^3)	--
				INDENO(1,2,3-C,D)PYRENE	9.92E-10	(mg/m^3)	3.03E-08	(ug/m^3)	6.00E-05	per (ug/m^3)	1.8E-12	5.43E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**1.3E-09**					**7.4E-04**
		Exposure Point Total									**1.3E-09**					**7.4E-04**
	Exposure Medium Total										**1.3E-09**					**7.4E-04**
Soil Total											**1.3E-06**					**3.1E-02**
										Total of Receptor Risks Across All Media	**1.3E-06**				Total of Receptor Hazards Across All Media	**3.1E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 336
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	2.8E-06	6.0E-07	3.0E-09	3.4E-06	ARSENIC	Skin, Cardiovascular	1.8E-02	3.7E-03	1.3E-04	2.1E-02
			COBALT	--	--	3.6E-09	3.6E-09	COBALT	Thyroid	1.7E-02	--	1.9E-04	1.7E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	7.9E-04	--	--	7.9E-04
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.4E-02	--	--	1.4E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.5E-03	--	1.6E-03	4.1E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	8.2E-03	--	--	8.2E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	4.1E-08	2.3E-08	5.4E-12	6.4E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	4.9E-08	2.7E-08	6.5E-12	7.6E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	3.3E-07	1.8E-07	4.4E-11	5.2E-07	BENZO(A)PYRENE	Developmental System	3.1E-03	1.7E-03	1.0E-04	4.9E-03
			DIBENZ(A,H)ANTHRACENE	5.9E-08	3.2E-08	7.8E-12	9.1E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.3E-08	1.3E-08	3.1E-12	3.6E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	3.3E-06	8.7E-07	6.6E-09	4.2E-06		(Total)	6.3E-02	5.4E-03	2.0E-03	7.1E-02
							Total Risk Across Surface Soil	**4.2E-06**					**Total Hazard Index Across Surface Soil**	**7.1E-02**
							Total Risk Across All Media and All Exposure Routes	**4E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.07**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 337
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Researcher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	1.1E-07	5.8E-08	1.2E-10	1.7E-07	ARSENIC	Skin, Cardiovascular	5.7E-03	3.0E-03	4.2E-05	8.8E-03
			COBALT	--	--	1.4E-10	1.4E-10	COBALT	Thyroid	5.5E-03	--	6.0E-05	5.5E-03
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	2.6E-04	--	--	2.6E-04
			IRON	--	--	--	NA	IRON	Gastrointestinal System	4.6E-03	--	--	4.6E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	8.3E-04	--	5.1E-04	1.3E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	2.7E-03	--	--	2.7E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	1.6E-09	2.2E-09	2.1E-13	3.8E-09	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.9E-09	2.6E-09	2.5E-13	4.5E-09	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	1.3E-08	1.8E-08	1.7E-12	3.1E-08	BENZO(A)PYRENE	Developmental System	1.0E-03	1.4E-03	3.3E-05	2.4E-03
			DIBENZ(A,H)ANTHRACENE	2.3E-09	3.1E-09	3.0E-13	5.4E-09	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	9.2E-10	1.3E-09	1.2E-13	2.2E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	1.3E-07	8.5E-08	2.6E-10	2.2E-07		(Total)	2.1E-02	4.4E-03	6.5E-04	2.6E-02
							Total Risk Across Surface Soil	**2.2E-07**					**Total Hazard Index Across Surface Soil**	**2.6E-02**
							Total Risk Across All Media and All Exposure Routes	**2E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.03**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 338
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Location: Iona Island
Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	6.4E-07	1.0E-07	1.7E-08	7.6E-07	ARSENIC	Skin, Cardiovascular	9.9E-02	1.6E-02	1.9E-02	1.3E-01
			COBALT	--	--	2.1E-08	2.1E-08	COBALT	Thyroid	9.5E-02	--	2.7E-02	1.2E-01
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	4.5E-03	--	--	4.5E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	8.1E-02	--	--	8.1E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.4E-02	--	2.3E-01	2.4E-01
			THALLIUM	--	--	--	NA	THALLIUM	Hair	2.5E-02	--	--	2.5E-02
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	9.3E-09	3.9E-09	3.2E-11	1.3E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.1E-08	4.6E-09	3.8E-11	1.6E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	7.5E-08	3.1E-08	2.6E-10	1.1E-07	BENZO(A)PYRENE	Developmental System	1.8E-02	7.3E-03	1.5E-02	4.0E-02
			DIBENZ(A,H)ANTHRACENE	1.3E-08	5.6E-09	4.5E-11	1.9E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	5.3E-09	2.2E-09	1.8E-11	7.6E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	7.5E-07	1.5E-07	3.8E-08	9.4E-07		(Total)	3.4E-01	2.3E-02	2.9E-01	6.5E-01
			Total Risk Across Surface Soil				**9.4E-07**		**Total Hazard Index Across Surface Soil**				**6.5E-01**
			Total Risk Across All Media and All Exposure Routes				**9E-07**		**Total Hazard Index Across All Media and All Exposure Routes**				**0.6**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 339
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	4.4E-07	9.2E-08	2.3E-10	5.3E-07	ARSENIC	Skin, Cardiovascular	3.4E-03	7.2E-04	1.2E-05	4.1E-03
			COBALT	--	--	2.8E-10	2.8E-10	COBALT	Thyroid	3.3E-03	--	1.8E-05	3.3E-03
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	1.5E-04	--	--	1.5E-04
			IRON	--	--	--	NA	IRON	Gastrointestinal System	2.8E-03	--	--	2.8E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.9E-04	--	1.5E-04	6.4E-04
			THALLIUM	--	--	--	NA	THALLIUM	Hair	1.6E-03	--	--	1.6E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	6.4E-09	3.5E-09	4.2E-13	9.9E-09	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	7.6E-09	4.2E-09	5.0E-13	1.2E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	5.2E-08	2.8E-08	3.4E-12	8.0E-08	BENZO(A)PYRENE	Developmental System	6.0E-04	3.3E-04	9.9E-06	9.4E-04
			DIBENZ(A,H)ANTHRACENE	9.1E-09	5.0E-09	6.0E-13	1.4E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	3.6E-09	2.0E-09	2.4E-13	5.6E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	5.2E-07	1.4E-07	5.1E-10	6.5E-07		(Total)	1.2E-02	1.0E-03	1.9E-04	1.3E-02
						Total Risk Across Surface Soil	**6.5E-07**					**Total Hazard Index Across Surface Soil**	**1.3E-02**
						Total Risk Across All Media and All Exposure Routes	**7E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.01**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 340
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	6.2E-07	1.4E-07	1.1E-10	7.6E-07	ARSENIC	Skin, Cardiovascular	1.6E-02	3.7E-03	2.1E-05	2.0E-02
			COBALT	--	--	1.4E-10	1.4E-10	COBALT	Thyroid	1.5E-02	--	3.0E-05	1.5E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	1.1E-04	--	--	1.1E-04
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.3E-02	--	--	1.3E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.3E-03	--	2.5E-04	2.6E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	7.5E-03	--	--	7.5E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	2.7E-08	1.6E-08	6.3E-13	4.3E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	3.2E-08	1.9E-08	7.5E-13	5.1E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	2.2E-07	1.3E-07	5.1E-12	3.5E-07	BENZO(A)PYRENE	Developmental System	2.8E-03	1.7E-03	1.7E-05	4.5E-03
			DIBENZ(A,H)ANTHRACENE	3.8E-08	2.3E-08	9.0E-13	6.2E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	1.5E-08	9.3E-09	3.6E-13	2.5E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	9.5E-07	3.4E-07	2.6E-10	1.3E-06		(Total)	5.7E-02	5.4E-03	3.2E-04	6.3E-02
							Total Risk Across Surface Soil	**1.3E-06**					**Total Hazard Index Across Surface Soil**	**6.3E-02**
							Total Risk Across All Media and All Exposure Routes	**1E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.06**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 341
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	8.7E-07	9.2E-08	4.6E-11	9.7E-07	ARSENIC	Skin, Cardiovascular	3.4E-02	3.6E-03	1.2E-05	3.8E-02
			COBALT	--	--	5.5E-11	5.5E-11	COBALT	Thyroid	3.3E-02	--	1.8E-05	3.3E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	1.5E-03	--	--	1.5E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	2.8E-02	--	--	2.8E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.9E-03	--	1.5E-04	5.1E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	1.6E-02	--	--	1.6E-02
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	3.8E-08	1.0E-08	2.5E-13	4.9E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	4.5E-08	1.2E-08	3.0E-13	5.8E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	3.1E-07	8.5E-08	2.0E-12	3.9E-07	BENZO(A)PYRENE	Developmental System	6.0E-03	1.6E-03	9.9E-06	7.7E-03
			DIBENZ(A,H)ANTHRACENE	5.5E-08	1.5E-08	3.6E-13	7.0E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.2E-08	6.0E-09	1.4E-13	2.8E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	1.3E-06	2.2E-07	1.0E-10	1.6E-06		(Total)	1.2E-01	5.2E-03	1.9E-04	1.3E-01
			Total Risk Across Surface Soil				**1.6E-06**		**Total Hazard Index Across Surface Soil**				**1.3E-01**
			Total Risk Across All Media and All Exposure Routes				**2E-06**		**Total Hazard Index Across All Media and All Exposure Routes**				**0.1**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 342
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	9.5E-08	4.4E-08	3.6E-11	1.4E-07	ARSENIC	Skin, Cardiovascular	2.5E-03	1.1E-03	6.4E-06	3.6E-03
			COBALT	--	--	4.3E-11	4.3E-11	COBALT	Thyroid	2.4E-03	--	9.3E-06	2.4E-03
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	1.1E-04	--	--	1.1E-04
			IRON	--	--	--	NA	IRON	Gastrointestinal System	2.0E-03	--	--	2.0E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.6E-04	--	7.8E-05	4.4E-04
			THALLIUM	--	--	--	NA	THALLIUM	Hair	1.2E-03	--	--	1.2E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	4.2E-09	5.0E-09	2.0E-13	9.2E-09	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	4.9E-09	6.0E-09	2.3E-13	1.1E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	3.4E-08	4.1E-08	1.6E-12	7.4E-08	BENZO(A)PYRENE	Developmental System	4.4E-04	5.3E-04	5.1E-06	9.7E-04
			DIBENZ(A,H)ANTHRACENE	5.9E-09	7.2E-09	2.8E-13	1.3E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.4E-09	2.9E-09	1.1E-13	5.2E-09	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	1.5E-07	1.1E-07	8.1E-11	2.5E-07		(Total)	8.9E-03	1.7E-03	9.9E-05	1.1E-02
							Total Risk Across Surface Soil	**2.5E-07**					**Total Hazard Index Across Surface Soil**	**1.1E-02**
							Total Risk Across All Media and All Exposure Routes	**3E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.01**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 343
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
ISLAND EXPOSURE AREA

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	Iona Island	**Inorganics**					**Inorganics**					
			ARSENIC	6.5E-07	1.3E-07	5.8E-10	7.8E-07	ARSENIC	Skin, Cardiovascular	7.8E-03	1.5E-03	4.8E-05	9.4E-03
			COBALT	--	--	7.0E-10	7.0E-10	COBALT	Thyroid	7.5E-03	--	6.9E-05	7.5E-03
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	3.5E-04	--	--	3.5E-04
			IRON	--	--	--	NA	IRON	Gastrointestinal System	6.3E-03	--	--	6.3E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.1E-03	--	5.9E-04	1.7E-03
			THALLIUM	--	--	--	NA	THALLIUM	Hair	3.7E-03	--	--	3.7E-03
			Polyaromatic Hydrocarbons					**Polyaromatic Hydrocarbons**					
			BENZO(A)ANTHRACENE	2.8E-08	1.5E-08	3.2E-12	4.3E-08	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	3.4E-08	1.7E-08	3.8E-12	5.1E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(A)PYRENE	2.3E-07	1.2E-07	2.6E-11	3.5E-07	BENZO(A)PYRENE	Developmental System	1.4E-03	7.1E-04	3.8E-05	2.1E-03
			DIBENZ(A,H)ANTHRACENE	4.1E-08	2.1E-08	4.5E-12	6.2E-08	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	1.6E-08	8.4E-09	1.8E-12	2.5E-08	INDENO(1,2,3-C,D)PYRENE	NA	--	--	--	NA
			(Total)	1.0E-06	3.1E-07	1.3E-09	1.3E-06		(Total)	2.8E-02	2.2E-03	7.4E-04	3.1E-02
							Total Risk Across Surface Soil	**1.3E-06**					**Total Hazard Index Across Surface Soil**	**3.1E-02**
							Total Risk Across All Media and All Exposure Routes	**1E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.03**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 344
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
HUDSON RIVER SHORELINE (IHRS)

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer	Intake/Exposure Concentration		RfD/RfC		Hazard
					Value	Units	Value	Units	Value	Units	Risk	Value	Units	Value	Units	Quotient
Sediment	Sediment	IHRS	Ingestion	**Inorganics**												
				ANTIMONY	1.23E+02	(mg/kg)	1.20E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.37E-05	(mg/kg-day)	4.00E-04	(mg/kg-day)	8.4E-02
				ARSENIC	3.62E+01	(mg/kg)	2.13E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.2E-06	5.95E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.0E-02
				CADMIUM	9.86E+00	(mg/kg)	9.65E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.70E-06	(mg/kg-day)	1.00E-04	(mg/kg-day)	2.7E-02
				COPPER	1.01E+04	(mg/kg)	9.88E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.77E-03	(mg/kg-day)	4.00E-02	(mg/kg-day)	6.9E-02
				IRON	1.92E+05	(mg/kg)	1.88E-02	(mg/kg-day)	NA	per (mg/kg-day)	--	5.26E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	7.5E-02
				THALLIUM	8.30E-02	(mg/kg)	8.12E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	2.27E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	2.3E-03
			Exp. Route Total								**3.2E-06**					**2.8E-01**
			Dermal[1]	**Inorganics**												
				ANTIMONY	1.23E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	3.62E+01	(mg/kg)	6.75E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.0E-05	1.89E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.3E-02
				CADMIUM	9.86E+00	(mg/kg)	6.12E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.71E-07	(mg/kg-day)	2.50E-06	(mg/kg-day)	6.9E-02
				COPPER	1.01E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.92E+05	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				THALLIUM	8.30E-02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
			Exp. Route Total								**1.0E-05**					**1.3E-01**
		Exposure Point Total									**1.3E-05**					**4.1E-01**
	Exposure Medium Total										**1.3E-05**					**4.1E-01**
Sediment Total											**1.3E-05**					**4.1E-01**
										Total of Receptor Risks Across All Media	**1.3E-05**			Total of Receptor Hazards Across All Media		**4.1E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 345
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
HUDSON RIVER SHORELINE (IHRS)

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	IHRS	Ingestion	**Inorganics**												
				ANTIMONY	1.23E+02	(mg/kg)	1.87E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	6.53E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	1.6E-02
				ARSENIC	3.62E+01	(mg/kg)	3.29E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.9E-07	1.15E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.8E-03
				CADMIUM	9.86E+00	(mg/kg)	1.50E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	5.23E-07	(mg/kg-day)	1.00E-04	(mg/kg-day)	5.2E-03
				COPPER	1.01E+04	(mg/kg)	1.53E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	5.36E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	1.3E-02
				IRON	1.92E+05	(mg/kg)	2.91E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.02E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.5E-02
				THALLIUM	8.30E-02	(mg/kg)	1.26E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	4.41E-09	(mg/kg-day)	1.00E-05	(mg/kg-day)	4.4E-04
			Exp. Route Total								**4.9E-07**					**5.4E-02**
			Dermal[1]	**Inorganics**												
				ANTIMONY	1.23E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	3.62E+01	(mg/kg)	1.79E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.7E-06	6.26E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.1E-02
				CADMIUM	9.86E+00	(mg/kg)	1.62E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	5.68E-08	(mg/kg-day)	2.50E-06	(mg/kg-day)	2.3E-02
				COPPER	1.01E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.92E+05	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				THALLIUM	8.30E-02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
			Exp. Route Total								**2.7E-06**					**4.4E-02**
		Exposure Point Total									**3.2E-06**					**9.7E-02**
	Exposure Medium Total										**3.2E-06**					**9.7E-02**
Sediment Total											**3.2E-06**					**9.7E-02**
										Total of Receptor Risks Across All Media	**3.2E-06**				Total of Receptor Hazards Across All Media	**9.7E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 346
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
HUDSON RIVER SHORELINE (IHRS)

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	IHRS	Ingestion	**Inorganics**												
				ANTIMONY	1.23E+02	(mg/kg)	1.31E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	9.20E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	2.3E-02
				ARSENIC	3.62E+01	(mg/kg)	2.32E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.5E-07	1.62E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.4E-03
				CADMIUM	9.86E+00	(mg/kg)	1.05E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	7.37E-07	(mg/kg-day)	1.00E-04	(mg/kg-day)	7.4E-03
				COPPER	1.01E+04	(mg/kg)	1.08E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	7.55E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	1.9E-02
				IRON	1.92E+05	(mg/kg)	2.05E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.44E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	2.1E-02
				THALLIUM	8.30E-02	(mg/kg)	8.86E-10	(mg/kg-day)	NA	per (mg/kg-day)	--	6.21E-09	(mg/kg-day)	1.00E-05	(mg/kg-day)	6.2E-04
			Exp. Route Total								**3.5E-07**					**7.6E-02**
			Dermal[1]	**Inorganics**												
				ANTIMONY	1.23E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	3.62E+01	(mg/kg)	3.56E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.3E-06	2.49E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.3E-02
				CADMIUM	9.86E+00	(mg/kg)	3.23E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	2.26E-07	(mg/kg-day)	2.50E-06	(mg/kg-day)	9.0E-02
				COPPER	1.01E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.92E+05	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				THALLIUM	8.30E-02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
			Exp. Route Total								**5.3E-06**					**1.7E-01**
		Exposure Point Total									**5.7E-06**					**2.5E-01**
	Exposure Medium Total										**5.7E-06**					**2.5E-01**
Sediment Total											**5.7E-06**					**2.5E-01**
										Total of Receptor Risks Across All Media	**5.7E-06**				Total of Receptor Hazards Across All Media	**2.5E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 347
REASONABLE MAXIMUM EXPOSURE
HUDSON RIVER SHORELINE (IHRS)

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	IHRS	Ingestion	**Inorganics**												
				ANTIMONY	1.23E+02	(mg/kg)	1.87E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	3.26E-05	(mg/kg-day)	4.00E-04	(mg/kg-day)	8.2E-02
				ARSENIC	3.62E+01	(mg/kg)	3.29E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.9E-07	5.76E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.9E-02
				CADMIUM	9.86E+00	(mg/kg)	1.50E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.62E-06	(mg/kg-day)	1.00E-04	(mg/kg-day)	2.6E-02
				COPPER	1.01E+04	(mg/kg)	1.53E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.68E-03	(mg/kg-day)	4.00E-02	(mg/kg-day)	6.7E-02
				IRON	1.92E+05	(mg/kg)	2.91E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	5.10E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	7.3E-02
				THALLIUM	8.30E-02	(mg/kg)	1.26E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	2.20E-08	(mg/kg-day)	1.00E-05	(mg/kg-day)	2.2E-03
			Exp. Route Total								**4.9E-07**					**2.7E-01**
			Dermal[1]	**Inorganics**												
				ANTIMONY	1.23E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	3.62E+01	(mg/kg)	2.29E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.4E-06	4.01E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-01
				CADMIUM	9.86E+00	(mg/kg)	2.08E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	3.64E-07	(mg/kg-day)	2.50E-06	(mg/kg-day)	1.5E-01
				COPPER	1.01E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.92E+05	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				THALLIUM	8.30E-02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
			Exp. Route Total								**3.4E-06**					**2.8E-01**
		Exposure Point Total									**3.9E-06**					**5.5E-01**
	Exposure Medium Total										**3.9E-06**					**5.5E-01**
Sediment Total											**3.9E-06**					**5.5E-01**
										Total of Receptor Risks Across All Media	**3.9E-06**				Total of Receptor Hazards Across All Media	**5.5E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 348
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
HUDSON RIVER SHORELINE (IHRS)

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	IHRS	Ingestion	**Inorganics**												
				ANTIMONY	1.23E+02	(mg/kg)	4.05E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	4.73E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	1.2E-02
				ARSENIC	3.62E+01	(mg/kg)	7.16E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.1E-07	8.35E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.8E-03
				CADMIUM	9.86E+00	(mg/kg)	3.25E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	3.79E-07	(mg/kg-day)	1.00E-04	(mg/kg-day)	3.8E-03
				COPPER	1.01E+04	(mg/kg)	3.33E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.88E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	9.7E-03
				IRON	1.92E+05	(mg/kg)	6.33E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	7.38E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.1E-02
				THALLIUM	8.30E-02	(mg/kg)	2.74E-10	(mg/kg-day)	NA	per (mg/kg-day)	--	3.19E-09	(mg/kg-day)	1.00E-05	(mg/kg-day)	3.2E-04
			Exp. Route Total								**1.1E-07**					**3.9E-02**
			Dermal[1]	**Inorganics**												
				ANTIMONY	1.23E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	3.62E+01	(mg/kg)	1.10E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.6E-06	1.28E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.3E-02
				CADMIUM	9.86E+00	(mg/kg)	9.96E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	1.16E-07	(mg/kg-day)	2.50E-06	(mg/kg-day)	4.6E-02
				COPPER	1.01E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.92E+05	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				THALLIUM	8.30E-02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
				ZINC	0.00E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-01	(mg/kg-day)	--
			Exp. Route Total								**1.6E-06**					**8.9E-02**
		Exposure Point Total									**1.8E-06**					**1.3E-01**
	Exposure Medium Total										**1.8E-06**					**1.3E-01**
Sediment Total											**1.8E-06**					**1.3E-01**
										Total of Receptor Risks Across All Media	**1.8E-06**				Total of Receptor Hazards Across All Media	**1.3E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 349
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
HUDSON RIVER SHORELINE (IHRS)

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	IHRS	Ingestion	**Inorganics**												
				ANTIMONY	1.23E+02	(mg/kg)	1.39E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	7.49E-06	(mg/kg-day)	4.00E-04	(mg/kg-day)	1.9E-02
				ARSENIC	3.62E+01	(mg/kg)	2.46E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.7E-07	1.32E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	4.4E-03
				CADMIUM	9.86E+00	(mg/kg)	1.11E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	6.00E-07	(mg/kg-day)	1.00E-04	(mg/kg-day)	6.0E-03
				COPPER	1.01E+04	(mg/kg)	1.14E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	6.15E-04	(mg/kg-day)	4.00E-02	(mg/kg-day)	1.5E-02
				IRON	1.92E+05	(mg/kg)	2.17E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.17E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.7E-02
				THALLIUM	8.30E-02	(mg/kg)	9.38E-10	(mg/kg-day)	NA	per (mg/kg-day)	--	5.05E-09	(mg/kg-day)	1.00E-05	(mg/kg-day)	5.1E-04
			Exp. Route Total								**3.7E-07**					**6.2E-02**
			Dermal[1]	**Inorganics**												
				ANTIMONY	1.23E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	6.00E-05	(mg/kg-day)	--
				ARSENIC	3.62E+01	(mg/kg)	3.20E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.8E-06	1.72E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.7E-02
				CADMIUM	9.86E+00	(mg/kg)	2.90E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.56E-07	(mg/kg-day)	2.50E-06	(mg/kg-day)	6.3E-02
				COPPER	1.01E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	4.00E-02	(mg/kg-day)	--
				IRON	1.92E+05	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				THALLIUM	8.30E-02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E-05	(mg/kg-day)	--
			Exp. Route Total								**4.8E-06**					**1.2E-01**
		Exposure Point Total									**5.2E-06**					**1.8E-01**
	Exposure Medium Total										**5.2E-06**					**1.8E-01**
Sediment Total											**5.2E-06**					**1.8E-01**
										Total of Receptor Risks Across All Media	**5.2E-06**				Total of Receptor Hazards Across All Media	**1.8E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 350
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
HUDSON RIVER SHORELINE (IHRS)

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	IHRS	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	8.4E-02	--	--	8.4E-02
			ARSENIC	3.2E-06	1.0E-05	--	1.3E-05	ARSENIC	Skin, Cardiovascular	2.0E-02	6.3E-02	--	8.3E-02
			CADMIUM	--	--	--	NA	CADMIUM	Kidneys, Urinary	2.7E-02	6.9E-02	--	9.6E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	6.9E-02	--	--	6.9E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	7.5E-02	--	--	7.5E-02
			THALLIUM	--	--	--	NA	THALLIUM	Hair	2.3E-03	--	--	2.3E-03
			(Total)	3.2E-06	1.0E-05	---	1.3E-05		(Total)	2.8E-01	1.3E-01	---	4.1E-01
				Total Risk Across Sediment			**1.3E-05**			**Total Hazard Index Across Sediment**			**4.1E-01**
			Total Risk Across All Media and All Exposure Routes				**1E-05**			**Total Hazard Index Across All Media and All Exposure Routes**			**0.4**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 351
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
HUDSON RIVER SHORELINE (IHRS)

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	IHRS	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	1.6E-02	--	--	1.6E-02
			ARSENIC	4.9E-07	2.7E-06	--	3.2E-06	ARSENIC	Skin, Cardiovascular	3.8E-03	2.1E-02	--	2.5E-02
			CADMIUM	--	--	--	NA	CADMIUM	Kidneys, Urinary	5.2E-03	2.3E-02	--	2.8E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	1.3E-02	--	--	1.3E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.5E-02	--	--	1.5E-02
			THALLIUM	--	--	--	NA	THALLIUM	Hair	4.4E-04	--	--	4.4E-04
			(Total)	4.9E-07	2.7E-06	---	3.2E-06		(Total)	5.4E-02	4.4E-02	---	9.7E-02
				Total Risk Across Sediment			**3.2E-06**			**Total Hazard Index Across Sediment**			**9.7E-02**
				Total Risk Across All Media and All Exposure Routes			**3E-06**			**Total Hazard Index Across All Media and All Exposure Routes**			**0.10**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 352
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
HUDSON RIVER SHORELINE (IHRS)

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	IHRS	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	2.3E-02	--	--	2.3E-02
			ARSENIC	3.5E-07	5.3E-06	--	5.7E-06	ARSENIC	Skin, Cardiovascular	5.4E-03	8.3E-02	--	8.8E-02
			CADMIUM	--	--	--	NA	CADMIUM	Kidneys, Urinary	7.4E-03	9.0E-02	--	9.8E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	1.9E-02	--	--	1.9E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	2.1E-02	--	--	2.1E-02
			THALLIUM	--	--	--	NA	THALLIUM	Hair	6.2E-04	--	--	6.2E-04
			(Total)	3.5E-07	5.3E-06	---	5.7E-06		(Total)	7.6E-02	1.7E-01	---	2.5E-01
				Total Risk Across Sediment			**5.7E-06**					**Total Hazard Index Across Sediment**	**2.5E-01**
							Total Risk Across All Media and All Exposure Routes	**6E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.2**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 353
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
HUDSON RIVER SHORELINE (IHRS)

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	IHRS	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	8.2E-02	--	--	8.2E-02
			ARSENIC	4.9E-07	3.4E-06	--	3.9E-06	ARSENIC	Skin, Cardiovascular	1.9E-02	1.3E-01	--	1.5E-01
			CADMIUM	--	--	--	NA	CADMIUM	Kidneys, Urinary	2.6E-02	1.5E-01	--	1.7E-01
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	6.7E-02	--	--	6.7E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	7.3E-02	--	--	7.3E-02
			THALLIUM	--	--	--	NA	THALLIUM	Hair	2.2E-03	--	--	2.2E-03
			(Total)	4.9E-07	3.4E-06	---	3.9E-06		(Total)	2.7E-01	2.8E-01	---	5.5E-01
				Total Risk Across Sediment			**3.9E-06**			**Total Hazard Index Across Sediment**			**5.5E-01**
				Total Risk Across All Media and All Exposure Routes			**4E-06**			**Total Hazard Index Across All Media and All Exposure Routes**			**0.5**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 354
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
HUDSON RIVER SHORELINE (IHRS)

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	IHRS	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	1.2E-02	--	--	1.2E-02
			ARSENIC	1.1E-07	1.6E-06	--	1.8E-06	ARSENIC	Skin, Cardiovascular	2.8E-03	4.3E-02	--	4.5E-02
			CADMIUM	--	--	--	NA	CADMIUM	Kidneys, Urinary	3.8E-03	4.6E-02	--	5.0E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	9.7E-03	--	--	9.7E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.1E-02	--	--	1.1E-02
			THALLIUM	--	--	--	NA	THALLIUM	Hair	3.2E-04	--	--	3.2E-04
			(Total)	1.1E-07	1.6E-06	---	1.8E-06		(Total)	3.9E-02	8.9E-02	---	1.3E-01
				Total Risk Across Sediment			**1.8E-06**		**Total Hazard Index Across Sediment**				**1.3E-01**
			Total Risk Across All Media and All Exposure Routes				**2E-06**		**Total Hazard Index Across All Media and All Exposure Routes**				**0.1**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 355
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
HUDSON RIVER SHORELINE (IHRS)

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Camper
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	IHRS	**Inorganics**					**Inorganics**					
			ANTIMONY	--	--	--	NA	ANTIMONY	Blood	1.9E-02	--	--	1.9E-02
			ARSENIC	3.7E-07	4.8E-06	--	5.2E-06	ARSENIC	Skin, Cardiovascular	4.4E-03	5.7E-02	--	6.2E-02
			CADMIUM	--	--	--	NA	CADMIUM	Kidneys, Urinary	6.0E-03	6.3E-02	--	6.9E-02
			COPPER	--	--	--	NA	COPPER	Gastrointestinal System	1.5E-02	--	--	1.5E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.7E-02	--	--	1.7E-02
			THALLIUM	--	--	--	NA	THALLIUM	Hair	5.1E-04	--	--	5.1E-04
			(Total)	3.7E-07	4.8E-06	---	5.2E-06		(Total)	6.2E-02	1.2E-01	---	1.8E-01
				Total Risk Across Sediment			**5.2E-06**			**Total Hazard Index Across Sediment**			**1.8E-01**
				Total Risk Across All Media and All Exposure Routes			**5E-06**			**Total Hazard Index Across All Media and All Exposure Routes**			**0.2**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 356
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
RIP RAP DRAINAGE SWALE (RRDS)

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	CSF/Unit Risk Value	CSF/Unit Risk Units	Cancer Risk	Non-Cancer Hazard Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	RfD/RfC Value	RfD/RfC Units	Hazard Quotient
Sediment	Sediment	RRDS	Ingestion	**Inorganics**												
				ARSENIC	9.82E+00	(mg/kg)	5.77E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.6E-07	1.61E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.4E-03
				IRON	3.76E+04	(mg/kg)	3.68E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.03E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.5E-02
				MANGANESE	2.87E+03	(mg/kg)	2.81E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	7.86E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	5.6E-03
			Exp. Route Total								**8.6E-07**					**2.6E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	9.82E+00	(mg/kg)	1.83E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.7E-06	5.12E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.7E-02
				IRON	3.76E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	2.87E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**2.7E-06**					**1.7E-02**
		Exposure Point Total									**3.6E-06**					**4.3E-02**
	Exposure Medium Total										**3.6E-06**					**4.3E-02**
Sediment Total											**3.6E-06**					**4.3E-02**
										Total of Receptor Risks Across All Media	**3.6E-06**				Total of Receptor Hazards Across All Media	**4.3E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 357
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
RIP RAP DRAINAGE SWALE (RRDS)

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	RRDS	Ingestion	**Inorganics**												
				ARSENIC	9.82E+00	(mg/kg)	8.94E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.3E-07	3.13E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.0E-03
				IRON	3.76E+04	(mg/kg)	5.70E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.00E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	2.9E-03
				MANGANESE	2.87E+03	(mg/kg)	4.35E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.52E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.1E-03
			Exp. Route Total								**1.3E-07**					**5.0E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	9.82E+00	(mg/kg)	4.85E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.3E-07	1.70E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.7E-03
				IRON	3.76E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	2.87E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**7.3E-07**					**5.7E-03**
		Exposure Point Total									**8.6E-07**					**1.1E-02**
	Exposure Medium Total										**8.6E-07**					**1.1E-02**
Sediment Total											**8.6E-07**					**1.1E-02**
										Total of Receptor Risks Across All Media	**8.6E-07**				Total of Receptor Hazards Across All Media	**1.1E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 358
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
RIP RAP DRAINAGE SWALE (RRDS)

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	RRDS	Ingestion	**Inorganics**												
				ARSENIC	9.82E+00	(mg/kg)	6.29E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.4E-08	4.41E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-03
				IRON	3.76E+04	(mg/kg)	4.02E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.81E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	4.0E-03
				MANGANESE	2.87E+03	(mg/kg)	3.07E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.15E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.5E-03
			Exp. Route Total								**9.4E-08**					**7.0E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	9.82E+00	(mg/kg)	9.65E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.4E-06	6.75E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.3E-02
				IRON	3.76E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	2.87E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**1.4E-06**					**2.3E-02**
		Exposure Point Total									**1.5E-06**					**3.0E-02**
	Exposure Medium Total										**1.5E-06**					**3.0E-02**
Sediment Total											**1.5E-06**					**3.0E-02**
										Total of Receptor Risks Across All Media	**1.5E-06**				Total of Receptor Hazards Across All Media	**3.0E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 359
REASONABLE MAXIMUM EXPOSURE
RIP RAP DRAINAGE SWALE (RRDS)

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	CSF/Unit Risk Value	CSF/Unit Risk Units	Cancer Risk	Non-Cancer Hazard Calculations: Intake/Exposure Concentration Value	Intake/Exposure Concentration Units	RfD/RfC Value	RfD/RfC Units	Hazard Quotient
Sediment	Sediment	RRDS	Ingestion	**Inorganics**												
				ARSENIC	9.82E+00	(mg/kg)	8.94E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.3E-07	1.56E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.2E-03
				IRON	3.76E+04	(mg/kg)	5.70E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	9.98E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.4E-02
				MANGANESE	2.87E+03	(mg/kg)	4.35E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	7.62E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	5.4E-03
			Exp. Route Total								**1.3E-07**					**2.5E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	9.82E+00	(mg/kg)	6.21E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.3E-07	1.09E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.6E-02
				IRON	3.76E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	2.87E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**9.3E-07**					**3.6E-02**
		Exposure Point Total									**1.1E-06**					**6.1E-02**
	Exposure Medium Total										**1.1E-06**					**6.1E-02**
Sediment Total											**1.1E-06**					**6.1E-02**
										Total of Receptor Risks Across All Media	**1.1E-06**				Total of Receptor Hazards Across All Media	**6.1E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 360
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
RIP RAP DRAINAGE SWALE (RRDS)

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	RRDS	Ingestion	**Inorganics**												
				ARSENIC	9.82E+00	(mg/kg)	1.94E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.9E-08	2.27E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.6E-04
				IRON	3.76E+04	(mg/kg)	1.24E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	1.45E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	2.1E-03
				MANGANESE	2.87E+03	(mg/kg)	9.46E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.10E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	7.9E-04
			Exp. Route Total								**2.9E-08**					**3.6E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	9.82E+00	(mg/kg)	2.98E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.5E-07	3.47E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.2E-02
				IRON	3.76E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	2.87E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**4.5E-07**					**1.2E-02**
		Exposure Point Total									**4.8E-07**					**1.5E-02**
	Exposure Medium Total										**4.8E-07**					**1.5E-02**
Sediment Total											**4.8E-07**					**1.5E-02**
										Total of Receptor Risks Across All Media	**4.8E-07**			Total of Receptor Hazards Across All Media		**1.5E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 361
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
RIP RAP DRAINAGE SWALE (RRDS)

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	RRDS	Ingestion	**Inorganics**												
				ARSENIC	9.82E+00	(mg/kg)	6.66E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.0E-07	3.59E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.2E-03
				IRON	3.76E+04	(mg/kg)	4.25E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.29E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	3.3E-03
				MANGANESE	2.87E+03	(mg/kg)	3.25E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.75E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	1.2E-03
			Exp. Route Total								**1.0E-07**					**5.7E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	9.82E+00	(mg/kg)	8.68E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.3E-06	4.67E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.6E-02
				IRON	3.76E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	2.87E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**1.3E-06**					**1.6E-02**
		Exposure Point Total									**1.4E-06**					**2.1E-02**
	Exposure Medium Total										**1.4E-06**					**2.1E-02**
Sediment Total											**1.4E-06**					**2.1E-02**
										Total of Receptor Risks Across All Media	**1.4E-06**				Total of Receptor Hazards Across All Media	**2.1E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 362
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
RIP RAP DRAINAGE SWALE (RRDS)

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	RRDS	**Inorganics**					**Inorganics**					
			ARSENIC	8.6E-07	2.7E-06	--	3.6E-06	ARSENIC	Skin, Cardiovascular	5.4E-03	1.7E-02	--	2.2E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.5E-02	--	--	1.5E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	5.6E-03	--	--	5.6E-03
			(Total)	8.6E-07	2.7E-06	--	3.6E-06		(Total)	2.6E-02	1.7E-02	---	4.3E-02
				Total Risk Across Sediment			**3.6E-06**		**Total Hazard Index Across Sediment**				**4.3E-02**
			Total Risk Across All Media and All Exposure Routes				**4E-06**		**Total Hazard Index Across All Media and All Exposure Routes**				**0.04**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 363
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
RIP RAP DRAINAGE SWALE (RRDS)

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	RRDS	**Inorganics**					**Inorganics**					
			ARSENIC	1.3E-07	7.3E-07	--	8.6E-07	ARSENIC	Skin, Cardiovascular	1.0E-03	5.7E-03	--	6.7E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	2.9E-03	--	--	2.9E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.1E-03	--	--	1.1E-03
			(Total)	1.3E-07	7.3E-07	---	8.6E-07		(Total)	5.0E-03	5.7E-03	---	1.1E-02
				Total Risk Across Sediment			**8.6E-07**		**Total Hazard Index Across Sediment**				**1.1E-02**
				Total Risk Across All Media and All Exposure Routes			**9E-07**		**Total Hazard Index Across All Media and All Exposure Routes**				**0.01**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 364
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
RIP RAP DRAINAGE SWALE (RRDS)

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	RRDS	**Inorganics**					**Inorganics**					
			ARSENIC	9.4E-08	1.4E-06	--	1.5E-06	ARSENIC	Skin, Cardiovascular	1.5E-03	2.3E-02	--	2.4E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	4.0E-03	--	--	4.0E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.5E-03	--	--	1.5E-03
			(Total)	9.4E-08	1.4E-06	---	1.5E-06		(Total)	7.0E-03	2.3E-02	---	3.0E-02
				Total Risk Across Sediment			**1.5E-06**		**Total Hazard Index Across Sediment**				**3.0E-02**
			Total Risk Across All Media and All Exposure Routes				**2E-06**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.03**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 365
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
RIP RAP DRAINAGE SWALE (RRDS)

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	RRDS	**Inorganics**					**Inorganics**					
			ARSENIC	1.3E-07	9.3E-07	--	1.1E-06	ARSENIC	Skin, Cardiovascular	5.2E-03	3.6E-02	--	4.1E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.4E-02	--	--	1.4E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	5.4E-03	--	--	5.4E-03
			(Total)	1.3E-07	9.3E-07	---	1.1E-06		(Total)	2.5E-02	3.6E-02	---	6.1E-02
				Total Risk Across Sediment			**1.1E-06**		**Total Hazard Index Across Sediment**				**6.1E-02**
			Total Risk Across All Media and All Exposure Routes				**1E-06**		**Total Hazard Index Across All Media and All Exposure Routes**				**0.06**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 366
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
RIP RAP DRAINAGE SWALE (RRDS)

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	RRDS	**Inorganics**					**Inorganics**					
			ARSENIC	2.9E-08	4.5E-07	--	4.8E-07	ARSENIC	Skin, Cardiovascular	7.6E-04	1.2E-02	--	1.2E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	2.1E-03	--	--	2.1E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	7.9E-04	--	--	7.9E-04
			(Total)	2.9E-08	4.5E-07	---	4.8E-07		(Total)	3.6E-03	1.2E-02	---	1.5E-02
				Total Risk Across Sediment			**4.8E-07**			**Total Hazard Index Across Sediment**			**1.5E-02**
				Total Risk Across All Media and All Exposure Routes			**5E-07**			**Total Hazard Index Across All Media and All Exposure Routes**			**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 367
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
RIP RAP DRAINAGE SWALE (RRDS)

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Camper
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	RRDS	**Inorganics**					**Inorganics**					
			ARSENIC	1.0E-07	1.3E-06	--	1.4E-06	ARSENIC	Skin, Cardiovascular	1.2E-03	1.6E-02	--	1.7E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	3.3E-03	--	--	3.3E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	1.2E-03	--	--	1.2E-03
			(Total)	1.0E-07	1.3E-06	---	1.4E-06		(Total)	5.7E-03	1.6E-02	---	2.1E-02
				Total Risk Across Sediment			**1.4E-06**					**Total Hazard Index Across Sediment**	**2.1E-02**
							1E-06						**0.02**

Total Risk Across All Media and All Exposure Routes

Total Hazard Index Across All Media and All Exposure Routes

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 368
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
TIDAL WETLAND SWALE (TWS)

Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	TWS	Ingestion	**Inorganics**												
				ARSENIC	9.69E+00	(mg/kg)	5.69E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.5E-07	1.59E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.3E-03
				CADMIUM	3.19E+00	(mg/kg)	3.12E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	8.74E-07	(mg/kg-day)	1.00E-04	(mg/kg-day)	8.7E-03
				COBALT	1.43E+01	(mg/kg)	1.40E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	3.92E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-02
				IRON	3.81E+04	(mg/kg)	3.73E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.04E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.5E-02
				MANGANESE	1.27E+03	(mg/kg)	1.24E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	3.48E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.5E-03
			Exp. Route Total								**8.5E-07**					**4.5E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	9.69E+00	(mg/kg)	1.81E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.7E-06	5.06E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.7E-02
				CADMIUM	3.19E+00	(mg/kg)	1.98E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	5.55E-08	(mg/kg-day)	2.50E-06	(mg/kg-day)	2.2E-02
				COBALT	1.43E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	3.81E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	1.27E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**2.7E-06**					**3.9E-02**
		Exposure Point Total									**3.6E-06**					**8.4E-02**
	Exposure Medium Total										**3.6E-06**					**8.4E-02**
Sediment Total											**3.6E-06**					**8.4E-02**
										Total of Receptor Risks Across All Media	**3.6E-06**			Total of Receptor Hazards Across All Media		**8.4E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 369
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
TIDAL WETLAND SWALE (TWS)

Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	TWS	Ingestion	**Inorganics**												
				ARSENIC	9.69E+00	(mg/kg)	8.82E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.3E-07	3.09E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.0E-03
				CADMIUM	3.19E+00	(mg/kg)	4.84E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.69E-07	(mg/kg-day)	1.00E-04	(mg/kg-day)	1.7E-03
				COBALT	1.43E+01	(mg/kg)	2.17E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	7.59E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.5E-03
				IRON	3.81E+04	(mg/kg)	5.78E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.02E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	2.9E-03
				MANGANESE	1.27E+03	(mg/kg)	1.93E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	6.74E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	4.8E-04
			Exp. Route Total								**1.3E-07**					**8.6E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	9.69E+00	(mg/kg)	4.79E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.2E-07	1.68E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.6E-03
				CADMIUM	3.19E+00	(mg/kg)	5.25E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	1.84E-08	(mg/kg-day)	2.50E-06	(mg/kg-day)	7.4E-03
				COBALT	1.43E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	3.81E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	1.27E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**7.2E-07**					**1.3E-02**
		Exposure Point Total									**8.5E-07**					**2.2E-02**
	Exposure Medium Total										**8.5E-07**					**2.2E-02**
Sediment Total											**8.5E-07**					**2.2E-02**
										Total of Receptor Risks Across All Media	**8.5E-07**			Total of Receptor Hazards Across All Media		**2.2E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 370
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
TIDAL WETLAND SWALE (TWS)

Scenario Timeframe: Current/Future
Receptor Population: Recreator (6 to 16 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	TWS	Ingestion	**Inorganics**												
				ARSENIC	9.69E+00	(mg/kg)	6.21E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.3E-08	4.35E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-03
				CADMIUM	3.19E+00	(mg/kg)	3.41E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	2.38E-07	(mg/kg-day)	1.00E-04	(mg/kg-day)	2.4E-03
				COBALT	1.43E+01	(mg/kg)	1.53E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	1.07E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.6E-03
				IRON	3.81E+04	(mg/kg)	4.07E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.85E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	4.1E-03
				MANGANESE	1.27E+03	(mg/kg)	1.36E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	9.49E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	6.8E-04
			Exp. Route Total								**9.3E-08**					**1.2E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	9.69E+00	(mg/kg)	9.52E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.4E-06	6.66E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.2E-02
				CADMIUM	3.19E+00	(mg/kg)	1.04E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	7.31E-08	(mg/kg-day)	2.50E-06	(mg/kg-day)	2.9E-02
				COBALT	1.43E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	3.81E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	1.27E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**1.4E-06**					**5.1E-02**
		Exposure Point Total									**1.5E-06**					**6.4E-02**
	Exposure Medium Total										**1.5E-06**					**6.4E-02**
Sediment Total											**1.5E-06**					**6.4E-02**
										Total of Receptor Risks Across All Media	**1.5E-06**			Total of Receptor Hazards Across All Media		**6.4E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 371
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
TIDAL WETLAND SWALE (TWS)

Scenario Timeframe: Current/Future
Receptor Population: Recreator (2 to 6 years)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	TWS	Ingestion	**Inorganics**												
				ARSENIC	9.69E+00	(mg/kg)	8.82E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.3E-07	1.54E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.1E-03
				CADMIUM	3.19E+00	(mg/kg)	4.84E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	8.47E-07	(mg/kg-day)	1.00E-04	(mg/kg-day)	8.5E-03
				COBALT	1.43E+01	(mg/kg)	2.17E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	3.80E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-02
				IRON	3.81E+04	(mg/kg)	5.78E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	1.01E-02	(mg/kg-day)	7.00E-01	(mg/kg-day)	1.4E-02
				MANGANESE	1.27E+03	(mg/kg)	1.93E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.37E-04	(mg/kg-day)	1.40E-01	(mg/kg-day)	2.4E-03
			Exp. Route Total								**1.3E-07**					**4.3E-02**
			Dermal[1]	**Inorganics**												
				ARSENIC	9.69E+00	(mg/kg)	6.13E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.2E-07	1.07E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.6E-02
				CADMIUM	3.19E+00	(mg/kg)	6.73E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	1.18E-07	(mg/kg-day)	2.50E-06	(mg/kg-day)	4.7E-02
				COBALT	1.43E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	3.81E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	1.27E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**9.2E-07**					**8.3E-02**
		Exposure Point Total									**1.1E-06**					**1.3E-01**
	Exposure Medium Total										**1.1E-06**					**1.3E-01**
Sediment Total											**1.1E-06**					**1.3E-01**
										Total of Receptor Risks Across All Media	**1.1E-06**				Total of Receptor Hazards Across All Media	**1.3E-01**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 372
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
TIDAL WETLAND SWALE (TWS)

Scenario Timeframe: Current/Future
Receptor Population: Trespasser (12 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	TWS	Ingestion	**Inorganics**												
				ARSENIC	9.69E+00	(mg/kg)	1.92E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.9E-08	2.24E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.5E-04
				CADMIUM	3.19E+00	(mg/kg)	1.05E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.23E-07	(mg/kg-day)	1.00E-04	(mg/kg-day)	1.2E-03
				COBALT	1.43E+01	(mg/kg)	4.71E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	5.50E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.8E-03
				IRON	3.81E+04	(mg/kg)	1.26E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	1.47E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	2.1E-03
				MANGANESE	1.27E+03	(mg/kg)	4.19E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.88E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	3.5E-04
			Exp. Route Total								**2.9E-08**					**6.2E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	9.69E+00	(mg/kg)	2.94E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	4.4E-07	3.43E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.1E-02
				CADMIUM	3.19E+00	(mg/kg)	3.22E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	3.76E-08	(mg/kg-day)	2.50E-06	(mg/kg-day)	1.5E-02
				COBALT	1.43E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	3.81E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	1.27E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**4.4E-07**					**2.6E-02**
		Exposure Point Total									**4.7E-07**					**3.3E-02**
	Exposure Medium Total										**4.7E-07**					**3.3E-02**
Sediment Total											**4.7E-07**					**3.3E-02**
										Total of Receptor Risks Across All Media	**4.7E-07**			Total of Receptor Hazards Across All Media		**3.3E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 373
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
TIDAL WETLAND SWALE (TWS)

Scenario Timeframe: Current/Future
Receptor Population: Camper (5 to 18 years)
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	TWS	Ingestion	**Inorganics**												
				ARSENIC	9.69E+00	(mg/kg)	6.57E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.9E-08	3.54E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.2E-03
				CADMIUM	3.19E+00	(mg/kg)	3.61E-08	(mg/kg-day)	NA	per (mg/kg-day)	--	1.94E-07	(mg/kg-day)	1.00E-04	(mg/kg-day)	1.9E-03
				COBALT	1.43E+01	(mg/kg)	1.62E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	8.71E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.9E-03
				IRON	3.81E+04	(mg/kg)	4.31E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.32E-03	(mg/kg-day)	7.00E-01	(mg/kg-day)	3.3E-03
				MANGANESE	1.27E+03	(mg/kg)	1.44E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	7.73E-05	(mg/kg-day)	1.40E-01	(mg/kg-day)	5.5E-04
			Exp. Route Total								**9.9E-08**					**9.9E-03**
			Dermal[1]	**Inorganics**												
				ARSENIC	9.69E+00	(mg/kg)	8.56E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.3E-06	4.61E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				CADMIUM	3.19E+00	(mg/kg)	9.40E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	5.06E-08	(mg/kg-day)	2.50E-06	(mg/kg-day)	2.0E-02
				COBALT	1.43E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				IRON	3.81E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	7.00E-01	(mg/kg-day)	--
				MANGANESE	1.27E+03	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.40E-01	(mg/kg-day)	--
			Exp. Route Total								**1.3E-06**					**3.6E-02**
		Exposure Point Total									**1.4E-06**					**4.5E-02**
	Exposure Medium Total										**1.4E-06**					**4.5E-02**
Sediment Total											**1.4E-06**					**4.5E-02**
										Total of Receptor Risks Across All Media	**1.4E-06**			Total of Receptor Hazards Across All Media		**4.5E-02**

1) Dermal intake is "NA" due to no published dermal absorption factor. Please see Table 7 and U.S. EPA 2004 guidance.
EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 374
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
TIDAL WETLAND SWALE (TWS)

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Park Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	TWS	**Inorganics**					**Inorganics**					
			ARSENIC	8.5E-07	2.7E-06	--	3.6E-06	ARSENIC	Skin, Cardiovascular	5.3E-03	1.7E-02	--	2.2E-02
			CADMIUM	--	--	--	NA	CADMIUM	Kidneys, Urinary	8.7E-03	2.2E-02	--	3.1E-02
			COBALT	--	--	--	NA	COBALT	Thyroid	1.3E-02	--	--	1.3E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.5E-02	--	--	1.5E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.5E-03	--	--	2.5E-03
			(Total)	8.5E-07	2.7E-06	---	3.6E-06		(Total)	4.5E-02	3.9E-02	---	8.4E-02
				Total Risk Across Sediment			**3.6E-06**			**Total Hazard Index Across Sediment**			**8.4E-02**
				Total Risk Across All Media and All Exposure Routes			**4E-06**			**Total Hazard Index Across All Media and All Exposure Routes**			**0.08**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 375
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
TIDAL WETLAND SWALE (TWS)

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	TWS	**Inorganics**					**Inorganics**					
			ARSENIC	1.3E-07	7.2E-07	--	8.5E-07	ARSENIC	Skin, Cardiovascular	1.0E-03	5.6E-03	--	6.6E-03
			CADMIUM	--	--	--	NA	CADMIUM	Kidneys, Urinary	1.7E-03	7.4E-03	--	9.0E-03
			COBALT	--	--	--	NA	COBALT	Thyroid	2.5E-03	--	--	2.5E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	2.9E-03	--	--	2.9E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	4.8E-04	--	--	4.8E-04
			(Total)	1.3E-07	7.2E-07	---	8.5E-07		(Total)	8.6E-03	1.3E-02	---	2.2E-02
				Total Risk Across Sediment			**8.5E-07**			**Total Hazard Index Across Sediment**			**2.2E-02**
				Total Risk Across All Media and All Exposure Routes			**9E-07**			**Total Hazard Index Across All Media and All Exposure Routes**			**0.02**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 376
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
TIDAL WETLAND SWALE (TWS)

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Adolescent (6 to 16 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	TWS	**Inorganics**					**Inorganics**					
			ARSENIC	9.3E-08	1.4E-06	--	1.5E-06	ARSENIC	Skin, Cardiovascular	1.4E-03	2.2E-02	--	2.4E-02
			CADMIUM	--	--	--	NA	CADMIUM	Kidneys, Urinary	2.4E-03	2.9E-02	--	3.2E-02
			COBALT	--	--	--	NA	COBALT	Thyroid	3.6E-03	--	--	3.6E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	4.1E-03	--	--	4.1E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	6.8E-04	--	--	6.8E-04
			(Total)	9.3E-08	1.4E-06	---	1.5E-06		(Total)	1.2E-02	5.1E-02	---	6.4E-02
				Total Risk Across Sediment			**1.5E-06**			**Total Hazard Index Across Sediment**			**6.4E-02**
				Total Risk Across All Media and All Exposure Routes			**2E-06**			**Total Hazard Index Across All Media and All Exposure Routes**			**0.06**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 377
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
TIDAL WETLAND SWALE (TWS)

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Recreator
Receptor Age: Child (2 to 6 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	TWS	**Inorganics**					**Inorganics**					
			ARSENIC	1.3E-07	9.2E-07	--	1.1E-06	ARSENIC	Skin, Cardiovascular	5.1E-03	3.6E-02	--	4.1E-02
			CADMIUM	--	--	--	NA	CADMIUM	Kidneys, Urinary	8.5E-03	4.7E-02	--	5.6E-02
			COBALT	--	--	--	NA	COBALT	Thyroid	1.3E-02	--	--	1.3E-02
			IRON	--	--	--	NA	IRON	Gastrointestinal System	1.4E-02	--	--	1.4E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.4E-03	--	--	2.4E-03
			(Total)	1.3E-07	9.2E-07	---	1.1E-06		(Total)	4.3E-02	8.3E-02	---	1.3E-01
				Total Risk Across Sediment			**1.1E-06**			**Total Hazard Index Across Sediment**			**1.3E-01**
				Total Risk Across All Media and All Exposure Routes			**1E-06**			**Total Hazard Index Across All Media and All Exposure Routes**			**0.1**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 378
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
TIDAL WETLAND SWALE (TWS)

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Trespasser
Receptor Age: Adolescent (12 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	TWS	**Inorganics**					**Inorganics**					
			ARSENIC	2.9E-08	4.4E-07	--	4.7E-07	ARSENIC	Skin, Cardiovascular	7.5E-04	1.1E-02	--	1.2E-02
			CADMIUM	--	--	--	NA	CADMIUM	Kidneys, Urinary	1.2E-03	1.5E-02	--	1.6E-02
			COBALT	--	--	--	NA	COBALT	Thyroid	1.8E-03	--	--	1.8E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	2.1E-03	--	--	2.1E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.5E-04	--	--	3.5E-04
			(Total)	2.9E-08	4.4E-07	---	4.7E-07		(Total)	6.2E-03	2.6E-02	---	3.3E-02
				Total Risk Across Sediment			**4.7E-07**		**Total Hazard Index Across Sediment**				**3.3E-02**
				Total Risk Across All Media and All Exposure Routes			**5E-07**		**Total Hazard Index Across All Media and All Exposure Routes**				**0.03**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

TABLE 379
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
TIDAL WETLAND SWALE (TWS)

Location: Iona Island
Scenario Timeframe: Current/Future
Receptor Population: Camper
Receptor Age: Adolescent (5 to 18 years)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Chemical of Potential Concern	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	TWS	**Inorganics**					**Inorganics**					
			ARSENIC	9.9E-08	1.3E-06	--	1.4E-06	ARSENIC	Skin, Cardiovascular	1.2E-03	1.5E-02	--	1.7E-02
			CADMIUM	--	--	--	NA	CADMIUM	Kidneys, Urinary	1.9E-03	2.0E-02	--	2.2E-02
			COBALT	--	--	--	NA	COBALT	Thyroid	2.9E-03	--	--	2.9E-03
			IRON	--	--	--	NA	IRON	Gastrointestinal System	3.3E-03	--	--	3.3E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	5.5E-04	--	--	5.5E-04
			(Total)	9.9E-08	1.3E-06	---	1.4E-06		(Total)	9.9E-03	3.6E-02	---	4.5E-02
				Total Risk Across Sediment			**1.4E-06**		**Total Hazard Index Across Sediment**				**4.5E-02**
				Total Risk Across All Media and All Exposure Routes			**1E-06**		**Total Hazard Index Across All Media and All Exposure Routes**				**0.05**

NA = Not applicable due to no toxicity values.
-- = No risks calculated for this exposure pathway.

ATTACHMENT 1

ANALYTICAL RESULTS SUMMARY TABLES

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Table A-1 DU-1 Through DU-16 Phase I Incremental Soil Sampling Analytical Results Compared to Human Health Screening Criteria

				Location	DU-1 (AOC #17: Area E – Former Coal Trestle and Storage Area [Located Near Former Building 410] and AOC #10: Former Building 406 – Tin, Electrical, and Annealing Building Shop)								DU-2 (AOC #17: Area E – Former Coal Trestle and Storage Area [Located Near Former Building 410])								DU-3 (AOC #12: Former Building 410 – Power House and AOC #11: Former Building 407 – Paint Shop and Pipe Shop							
				Sample ID	IINY-DU-1A-SSIS-20200318		IINY-DU-1B-SSIS-20200318		IINY-DU-1C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-2A-SSIS-20200319		IINY-DU-2B-SSIS-20200319		IINY-DU-2C-SSIS-20200319		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-3A-SSIS-20200318		IINY-DU-3B-SSIS-20200318		IINY-DU-3C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test
				Depth (in.)	0-6		0-6		0-6				0-6		0-6		0-6				0-6		0-6		0-6			
				Matrix	Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
				Sample Date	3/18/2020 15:00		3/18/2020 15:00		3/18/2020 15:00				3/19/2020 8:15		3/19/2020 8:15		3/19/2020 8:15				3/18/2020 15:45		3/18/2020 15:45		3/18/2020 15:45			
Analyte	**CAS #**	**Residential Soil RSL (mg/kg)[1,2]**	**Industrial Soil RSL (mg/kg)[1]**	**Unit**																								
Soil pH																												
pH	N/A	N/A	N/A	N/A	5.6		6.5		6.8		9.91	7.87	5.6		6.6		6.8		10.2	7.95	7.0		7.0		7.1		0.821	7.18
Mercury																												
Mercury	7439-97-6	1.1	4.6	mg/kg	0.084		0.08		0.078		4	0.0884	0.091		0.092		0.11		11	0.125	0.14		0.13		0.11		12	0.165
Target Analyte List Metals																												
Aluminum	7429-90-5	7,700	110,000	mg/kg	11,000		11,000		11,000		0	11,000	13,000		13,000		13,000		0	13,000	13,000		13,000		13,000		0	13,000
Antimony	7440-36-0	3.1	47	mg/kg	0.52		0.51		0.47		5.29	0.567	0.61		0.62		0.68		5.95	0.732	0.7		0.63		0.65		5.46	0.751
Arsenic	7440-38-2	0.68	3	mg/kg	11		12		8.9	J/TR	14.9	14.6	14		13		14		4.22	15.1	15		13		12		11.5	17.2
Barium	7440-39-3	1,500	22,000	mg/kg	71		66		65		4.77	75.4	68		74		79		7.48	87.5	85		75		79		6.32	92.3
Beryllium	7440-41-7	16	230	mg/kg	0.52		0.5		0.55		4.81	0.587	0.54		0.55		0.65		10.5	0.733	0.57		0.56		0.54		2.74	0.595
Cadmium	7440-43-9	7.1	98	mg/kg	0.35		0.26		0.24		20.7	0.431	0.2		0.23		0.25		11.1	0.29	0.26		0.24		0.26		4.56	0.282
Calcium	7440-70-2	NS	NS	mg/kg	3,700		5,100		4,800		16.3	6,390	13,000		11,000		7,800		24.7	17,200	3,100		8,200		7,400		44	13,100
Total Chromium, Total	7440-47-3	12,000	180,000	mg/kg	14		13		13		4.33	14.8	15		15		15		0	15	16		15		15		3.77	16.8
Cobalt	7440-48-4	2.3	35	mg/kg	7		6.8		7.5		5.08	8.01	7.6		7.4		7.7		2.02	7.95	8		7.3		7.6		4.6	8.52
Copper	7440-50-8	310	4,700	mg/kg	21		22		21		2.71	22.8	27		26		28		3.7	29.5	28		25		27		5.73	30.5
Iron	7439-89-6	5,500	82,000	mg/kg	16,000		16,000		15,000		3.69	17,100	19,000		18,000		19,000		3.09	20,100	19,000		18,000		19,000		3.09	20,100
Lead	7439-92-1	400	800	mg/kg	84		57		52		26.8	108	78		93		110		17.1	134	150		120		120		13.3	174
Magnesium	7439-95-4	NS	NS	mg/kg	3800		4700		4300		10.6	5400	10,000		9,000		7,300		15.6	12,200	4,400		7,200		6,600		24.3	9,780
Manganese	7439-96-5	180	2,600	mg/kg	470		470		480		1.22	488	620		660		640		3.12	690	670		580		630		7.2	740
Nickel	7440-02-0	150	2,200	mg/kg	14		14		14		0	14	17		16		18		5.88	19.5	18		16		16		6.93	19.6
Potassium	2023695	NS	NS	mg/kg	1,200		1,200		1,200		0	1,200	1,400		1,300		1,200		7.69	1,550	1200		1300		1400		7.69	1550
Selenium	7782-49-2	39	580	mg/kg	0.44	J/TR	0.32	J/TR	0.31	J/TR	20.3	0.539	0.31	J/TR	0.33	J/TR	0.32	J/TR	3.13	0.345	0.45	J/TR	0.41	J/TR	0.39	J/TR	7.33	0.494
Silver	7440-22-4	39	580	mg/kg	0.093	U (LOQ)/L	0.099	U (LOQ)/L	0.099	U (LOQ)/L	ND	ND	0.097	U (LOQ)/L	0.097	U (LOQ)/L	0.1	U (LOQ)/L	ND	ND	0.098		0.094	U (LOQ)/L	0.099	U (LOQ)/L	2.73	0.104
Sodium	7440-23-5	NS	NS	mg/kg	95	J/TR	100	J/TR	110	J/TR	7.51	121	75	J/TR	75	J/TR	71	J/TR	3.13	79.5	68	J/TR	88	J/TR	110	J/TR	23.7	142
Thallium	7440-28-0	0.078	1.2	mg/kg	0.14		0.12		0.12		9.12	0.156	0.13		0.13		0.13		0	0.13	0.13		0.14		0.13		4.33	0.148
Vanadium	7440-62-2	39	580	mg/kg	23		21		22		4.55	24.5	21		21		23		5.33	24.6	25		23		24		4.17	26.5
Zinc	7440-66-6	2,300	35,000	mg/kg	92	J/TR	76	J/TR	67	J/TR	16.2	110	72		74		80		5.53	85.8	98	J/TR	130		99	J/TR	16.7	155
Polycyclic Aromatic Hydrocarbons																												
1-Methylnaphthalene	90-12-0	18	73	mg/kg	0.0058	J-/H2/TR	0.0044	J-/H2/TR	0.0036	J-/H2/TR	24.2	0.0074	0.075		0.036		0.046		38.7	0.103	0.015	J-/H2/TR	0.01	J-/H2/TR	0.0071	J-/H2/TR	37.3	0.0208
2-Methylnaphthalene	91-57-6	24	300	mg/kg	0.0098	J-/H2	0.0062	J-/H2/TR	0.0053	J-/H2/TR	33.500	0.0131	0.055		0.031		0.04		28.9	0.0725	0.017	J-/H2/TR	0.011	J-/H2/TR	0.0088	J-/H2/TR	34.600	0.0229
Acenaphthene	83-32-9	360	4,500	mg/kg	0.007	J-/H2/TR	0.0068	J-/H2/TR	0.0054	J-/H2/TR	13.600	0.00859	0.26		0.12		0.15		41.7	0.362	0.036	J-/H2/TR	0.028	J-/H2/TR	0.015	J-/H2/TR	40.200	0.053
Acenaphthylene	208-96-8	NS	NS	mg/kg	0.041	J-/H2	0.027	J-/H2	0.026	J-/H2	26.800	0.0524	0.14		0.1		0.09		24.1	0.177	0.06	J-/H2/TR	0.031	J-/H2/TR	0.028	J-/H2/TR	44.600	0.0841
Anthracene	120-12-7	1,800	23,000	mg/kg	0.032	J-/H2	0.028	J-/H2	0.025	J-/H2	12.400	0.0372	0.73		0.34	J/TR	0.36	J/TR	46.1	1.03	0.14	J-/H2/TR	0.082	J-/H2/TR	0.052	J-/H2/TR	49.000	0.204
Benzo(a)anthracene	56-55-3	1.1	21	mg/kg	0.15	J-/H2	0.13	J-/H2	0.11	J-/H2	15.400	0.18	3.3		1.5		1.4		51.7	4.76	0.59	J-/H2	0.35	J-/H2	0.23	J-/H2	47.000	0.851
Benzo(a)pyrene	50-32-8	0.11	2.1	mg/kg	0.17	J-/H2	0.15	J-/H2	0.13	J-/H2	13.300	0.2	2.7		1.3		1.2		48.4	3.84	0.61	J-/H2	0.35	J-/H2	0.25	J-/H2	46.100	0.871
Benzo(b)fluoranthene	205-99-2	1.1	21	mg/kg	0.27	J-/H2	0.23	J-/H2	0.2	J-/H2	15.100	0.322	3.9		1.8		1.7		50.4	5.59	0.93	J-/H2	0.48	J-/H2	0.37	J-/H2	50.000	1.34
Benzo(g,h,i)perylene	191-24-2	NS	NS	mg/kg	0.13	J-/H2	0.12	J-/H2	0.1	J-/H2	13.100	0.155	1.5		0.75		0.68		46.5	2.12	0.43	J-/H2	0.26	J-/H2	0.18	J-/H2	44.000	0.611
Benzo(k)fluoranthene	207-08-9	11	210	mg/kg	0.092	J-/H2	0.076	J-/H2	0.065	J-/H2	17.500	0.112	1.2		0.61		0.48		50.3	1.73	0.27	J-/H2	0.16	J-/H2	0.13	J-/H2	39.500	0.372
Chrysene	218-01-9	110	2,100	mg/kg	0.17	J-/H2	0.14	J-/H2	0.12	J-/H2	17.600	0.207	3.1		1.5		1.3		50.2	4.45	0.61	J-/H2	0.35	J-/H2	0.25	J-/H2	46.100	0.871
Dibenz(a,h)anthracene	53-70-3	0.11	2.1	mg/kg	0.035	J-/H2	0.03	J-/H2	0.026	J-/H2	14.900	0.0417	0.45		0.26		0.24		36.6	0.608	0.11	J-/H2/TR	0.064	J-/H2/TR	0.055	J-/H2/TR	38.600	0.151
Fluoranthene	206-44-0	240	3,000	mg/kg	0.26	J-/H2	0.24	J-/H2	0.2	J-/H2	13.100	0.31	5.6		2.7		2.6		46.9	7.92	1.1	J-/H2	0.65	J-/H2	0.43	J-/H2	47.000	1.59
Fluorene	86-73-7	240	3,000	mg/kg	0.009	J-/H2	0.0077	J-/H2/TR	0.008	J-/H2/TR	8.270	0.00995	0.22		0.1		0.13		41.6	0.307	0.044	J-/H2/TR	0.025	J-/H2/TR	0.015	J-/H2/TR	52.600	0.0651
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	21	mg/kg	0.15	J-/H2	0.14	J-/H2	0.12	J-/H2	11.200	0.175	1.8		0.83		0.81		49.4	2.57	0.46	J-/H2	0.27	J-/H2	0.19	J-/H2	45.200	0.656
Naphthalene	91-20-3	2	8.6	mg/kg	0.011	J-/H2	0.0075	J-/H2/TR	0.0063	J-/H2/TR	29.500	0.0144	0.067		0.044		0.056		20.7	0.0846	0.023	J-/H2/TR	0.013	J-/H2/TR	0.012	J-/H2/TR	38.000	0.0313
Phenanthrene	85-01-8	NS	NS	mg/kg	0.084	J-/H2	0.09	J-/H2	0.074	J-/H2	9.780	0.103	2.8		1.4		1.5		41.1	3.87	0.53	J-/H2	0.34	J-/H2	0.21	J-/H2	44.700	0.765
Pyrene	129-00-0	180	2,300	mg/kg	0.26	J-/H2	0.24	J-/H2	0.2	J-/H2	13.100	0.31	5.5		2.7		2.5		47	7.79	1.1	J-/H2	0.65	J-/H2	0.44	J-/H2	46.200	1.58
Total LMW PAHs	N/A	NS	NS	mg/kg	0.3496		0.3076		0.2636		14	0.415	7.647		3.671		3.772		45.1	10.7	1.455		0.89		0.5779		45.600	2.09
Total HMW PAHs	N/A	NS	NS	mg/kg	1.7766		1.5636		1.3346		14.2	2.11	31.197		14.921		14.182		47.8	44.3	6.565		3.824		2.6629		46.100	9.39

1. EPA Regional Screening Levels Table, EPA, November 2019. Value shown is equal to HI=0.1. Carcinogenic values equal to $1x10^{-6}$.
2. A deed restriction is in place noting that there is to be no residential development at the site (USACE 1995); however, EPA residential soil RSLs are included to assess for children receptors including site visitation for nature walks and potential camping.

DU-8 (AOC #5: Former Building 207 – Marine Garage Building) was not sampled because it would not be possible to separate metals and PAH contaminants originating from former Building 207, from contaminants originating from drums and other debris observed in DU-8.

NOTES:

mg/kg = milligrams per kilogram
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
PCB = Polychlorinated biphenyl
RSL = regional screening level
U = Analyte not detected. Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate
- Bias low
+ Bias high

Red concentrations exceed EPA Residential Soil RSL.
Concentrations highlighted in yellow exceed EPA Industrial Soil RSL.

Validation Reason Codes:

A	Serial dilution
C	LCS Recovery
D	MS RPD
H2	Prep Hold Time
I	Surrogate recovery outside project limits
L	Lab Blank
M	MS Recovery
M2	Post Spike
P1	Column RPD
TR	Trace Level Detect
V2	CCV

Table A-1 DU-1 Through DU-16 Phase I Incremental Soil Sampling Analytical Results Compared to Human Health Screening Criteria

Location					DU-4 (Previous Sampling Locations II-EA-SD-02-01 and IX407-B1)								DU-5 (AOC #3: Former Building 123 – Garage Building and Previous Sampling Location II-EA-SS-02-06)								DU-6 (Previous Sampling Locations II-EA-SS-02-09 and EA-SS-02-03)							
Sample ID					IINY-DU-4A-SSIS-20200318		IINY-DU-4B-SSIS-20200318		IINY-DU-4C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-5A-SSIS-20200319		IINY-DU-5B-SSIS-20200319		IINY-DU-5C-SSIS-20200319		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-6A-SSIS-20200319		IINY-DU-6B-SSIS-20200319		IINY-DU-6C-SSIS-20200319		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in.)					0-6		0-6		0-6				0-6		0-6		0-6				0-6		0-6		0-6			
Matrix					Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date					3/18/2020 14:30		3/18/2020 14:30		3/18/2020 14:30				3/19/2020 9:00		3/19/2020 9:00		3/19/2020 9:00				3/19/2020 15:00		3/19/2020 15:00		3/19/2020 15:00			
Analyte	**CAS #**	**Residential Soil RSL (mg/kg)[1,2]**	**Industrial Soil RSL (mg/kg)[1]**	**Unit**																								
Soil pH																												
pH	N/A	N/A	N/A	N/A	6.9		7.0		7.1		1.43	7.25	7.1		7.1		7.1		1.5E-14	7.1	7.5		7.5		7.5		0	7.5
Mercury																												
Mercury	7439-97-6	1.1	4.6	mg/kg	0.29		0.34		0.23		19	0.425	0.23		0.11		0.12		43	0.321	ot Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Target Analyte List Metals																												
Aluminum	7429-90-5	7,700	110,000	mg/kg	10,000		10,000		10,000		0	10,000	13,000		13,000		13,000		0	13,000	10,000		12,000		10,000		11	13,600
Antimony	7440-36-0	3.1	47	mg/kg	1.5		2.1		1.5		20.4	2.57	0.49		0.47		0.59		12.4	0.678	1.4		0.62		0.58		53.3	2.03
Arsenic	7440-38-2	0.68	3	mg/kg	23		30		41		29	54.2	11		11		12		5.09	12.8	10		11		8		15.8	13.5
Barium	7440-39-3	1,500	22,000	mg/kg	74		100		81		15.8	119	75		65		78		9.37	89.8	70		72		55		14.1	89
Beryllium	7440-41-7	16	230	mg/kg	0.43		0.49		0.53		10.4	0.61	0.53		0.58		0.63		8.62	0.706	0.58		0.55		0.46		11.8	0.687
Cadmium	7440-43-9	7.1	98	mg/kg	1.1		1		0.86		12.2	1.29	0.23		0.2		0.2		8.25	0.254	0.22		0.31		0.19		26	0.397
Calcium	7440-70-2	NS	NS	mg/kg	12,000		9,800		7,200		24.9	15,700	3,000	J/M2	3,800		2,900		15.3	4,470	14,000		14,000		15,000		4.03	15,800
Total Chromium, Total	7440-47-3	12,000	180,000	mg/kg	14		19		18		15.6	23.7	15		15		15		0	15	14		14		11		13.3	17.4
Cobalt	7440-48-4	2.3	35	mg/kg	6.8		7.8		7.3		6.85	8.56	7.9		7.8		7.7		1.28	8.05	7.9		7.5		6.3		11.5	9.33
Copper	7440-50-8	310	4,700	mg/kg	49		61		58		11.2	71.7	25		25		24		2.34	26.1	38		42		30		16.7	52
Iron	7439-89-6	5,500	82,000	mg/kg	19,000		20,000		19,000		2.99	20,800	20,000		20,000		19,000		2.94	21,100	16,000		19000		17000		8.81	21200
Lead	7439-92-1	400	800	mg/kg	250		360		280		19.2	440	82		76		100		14.5	117	93		130		72		29.9	172
Magnesium	7439-95-4	NS	NS	mg/kg	8,100		6,200		5,100		23.5	10,300	4,800		5,500		4,600		9.52	6,160	10,000		10,000		11,000		5.59	11,800
Manganese	7439-96-5	180	2,600	mg/kg	430		480		510		8.54	575	800		690		700		8.33	883	870		680		520		25.4	1,130
Nickel	7440-02-0	150	2,200	mg/kg	14		17		16		9.75	19.5	18		19		17		5.56	20.5	16		16		13		11.5	19.4
Potassium	2023695	NS	NS	mg/kg	1,200		1,300		1,300		4.56	1,410	1,300		1,200		1,200		4.68	1,380	1,200		1,200		1,200		0	1,200
Selenium	7782-49-2	39	580	mg/kg	0.38	J/TR	0.5		0.58		20.7	0.74	0.27	J/TR	0.28	J/TR	0.31	J/TR	7.26	0.339	0.4	J/TR	0.36	J/TR	0.29	J/TR	15.9	0.49
Silver	7440-22-4	39	580	mg/kg	0.1		0.11		0.098		6.26	0.119	0.099	U (LOQ)/L	0.095	U (LOQ)/L	0.098	U (LOQ)/L	ND	ND	0.1		0.065	J/TR	0.066	J/TR	25.9	0.127
Sodium	7440-23-5	NS	NS	mg/kg	230	J/TR	230	J/TR	170	J/TR	16.5	297	64	J/TR	57	J/TR	64	J/TR	6.55	71.8	89	J/TR	86	J/TR	79	J/TR	6.06	97.6
Thallium	7440-28-0	0.078	1.2	mg/kg	0.16		0.19		0.2		11.4	0.236	0.11		0.1		0.1		5.59	0.118	0.14		0.15		0.12		11.2	0.175
Vanadium	7440-62-2	39	580	mg/kg	20		23		23		7.87	26.4	20		19		20		2.94	21.1	23		21		17		15	28
Zinc	7440-66-6	2,300	35,000	mg/kg	280		190		150		32.2	374	74		74		79		3.82	82.9	68		79		56		17	96.6
Polycyclic Aromatic Hydrocarbons																												
1-Methylnaphthalene	90-12-0	18	73	mg/kg	0.061	J-/H2/TR	0.19	UJ (LOD)/H2	0.021	J-/H2/TR	97.4	0.313	0.0056	J/TR	0.011		0.0069	J/TR	36	0.0149	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
2-Methylnaphthalene	91-57-6	24	300	mg/kg	0.069	J-/H2/TR	0.19	UJ (LOD)/H2	0.039	J-/H2/TR	80.5	0.301	0.0082	J/TR	0.013		0.0092	J/TR	25.000	0.0165	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Acenaphthene	83-32-9	360	4,500	mg/kg	0.2	J-/H2/TR	0.079	J-/H2/TR	0.026	J-/H2/TR	87.7	0.326	0.016		0.019		0.014		15.400	0.0227	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Acenaphthylene	208-96-8	NS	NS	mg/kg	0.23	J-/H2/TR	0.25	J-/H2/TR	0.15	J-/H2/TR	25.2	0.343	0.016		0.019		0.024		20.500	0.0298	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Anthracene	120-12-7	1,800	23,000	mg/kg	0.39	J-/H2/TR	0.37	J-/H2/TR	0.18	J-/H2/TR	37	0.605	0.068		0.052		0.062		13.300	0.081	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Benzo(a)anthracene	56-55-3	1.1	21	mg/kg	1.2	J-/H2	1.3	J-/H2	0.89	J-/H2	18.9	1.67	0.4		0.25		0.3		24.100	0.509	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Benzo(a)pyrene	50-32-8	0.11	2.1	mg/kg	1.1	J-/H2	1.1	J-/H2	1.1	J-/H2	0	1.1	0.35		0.23		0.26		22.300	0.437	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Benzo(b)fluoranthene	205-99-2	1.1	21	mg/kg	2.9	J-/H2	2.7	J-/H2	2.1	J-/H2	16.2	3.61	0.48		0.34		0.41		17.100	0.586	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Benzo(g,h,i)perylene	191-24-2	NS	NS	mg/kg	0.91	J-/H2	0.86	J-/H2/TR	0.87	J-/H2	3.01	0.947	0.22		0.15		0.17		20.000	0.271	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Benzo(k)fluoranthene	207-08-9	11	210	mg/kg	0.92	J-/H2	0.83	J-/H2/TR	0.66	J-/H2	16.4	1.14	0.16		0.11		0.13		18.900	0.197	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Chrysene	218-01-9	110	2,100	mg/kg	2.6	J-/H2	1.9	J-/H2	1	J-/H2	43.7	3.85	0.39		0.25		0.3		22.600	0.492	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Dibenz(a,h)anthracene	53-70-3	0.11	2.1	mg/kg	0.28	J-/H2/TR	0.3	J-/H2/TR	0.26	J-/H2	7.14	0.33	0.069		0.043		0.05		24.900	0.0879	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Fluoranthene	206-44-0	240	3,000	mg/kg	7.9	J-/H2	4.2	J-/H2	1.3	J-/H2	74.1	12.8	0.62		0.45		0.55		15.800	0.755	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Fluorene	86-73-7	240	3,000	mg/kg	0.27	J-/H2/TR	0.11	J-/H2/TR	0.043	J-/H2/TR	82.7	0.435	0.018		0.021		0.016		13.700	0.0247	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	21	mg/kg	1	J-/H2	1.1	J-/H2	1	J-/H2	5.59	1.18	0.25		0.17		0.21		19.000	0.311	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Naphthalene	91-20-3	2	8.6	mg/kg	0.18	UJ (LOD)	0.19	UJ (LOD)	0.051	J-/H2/TR	55.2	0.335	0.01		0.018		0.014		28.600	0.0241	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Phenanthrene	85-01-8	NS	NS	mg/kg	3.8	J-/H2	1.6	J-/H2	0.46	J-/H2	86.9	6.23	0.25		0.22		0.25		7.220	0.284	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Pyrene	129-00-0	180	2,300	mg/kg	5.7	J-/H2	3.3	J-/H2	1.3	J-/H2	64.2	8.98	0.68		0.48		0.57		17.400	0.829	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Total LMW PAHs	N/A	NS	NS	mg/kg	6.22		3.709		1.86		55.700	9.44	0.7918		0.623		0.6961		12.000	0.917	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Total HMW PAHs	N/A	NS	NS	mg/kg	25.03		17.999		11.04		38.800	35.6	3.7308		2.616		3.0761		17.800	4.55	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A

(a) EPA Regional Screening Levels Table, EPA, November 2019. Value shown is equal to HI=0.1. Carcinogenic values equal to $1x10^{-6}$.

(b) A deed restriction is in place noting that there is to be no residential development at the site (USACE 1995); however, EPA residential soil RSLs are included to assess for children receptors including site visitation for nature walks and potential camping.

DU-8 (AOC #5: Former Building 207 – Marine Garage Building) was not sampled because it would not be possible to separate metals and PAH contaminants originating from former Building 207, from contaminants originating from drums and other debris observed in DU-8.

NOTES:

mg/kg = milligrams per kilogram
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
PCB = Polychlorinated biphenyl
RSL = regional screening level
U = Analyte not detected. Numerical value is LOD or LOQ, as indicated.
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate.
- Bias low
+ Bias high

Validation Reason Codes:

A Serial dilution
C LCS Recovery
D MS RPD
H2 Prep Hold Time
I Surrogate recovery outside project limits
L Lab Blank
M MS Recovery
M2 Post Spike
P1 Column RPD
TR Trace Level Detect
V2 CCV

Red concentrations exceed EPA Residential Soil RSL.

Concentrations highlighted in yellow exceed EPA Industrial Soil RSL.

Table A-1 DU-1 Through DU-16 Phase I Incremental Soil Sampling Analytical Results Compared to Human Health Screening Criteria

Location					DU-7 (Previous Sampling Location II-EA-SS-02-08)									DU-9 (AOC #8: Former Building 219 – Garage Building and AOC #9: Former Building 220 – Garage Building)								DU-10 (Previous Sampling Location II-EA-SS-02-14)							
Sample ID					IINY-DU-7A-SSIS-20200319		IINY-DU-7B-SSIS-20200319		IINY-DU-7C-SSIS-20200319		% RSD	95% Upper Confidence Limit Chebychev Test		IINY-DU-9A-SSIS-20200319		IINY-DU-9B-SSIS-20200319		IINY-DU-9C-SSIS-20200319		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-10A-SSIS-20200319		IINY-DU-10B-SSIS-20200319		IINY-DU-10C-SSIS-20200319		95% Upper Confidence Limit Chebychev Test
Depth (in.)					0-6		0-6		0-6					0-6		0-6		0-6				0-6		0-6		0-6		
Matrix					Surface Soil		Surface Soil		Surface Soil					Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil		
Sample Date					3/19/2020 13:45		3/19/2020 13:45		3/19/2020 13:45					3/19/2020 10:40		3/19/2020 10:40		3/19/2020 10:40				3/19/2020 11:20		3/19/2020 11:20		3/19/2020 11:20		
Analyte	CAS #	Residential Soil RSL (mg/kg)[1,2]	Industrial Soil RSL (mg/kg)[1]	Unit																								
Soil pH																												
pH	N/A	N/A	N/A	N/A	7.4		7.4		7.5		0.777	7.58		7.1		6.9		7.0		1.43	7.25	7.1		7.1		7.2		7.28
Mercury																												
Mercury	7439-97-6	1.1	4.6	mg/kg	ot analyzed		Not analyzed		Not analyzed		N/A	N/A		0.073		0.081		0.074		5.74	0.087	ot analyzed		Not analyzed		Not analyzed		N/A
Target Analyte List Metals																												
Aluminum	7429-90-5	7,700	110,000	mg/kg	11,000		10,000		11,000		5	12,100		10,000		11,000		11,000		5	12,100	11,000		11,000		9,300		12,900
Antimony	7440-36-0	3.1	47	mg/kg	0.75		1.6		2.5		54.1	3.82		0.44		0.42		0.44		2.66	0.462	0.41		0.41		0.35		0.477
Arsenic	7440-38-2	0.68	3	mg/kg	18		17		17		3.33	18.8		7		7.3		6.9		2.95	7.59	7.5		7.2		6.5		8.36
Barium	7440-39-3	1,500	22,000	mg/kg	110		93		110		9.41	129		61		65		59		4.95	69.4	57		58		56		59.5
Beryllium	7440-41-7	16	230	mg/kg	0.55		0.48		0.58		9.56	0.666		0.48		0.51		0.5		3.08	0.535	0.6		0.56		0.5		0.68
Cadmium	7440-43-9	7.1	98	mg/kg	0.59	J/TR	0.48	J/TR	0.62	J/TR	13.1	0.749		0.23		0.22		0.26		8.8	0.289	0.17		0.19		0.19		0.212
Calcium	7440-70-2	NS	NS	mg/kg	17,000		15,000		16,000		6.25	18,500		7,600	J-/M	5,800	J-/M	8,700	J-/MA	19.9	11,100	14,000		14,000		17,000		19,400
Total Chromium, Total	7440-47-3	12,000	180,000	mg/kg	17		15		16		6.25	18.5		13		13		13		0	13	14		14		13		15.1
Cobalt	7440-48-4	2.3	35	mg/kg	6.2		5.6		6.5		7.51	7.25		7.6		7.4		7.3		2.05	7.82	7.9		8		7.5		8.47
Copper	7440-50-8	310	4,700	mg/kg	43		60		44		19.5	73		30		28		27		5.39	32.2	23		23		23		23
Iron	7439-89-6	5,500	82,000	mg/kg	19,000		18,000		19,000		3.09	20,100		16,000		16,000		17,000	J/A	3.53	17,800	18,000		18,000		16,000		20,200
Lead	7439-92-1	400	800	mg/kg	690		2,000		570		73	3,080		63		58		54		7.73	69.7	31		35		37		42
Magnesium	7439-95-4	NS	NS	mg/kg	12,000		10,000		11,000		9.09	13,500		6,100	J-/M	5,100	J-/M	6,800	J-/M/A	14.2	8,150	10,000	J/A	9,900		11,000		11,800
Manganese	7439-96-5	180	2,600	mg/kg	480		460		630		17.8	757		510		500		470		4.22	546	570		550		520		610
Nickel	7440-02-0	150	2,200	mg/kg	14		13		15		7.14	16.5		16		14		14		7.87	17.6	16		16		15		17.1
Potassium	2023695	NS	NS	mg/kg	1,100		1,000		1,000		5.59	1,180		1,200	J-/M	1,300	J-/M	1,300	J-/M	4.56	1,410	1,400	J/TR	1,400		1,200		1,620
Selenium	7782-49-2	39	580	mg/kg	0.38	J/TR	0.35	J/TR	0.43	J/TR	10.5	0.488		0.28	J/TR	0.28	J/TR	0.31	J/TR	5.97	0.334	0.27	J/TR	0.26	J/TR	0.3	J/TR	0.329
Silver	7440-22-4	39	580	mg/kg	0.09	J/TR	0.11	J/TR	0.1	J/TR	10	0.125		0.095	U (LOQ)/L	0.095	U (LOQ)/L	0.094	U (LOQ)/L	ND	ND	0.094	U (LOQ)/L	0.094	U (LOQ)/L	0.059	J/TR	0.133
Sodium	7440-23-5	NS	NS	mg/kg	95	J/TR	85	J/TR	92	J/TR	5.66	104		170	J-/M/TR	160	J/M/TR	160	J-/M/TR	3.53	178	500	UJ (LOD)/M2	83	J/TR	88	J/TR	826
Thallium	7440-28-0	0.078	1.2	mg/kg	0.21		0.19		0.21		5.68	0.232		0.11		0.12		0.14		12.4	0.162	0.15		0.15		0.15		0.15
Vanadium	7440-62-2	39	580	mg/kg	21		18		22		10.2	25.6		25	J+/M	25	J+/M	25	J+/M	0	25	23		24		21		26.5
Zinc	7440-66-6	2,300	35,000	mg/kg	200		210		210		2.79	221		69		67		70		2.22	72.5	59		60		55		64.7
Polycyclic Aromatic Hydrocarbons																												
1-Methylnaphthalene	90-12-0	18	73	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A		0.0075	J/TR	0.0057	J/TR	0.0057	J-/I/TR	16.5	0.00892	Not Analyzed		Not Analyzed		Not Analyzed		N/A
2-Methylnaphthalene	91-57-6	24	300	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A		0.01		0.0082	J/TR	0.0078	J-/I/TR	13.5	0.0116	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Acenaphthene	83-32-9	360	4,500	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A		0.013		0.0078	J/TR	0.011	J-/I	24.7	0.0172	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Acenaphthylene	208-96-8	NS	NS	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A		0.036		0.03		0.026	J-/I	16.4	0.0433	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Anthracene	120-12-7	1,800	23,000	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A		0.045		0.03		0.035	J-/I	20.8	0.0559	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Benzo(a)anthracene	56-55-3	1.1	21	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A		0.19	J+/M	0.13	J+/M	0.15	J-/M/I	19.5	0.234	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Benzo(a)pyrene	50-32-8	0.11	2.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A		0.21		0.15		0.17	J-/I	17.3	0.254	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Benzo(b)fluoranthene	205-99-2	1.1	21	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A		0.35		0.23		0.26	J-/I	22.3	0.437	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Benzo(g,h,i)perylene	191-24-2	NS	NS	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A		0.15	J+/M	0.1	J+/M	0.11	J-/M/I	22	0.187	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Benzo(k)fluoranthene	207-08-9	11	210	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A		0.12		0.078		0.086	J-/I	23.6	0.151	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Chrysene	218-01-9	110	2,100	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A		0.21	J+/M	0.15	J+/M	0.17	J/M/I	17.3	0.254	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Dibenz(a,h)anthracene	53-70-3	0.11	2.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A		0.038		0.027		0.028	J-/I	19.6	0.0463	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Fluoranthene	206-44-0	240	3,000	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A		0.44		0.27		0.34	J-/I	24.4	0.565	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Fluorene	86-73-7	240	3,000	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A		0.017		0.0099		0.013	J-/I	26.8	0.0223	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	21	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A		0.18	J/M	0.12	J/M	0.14	J-/M/I	20.8	0.224	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Naphthalene	91-20-3	2	8.6	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A		0.013		0.011		0.0097	J-/I	14.8	0.0154	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Phenanthrene	85-01-8	NS	NS	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A		0.16	J+/M	0.095	J+/M	0.12	J/M/I	26.2	0.208	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Pyrene	129-00-0	180	2,300	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A		0.41		0.27		0.3	J-/I	22.6	0.512	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Total LMW PAHs	N/A	NS	NS	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A		0.4915		0.3276		0.3782		21	0.61	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Total HMW PAHs	N/A	NS	NS	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A		2.3795		1.5826		1.8322		21.1	2.96	Not Analyzed		Not Analyzed		Not Analyzed		N/A

Table A-1 DU-1 Through DU-16 Phase I Incremental Soil Sampling Analytical Results Compared to Human Health Screening Criteria

Location					DU-11 (AOC #18: Area F – Former Coal Storage Area (Located Near Former Building 215))								DU-12 (AOC #6: Former Building 213 – Paint Locker for Building 202 and AOC #7: Former Building 215 – Garage Building)								DU-13 (AOC #1: Former Building 103 – Paint and Oil Storage and Previous Sampling Location IX 103-B1)							
Sample ID					IINY-DU-11A-SSIS-20200330		IINY-DU-11B-SSIS-20200330		IINY-DU-11C-SSIS-20200330		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-12A-SSIS-20200330		IINY-DU-12B-SSIS-20200330		IINY-DU-12C-SSIS-20200330		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-13A-SSIS-20200330		IINY-DU-13B-SSIS-20200330		IINY-DU-13C-SSIS-20200330		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in.)					0-6		0-6		0-6				0-6		0-6		0-6				0-6		0-6		0-6			
Matrix					Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date					3/30/2020 11:15		3/30/2020 11:15		3/30/2020 11:15				3/30/2020 12:15		3/30/2020 12:15		3/30/2020 12:15				3/30/2020 13:40		3/30/2020 13:40		3/30/2020 13:40			
Analyte	**CAS #**	**Residential Soil RSL (mg/kg)[1,2]**	**Industrial Soil RSL (mg/kg)[1]**	**Unit**																								
Soil pH																												
pH	N/A	N/A	N/A	N/A	7.0		7.0		7.2		1.63	7.36	5.5		6.1		6.3		6.98	7.01	6.8		7.0		6.9		1.45	7.15
Mercury																												
Mercury	7439-97-6	1.1	4.6	mg/kg	0.25	J-/M	0.15	J-/M	0.15	J-/M	31.5	0.329	0.26		0.26		0.21		11.9	0.316	0.28		0.31		0.36		12.8	0.418
Target Analyte List Metals																												
Aluminum	7429-90-5	7,700	110,000	mg/kg	9,700		11,000		10,000		7	11,900	11,000		11,000		11,000		0	11,000	11,000		11,000		12,000		5	12,800
Antimony	7440-36-0	3.1	47	mg/kg	0.74		0.83		0.9		9.74	1.03	0.7		0.63		0.58		9.47	0.788	1.2		1.4		2.5		41.2	3.46
Arsenic	7440-38-2	0.68	3	mg/kg	37		43		39		7.7	47.4	13		14		14		4.22	15.1	9.7		11		11		7.1	12.5
Barium	7440-39-3	1,500	22,000	mg/kg	76		79		78		1.97	81.5	84		79		79		3.58	87.9	88		86		96		5.88	103
Beryllium	7440-41-7	16	230	mg/kg	0.55		0.59		0.51		7.27	0.651	0.69		0.62		0.63		5.85	0.742	0.61		0.55		0.64		7.64	0.715
Cadmium	7440-43-9	7.1	98	mg/kg	0.37		0.36		0.37		1.57	0.381	0.38		0.33		0.35		7.12	0.417	0.74		0.77		0.75		2.03	0.792
Calcium	7440-70-2	NS	NS	mg/kg	28,000		25,000		27,000		5.73	30,500	10,000		11,000		13,000		13.5	15,200	9,200		8,500		8,900		3.96	9,750
Total Chromium, Total	7440-47-3	12,000	180,000	mg/kg	15	J+/M	15	J+/M	15	J+/M	0	15	15		15		15		0	15	15		14		15		3.94	16.1
Cobalt	7440-48-4	2.3	35	mg/kg	6.7		7		6.7		2.55	7.24	7.6		7.9		7.5		2.72	8.19	8.6		8.2		8.5		2.47	8.96
Copper	7440-50-8	310	4,700	mg/kg	30		37		33		10.5	42.2	51		48		47		4.28	53.9	220		600		260		58	885
Iron	7439-89-6	5,500	82,000	mg/kg	17,000	J/A	19,000		19,000		6.3	21,200	17,000		17,000		17,000		0	17,000	18,000		18,000		19,000		3.15	19,800
Lead	7439-92-1	400	800	mg/kg	130		110		130		9.36	152	82		83		89		4.47	94.2	190		150		160		12.5	219
Magnesium	7439-95-4	NS	NS	mg/kg	19,000		17,000		18,000		5.56	20,500	7,100		7,200		8,600		11	9,740	5,700		5,500		5,400		2.76	5,920
Manganese	7439-96-5	180	2,600	mg/kg	600		600		600		0	600	940		820		790		9.34	1,050	1,000		830		1,100		14	1,320
Nickel	7440-02-0	150	2,200	mg/kg	16		16		16		0	16	15		15		15		0	15	16		16		17		3.53	17.8
Potassium	2023695	NS	NS	mg/kg	910		960		1,000		4.71	1,070	1,100		1,100		1,100		0	1,100	1,400		1,400		1,400		0	1,400
Selenium	7782-49-2	39	580	mg/kg	0.47	J/TR	0.61		0.57		13.1	0.731	0.51		0.54		0.24	J/TR	38.4	0.846	0.55		0.6		0.68		10.7	0.775
Silver	7440-22-4	39	580	mg/kg	0.073	J/TR	0.082	J/TR	0.084	J/TR	7.35	0.0944	0.069	J/TR	0.069	J/TR	0.075	J/TR	4.88	0.0797	0.086	J/TR	0.094	J/TR	0.089	J/TR	4.51	0.0998
Sodium	7440-23-5	NS	NS	mg/kg	61	J/TR	56	J/TR	64	J/TR	6.7	70.5	73	J/TR	67	J/TR	68	J/TR	4.64	77.4	120	J/TR	120	J/TR	130	J/TR	4.68	138
Thallium	7440-28-0	0.078	1.2	mg/kg	0.19		0.22		0.22		8.25	0.254	0.15		0.14		0.15		3.94	0.161	0.16		0.16		0.18		6.93	0.196
Vanadium	7440-62-2	39	580	mg/kg	22	J+/M	24	J+/M	23	J+/M	4.35	25.5	28		26		27		3.7	29.5	30		30		31		1.9	31.8
Zinc	7440-66-6	2,300	35,000	mg/kg	87		100		110		11.6	128	95		100		93		3.76	105	140		150		170		9.96	192
Polycyclic Aromatic Hydrocarbons																												
1-Methylnaphthalene	90-12-0	18	73	mg/kg	0.028	J-/H2/TR	0.027	J-/H2/TR	0.023	J-/H2/TR	10.2	0.0327	0.073	J-/H2/TR	0.044	J-/H2/TR	0.053	J-/H2/TR	26.2	0.094	0.38	J-/H2/TR	0.45	J-/H2/TR	0.26	J-/H2/TR	26.4	0.605
2-Methylnaphthalene	91-57-6	24	300	mg/kg	0.043	J-/H2/TR	0.044	J-/H2/TR	0.036	J-/H2/TR	10.6	0.052	0.098	J-/H2/TR	0.055	J-/H2/TR	0.053	J-/H2/TR	37	0.133	0.43	J-/H2/TR	0.5	J-/H2/TR	0.31	J-/H2/TR	23.2	0.655
Acenaphthene	83-32-9	360	4,500	mg/kg	0.02	J-/H2/TR	0.029	J-/H2/TR	0.015	J-/H2/TR	33.3	0.0392	0.54	J-/H2	0.36	J-/H2/TR	0.39	J-/H2	22.4	0.673	4.5	J-/H2	4.7	J-/H2	2.6	J-/H2	29.5	6.85
Acenaphthylene	208-96-8	NS	NS	mg/kg	0.17	J-/H2/TR	0.23	J-/H2	0.16	J-/H2/TR	20.3	0.282	0.088	J-/H2/TR	0.029	J-/H2/TR	0.062	J-/H2/TR	49.6	0.134	0.21	UJ (LOD)/H2	1.3	J-/H2/TR	0.2	UJ (LOD)/H2	111	2.16
Anthracene	120-12-7	1,800	23,000	mg/kg	0.13	J-/H2/TR	0.15	J-/H2/TR	0.097	J-/H2	21.3	0.193	0.86	J-/H2	0.59	J-/H2	0.75	J-/H2	18.5	1.08	6.6	J-/H2	8	J-/H2	3.9	J-/H2	33.8	11.4
Benzo(a)anthracene	56-55-3	1.1	21	mg/kg	0.67	J-/H2	0.97	J-/H2	0.52	J-/H2	31.8	1.3	2.2	J-/H2	1.5	J-/H2	2.1	J-/H2	19.6	2.89	16	J-/H2	17	J-/H2	9.4	J-/H2	29.2	24.5
Benzo(a)pyrene	50-32-8	0.11	2.1	mg/kg	0.87	J-/H2	1.2	J-/H2	0.75	J-/H2	24.8	1.53	1.8	J-/H2	1.2	J-/H2	1.8	J-/H2	21.7	2.47	12	J-/H2	13	J-/H2	7.1	J-/H2	29.5	18.6
Benzo(b)fluoranthene	205-99-2	1.1	21	mg/kg	1.2	J-/H2	1.6	J-/H2	1.1	J-/H2	20.4	1.97	2.8	J-/H2	1.6	J-/H2	2.6	J-/H2	27.6	3.95	17	J-/H2	17	J-/H2	9.7	J-/H2	28.9	25.2
Benzo(g,h,i)perylene	191-24-2	NS	NS	mg/kg	0.82	J-/H2	1.2	J-/H2	0.78	J-/H2	24.8	1.52	1.4	J-/H2	0.69	J-/H2	1.3	J-/H2	34	2.1	7.2	J-/H2	7.9	J-/H2	4.2	J-/H2	30.6	11.4
Benzo(k)fluoranthene	207-08-9	11	210	mg/kg	0.43	J-/H2	0.57	J-/H2	0.36	J-/H2	23.6	0.722	1.1	J-/H2	0.62	J-/H2	0.97	J-/H2	27.7	1.52	6.4	J-/H2	7.4	J-/H2	3.8	J-/H2	31.7	10.5
Chrysene	218-01-9	110	2,100	mg/kg	0.96	J-/H2	1.3	J-/H2	0.75	J-/H2	27.7	1.7	2.4	J-/H2	1.5	J-/H2	2.2	J-/H2	23.2	3.22	16	J-/H2	16	J-/H2	9.3	J-/H2	28.1	23.5
Dibenz(a,h)anthracene	53-70-3	0.11	2.1	mg/kg	0.18	J-/H2/TR	0.23	J-/H2	0.16	J-/H2	19	0.281	0.38	J-/H2	0.2	J-/H2/TR	0.37	J-/H2	31.9	0.571	2.3	J-/H2	2.4	J-/H2	1.2	J-/H2/TR	33.9	3.64
Fluoranthene	206-44-0	240	3,000	mg/kg	1.1	J-/H2	1.3	J-/H2	0.71	J-/H2	28.9	1.79	4.2	J-/H2	3.1	J-/H2	4.3	J-/H2	17.2	5.54	34	J-/H2	38	J-/H2	21	J-/H2	28.7	53.4
Fluorene	86-73-7	240	3,000	mg/kg	0.043	J-/H2/TR	0.061	J-/H2/TR	0.028	J-/H2	37.6	0.0856	0.44	J-/H2	0.28	J-/H2/TR	0.32	J-/H2/TR	24	0.556	3.2	J-/H2	3.9	J-/H2	2	J-/H2	31.7	5.45
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	21	mg/kg	0.78	J-/H2	1.1	J-/H2	0.74	J-/H2	22.6	1.37	1.5	J-/H2	0.76	J-/H2	1.4	J-/H2	32.9	2.23	7.9	J-/H2	9.2	J-/H2	4.9	J-/H2	30.1	12.9
Naphthalene	91-20-3	2	8.6	mg/kg	0.098	J-/H2/TR	0.092	J-/H2/TR	0.068	J-/H2/TR	18.5	0.126	0.25	J-/H2/TR	0.12	J-/H2/TR	0.086	J-/H2/TR	56.9	0.37	0.95	J-/H2/TR	1.1	J-/H2/TR	0.75	J-/H2/TR	18.8	1.38
Phenanthrene	85-01-8	NS	NS	mg/kg	0.42	J-/H2	0.42	J-/H2	0.22	J-/H2	32.7	0.644	3.2	J-/H2	2.3	J-/H2	2.7	J-/H2	16.5	3.87	26	J-/H2	27	J-/H2	15	J-/H2	29.4	39.4
Pyrene	129-00-0	180	2,300	mg/kg	1.2	J-/H2	1.6	J-/H2	0.87	J-/H2	29.9	2.14	3.5	J-/H2	2.5	J-/H2	3.6	J-/H2	19	4.73	27	J-/H2	30	J-/H2	17	J-/H2	27.6	41.8
Total LMW PAHs	N/A	NS	NS	mg/kg	1.622		2.023		1.167		26.7	2.68	7.749		5.278		6.514		19	9.62	58.06		63.95		34.22		30.2	91.7
Total HMW PAHs	N/A	NS	NS	mg/kg	8.632		11.493		7.037		24.9	14.7	25.529		16.448		23.554		21.9	33.9	176.86		191.85		104.82		29.5	275

Table A-1 DU-1 Through DU-16 Phase I Incremental Soil Sampling Analytical Results Compared to Human Health Screening Criteria

Location					DU-14 (Previous Sampling Location II-EA-SS-02-13)								DU-15 (Previous Sampling Location II-EA-SS-02-15)								DU-16 (AOC #4: Former Building 124 to 128 – Sewage Disposal Plant [and Suspected Outfall])							
Sample ID					IINY-DU-14A-SSIS-20200320		IINY-DU-14B-SSIS-20200320		IINY-DU-14C-SSIS-20200320		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-15A-SSIS-20200401		IINY-DU-15B-SSIS-20200401		IINY-DU-15C-SSIS-20200401		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-16A-SSIS-20200331		IINY-DU-16B-SSIS-20200331		IINY-DU-16C-SSIS-20200331		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in.)					0-6		0-6		0-6				0-6		0-6		0-6				0-6		0-6		0-6			
Matrix					Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date					3/20/2020 8:30		3/20/2020 8:30		3/20/2020 8:30				4/1/2020 8:20		4/1/2020 8:20		4/1/2020 8:20				3/31/2020 9:50		3/31/2020 9:50		3/31/2020 9:50			
Analyte	**CAS #**	**Residential Soil RSL (mg/kg)[1,2]**	**Industrial Soil RSL (mg/kg)[1]**	**Unit**																								
Soil pH																												
pH	N/A	N/A	N/A	N/A	6.7		6.9		7.0		2.22	7.25	6.2		6.3		6.6		3.27	6.89	6.9		6.9		7.4		4.09	7.79
Mercury																												
Mercury	7439-97-6	1.1	4.6	mg/kg	0.16		0.18		0.19		8.65	0.215	0.14		0.21		0.29		35.2	0.402	0.097		0.096		0.096		0.599	0.0978
Target Analyte List Metals																												
Aluminum	7429-90-5	7,700	110,000	mg/kg	10,000		11,000		10,000		6	11,800	11,000		11,000		11,000		0	11,000	15,000		14,000		13,000		7	16,500
Antimony	7440-36-0	3.1	47	mg/kg	0.6		0.56		0.59		3.57	0.636	1.1		0.7		0.7		27.7	1.41	0.44		0.4		0.42		4.76	0.47
Arsenic	7440-38-2	0.68	3	mg/kg	16		18		17		5.88	19.5	7		6.5		7.1		4.68	7.68	7.1		6.8		7.2		2.96	7.56
Barium	7440-39-3	1,500	22,000	mg/kg	76		81		78		3.21	84.7	58		61		62		3.45	65.6	61		56		59		4.29	65
Beryllium	7440-41-7	16	230	mg/kg	0.53		0.57		0.55		3.64	0.6	0.47		0.5		0.47		3.61	0.524	0.6		0.6		0.53		7.01	0.678
Cadmium	7440-43-9	7.1	98	mg/kg	0.28		0.27		0.28		2.09	0.291	0.58		0.38		0.58		22.5	0.804	0.25		0.33		0.27		14.7	0.388
Calcium	7440-70-2	NS	NS	mg/kg	9,500	J+/M	8,900	J+/M	6,800	J+/M/A	16.9	12,000	7,100		7,500		9,900		18.5	12,000	8,000		7,600		7,200		5.26	8,610
Total Chromium, Total	7440-47-3	12,000	180,000	mg/kg	13		14		14		4.22	15.1	15		15		15		0	15	15		15		14		3.94	16.1
Cobalt	7440-48-4	2.3	35	mg/kg	6.8		6.9		7.3		3.78	7.67	6.8		6.7		6.8		0.853	6.91	8.5		8		8.4		3.19	8.97
Copper	7440-50-8	310	4,700	mg/kg	23		26		25		6.19	28.5	30	J/TR	31	J/TR	33	J/TR	4.88	35.2	38		33		39		8.77	44.8
Iron	7439-89-6	5,500	82,000	mg/kg	16,000		17,000		16,000	J/A	3.53	17,800	19,000		18,000		18,000		3.15	19,800	22,000		20,000		21,000		4.76	23,500
Lead	7439-92-1	400	800	mg/kg	96		120		110		11.1	139	130		130		120		4.56	141	38		42		46		9.52	52.1
Magnesium	7439-95-4	NS	NS	mg/kg	7,100	J+/M	6,800	J+/M	5,500	J+/M	13.2	8,610	6,000		5,900		7,700		15.5	9,080	6,500		6,200		6,100		3.32	6,790
Manganese	7439-96-5	180	2,600	mg/kg	670		720		700		3.61	760	410		480		430		8.19	531	450		430		440		2.27	465
Nickel	7440-02-0	150	2,200	mg/kg	15		16		16		3.69	17.1	14		14		15		4.03	15.8	16		16		16		0	16
Potassium	2023695	NS	NS	mg/kg	980		1,000		1,000		1.16	1,020	1,200		1,200		1,200		0	1,200	1,700		1,600		1,400		9.75	1,950
Selenium	7782-49-2	39	580	mg/kg	0.38	J/TR	0.38	J/TR	0.4	J/TR	2.99	0.416	0.52		0.62		0.47	J/TR	14.2	0.729	0.4	J/TR	0.4	J/TR	0.35	J/TR	7.53	0.456
Silver	7440-22-4	39	580	mg/kg	0.08	J/TR	0.063	J/TR	0.087	J/TR	16.1	0.108	0.079	J/TR	0.089		0.073	J/TR	10.1	0.101	0.055	J/TR	0.063	J/TR	0.057	J/TR	7.14	0.0688
Sodium	7440-23-5	NS	NS	mg/kg	72	J-/M/TR	70	J-/M/TR	73	J-/M/TR	2.13	75.5	75	J/TR	81	J/TR	77	J/TR	3.93	85.4	440	J/TR	360	J/TR	330	J/TR	15.1	520
Thallium	7440-28-0	0.078	1.2	mg/kg	0.11		0.13		0.12		8.33	0.145	0.16		0.15		0.16		3.69	0.171	0.13		0.12		0.12		4.68	0.138
Vanadium	7440-62-2	39	580	mg/kg	20		20		20		0	20	25		26		25		2.28	26.8	28		30		30		3.94	32.2
Zinc	7440-66-6	2,300	35,000	mg/kg	74		74		78		3.07	81.1	250		120		120		46	352	70		71		66		3.83	75.7
Polycyclic Aromatic Hydrocarbons																												
1-Methylnaphthalene	90-12-0	18	73	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.026	J-/I	0.028		0.0077	J-/TR	54.4	0.0487
2-Methylnaphthalene	91-57-6	24	300	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.033	J-/I	0.041		0.0082	J-/TR	62.4	0.0704
Acenaphthene	83-32-9	360	4,500	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.15	J-/I	0.14		0.036		58.1	0.268
Acenaphthylene	208-96-8	NS	NS	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.032	J-/I	0.034		0.028		9.75	0.039
Anthracene	120-12-7	1,800	23,000	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.18	J-/I	0.16		0.063		46.6	0.292
Benzo(a)anthracene	56-55-3	1.1	21	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.5	J-/I	0.44		0.21		39.9	0.769
Benzo(a)pyrene	50-32-8	0.11	2.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.47	J-/I	0.43		0.24		32.3	0.689
Benzo(b)fluoranthene	205-99-2	1.1	21	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.71	J-/I	0.65		0.33		36.3	1.08
Benzo(g,h,i)perylene	191-24-2	NS	NS	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.31	J-/I	0.29		0.15		34.9	0.469
Benzo(k)fluoranthene	207-08-9	11	210	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.26	J-/I	0.23		0.12		36.3	0.389
Chrysene	218-01-9	110	2,100	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.49	J-/I	0.44		0.21		39.3	0.756
Dibenz(a,h)anthracene	53-70-3	0.11	2.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.1	J-/I	0.085		0.042		39.8	0.151
Fluoranthene	206-44-0	240	3,000	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	1	J-/I	0.96		0.41		41.7	1.62
Fluorene	86-73-7	240	3,000	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.1	J-/I	0.1		0.027		55.7	0.182
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	21	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.38	J-/I	0.35		0.19		33.3	0.564
Naphthalene	91-20-3	2	8.6	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.064	J-/I	0.089		0.012		71.4	0.154
Phenanthrene	85-01-8	NS	NS	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.74	J-/I	0.66		0.2		54.6	1.27
Pyrene	129-00-0	180	2,300	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.86	J-/I	0.8		0.35		41.6	1.37
Total LMW PAHs	N/A	NS	NS	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	1.825		1.692		0.5919		49.4	3.07
Total HMW PAHs	N/A	NS	NS	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	6.045		5.567		2.4939		41	9.55

Table A-2 DU-17 Through DU-19 Phase I Incremental Soil Sampling Analytical Results Compared to Human Health Screening Criteria

Location					DU-17 (AOC #2 - Former Building 121 [Incinerator], AOC #16 - Area D - Dumping Area, and Previous Sampling Locations IX-121-B1 and II-EA-SD-02-02															
Sample ID					IINY-DU-17A-SSIS-20200331		IINY-DU-17B-SSIS-20200331		IINY-DU-17C-SSIS-20200331		%RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-17A-SBIS1-20200331		IINY-DU-17B-SBIS1-20200331		IINY-DU-17C-SBIS1-20200331		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)					0-6		0-6		0-6				6-36		6-36		6-36			
Matrix					Surface Soil		Surface Soil		Surface Soil				Subsurface Soil		Subsurface Soil		Subsurface Soil			
Sample Date					3/31/2020 8:15		3/31/2020 8:15		3/31/2020 8:15				3/31/2020 8:45		3/31/2020 8:45		3/31/2020 8:45			
Analyte	**CAS #**	**Residential Soil RSL (mg/kg)[1,2]**	**Industrial Soil RSL (mg/kg)[1]**	**Unit**																
Soil pH																				
pH	N/A	N/A	N/A	N/A	7.2		7.2		7.1		0.806	7.31	7.0		7.4		7.7		4.77	8.25
Mercury																				
Mercury	7439-97-6	1.1	4.6	mg/kg	0.98		0.61		0.77		24	1.25	0.9		0.8		0.77		8	0.995
Target Analyte List Metals																				
Aluminum	7429-90-5	7,700	110,000	mg/kg	5,400		5,300		7,000		16	8,300	6,100		5,900		6,100		2	6,320
Antimony	7440-36-0	3.1	47	mg/kg	9.9		7.3		6.5		22.5	12.4	4.8		4.5		4.4		4.56	5.09
Arsenic	7440-38-2	0.68	3	mg/kg	8.2		2.7		8.8		51.2	15	22		25		23		6.55	27.2
Barium	7440-39-3	1,500	22,000	mg/kg	150		120		130		11.5	172	460		330		280		26.1	590
Beryllium	7440-41-7	16	230	mg/kg	0.38		0.15		0.53		54.2	0.835	1.2		1.3		1.5		11.5	1.72
Cadmium	7440-43-9	7.1	98	mg/kg	5		20		16		56.8	33.2	3.9		3.4		3.2		10.3	4.41
Calcium	7440-70-2	NS	NS	mg/kg	74,000		43,000		58,000		26.6	97300	14,000		19,000		22,000		22	28,500
Total Chromium, Total	7440-47-3	12,000	180,000	mg/kg	19		6.9		25		54.3	40.2	13		13		12		4.56	14.1
Cobalt	7440-48-4	2.3	35	mg/kg	7.2		4.9		5.7		19.7	8.87	6.3		6.8		6.6		3.83	7.2
Copper	7440-50-8	310	4,700	mg/kg	210		83		280		52.3	442	180		130		130		19.7	219
Iron	7439-89-6	5,500	82,000	mg/kg	16,000		14,000		19,000		15.4	22,700	26,000		26,000		25,000		2.25	27,100
Lead	7439-92-1	400	800	mg/kg	2,900		1,500		1,200		48.6	4,150	2,700		1,200		820		63.2	4,070
Magnesium	7439-95-4	NS	NS	mg/kg	45,000		26,000		34,000		27.3	59,000	6,400		8,500		9,800		20.8	12,600
Manganese	7439-96-5	180	2,600	mg/kg	400		380		440		7.51	484	170		170		170		0	170
Nickel	7440-02-0	150	2,200	mg/kg	16		5.9		20		52	32.3	19		21		19		5.87	22.6
Potassium	2023695	NS	NS	mg/kg	1100		1100		1400		14.4	1640	610		550		560		5.61	654
Selenium	7782-49-2	39	580	mg/kg	0.52		0.2	J/TR	0.68		52.4	1.08	1.1		1.4		1.5		15.6	1.86
Silver	7440-22-4	39	580	mg/kg	0.59		0.56		0.72		13.6	0.837	0.3		0.25		0.24		12.2	0.344
Sodium	7440-23-5	NS	NS	mg/kg	400	J/TR	370	J/TR	490		14.9	577	510		480		510		3.46	544
Thallium	7440-28-0	0.078	1.2	mg/kg	0.12		0.1		0.15		20.4	0.187	0.6		0.72		0.8		14.2	0.96
Vanadium	7440-62-2	39	580	mg/kg	17		18		22		13.9	25.7	24		22		21		6.84	26.2
Zinc	7440-66-6	2,300	35,000	mg/kg	8,200		7,200		5,700		17.9	10,200	1,900		2,900		1,600		31.9	3,850
Polycyclic Aromatic Hydrocarbons																				
1-Methylnaphthalene	90-12-0	18	73	mg/kg	0.03		0.026		0.037		18	0.045	0.087	J-/I	0.098	J-/I	0.11	J-/I	11.7	0.127
2-Methylnaphthalene	91-57-6	24	300	mg/kg	0.044		0.039		0.056		18.900	0.0683	0.12	J-/I	0.14	J-/I	0.16	J-/I	14.300	0.19
Acenaphthene	83-32-9	360	4,500	mg/kg	0.035		0.028		0.044		22.500	0.0559	0.068	J-/I	0.058	J-/I	0.087	J-/I	20.700	0.108
Acenaphthylene	208-96-8	NS	NS	mg/kg	0.13		0.11		0.18		25.800	0.231	0.031	J-/I	0.035	J-/I	0.042	J-/I	15.500	0.05
Anthracene	120-12-7	1,800	23,000	mg/kg	0.17		0.15		0.24		25.300	0.306	0.21		0.081	J-/I	0.16	J-/I	43.300	0.314
Benzo(a)anthracene	56-55-3	1.1	21	mg/kg	0.58		0.48	J-/I	0.89		32.900	1.19	0.7		0.2	J-/I	0.47	J-/I	54.800	1.09
Benzo(a)pyrene	50-32-8	0.11	2.1	mg/kg	0.5		0.41	J-/I	0.75		31.800	0.997	0.45		0.11	J-/I	0.31	J-/I	58.900	0.72
Benzo(b)fluoranthene	205-99-2	1.1	21	mg/kg	0.88		0.71	J-/I	1.3		31.500	1.73	0.97		0.32	J-/I	0.67	J-/I	49.800	1.47
Benzo(g,h,i)perylene	191-24-2	NS	NS	mg/kg	0.32		0.29		0.45		24.100	0.567	0.34		0.13	J-/I	0.27	J-/I	43.300	0.516
Benzo(k)fluoranthene	207-08-9	11	210	mg/kg	0.28		0.24		0.38		24.000	0.481	0.23	J-/I	0.051	J-/I	0.17	J-/I	60.600	0.38
Chrysene	218-01-9	110	2,100	mg/kg	0.66		0.57	J-/I	1		30.500	1.31	1		0.48	J-/I	0.8	J-/I	34.500	1.42
Dibenz(a,h)anthracene	53-70-3	0.11	2.1	mg/kg	0.12		0.093		0.15		23.600	0.193	0.15	J-/I	0.068	J-/I	0.13	J-/I	36.900	0.224
Fluoranthene	206-44-0	240	3,000	mg/kg	1.1		0.94	J-/I	1.6		28.400	2.08	1.5		0.44	J-/I	1	J-/I	54.100	2.31
Fluorene	86-73-7	240	3,000	mg/kg	0.043		0.035		0.06		27.800	0.0781	0.076	J-/I	0.064	J-/I	0.11	J-/I	28.600	0.143
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	21	mg/kg	0.38		0.3	J-/I	0.52		27.800	0.68	0.29		0.085	J-/I	0.25	J-/I	52.200	0.482
Naphthalene	91-20-3	2	8.6	mg/kg	0.073		0.069		0.094		17.100	0.112	0.2	J-/I	0.24	J-/I	0.28	J-/I	16.700	0.341
Phenanthrene	85-01-8	NS	NS	mg/kg	0.49		0.4	J-/I	0.74		32.400	0.987	1.1		0.48	J-/I	0.88	J-/I	38.300	1.61
Pyrene	129-00-0	180	2,300	mg/kg	1.1		0.92	J-/I	1.6		29.200	2.09	1.2		0.4	J-/I	0.87	J-/I	48.800	1.84
Total LMW PAHs	N/A	NS	NS	mg/kg	1.015		0.857		1.451		27.800	1.88	1.892		1.196		1.829		23.500	2.61
Total HMW PAHs	N/A	NS	NS	mg/kg	5.92		4.953		8.64		29.400	11.3	6.83		2.284		4.94		48.700	10.4
Polychlorinated Biphenyls																				
PCB, Total	1336-36-3	0.23	0.94	mg/kg	0.14		0.13		0.14		4.22	0.151	0.016	UJ (LOD)/I	0.015	UJ (LOD)/I	0.015	UJ (LOD)/I	ND	ND
PCB-1016 (Aroclor 1016)	12674-11-2	0.41	5.1	mg/kg	0.03	U (LOD)	0.027	U (LOD)	0.027	U (LOD)	ND	ND	0.031	UJ (LOD)/I	0.029	UJ (LOD)/I	0.028	UJ (LOD)/I	ND	ND
PCB-1221 (Aroclor 1221)	11104-28-2	0.2	0.83	mg/kg	0.078	U (LOD)	0.071	U (LOD)	0.071	U (LOD)	ND	ND	0.082	UJ (LOD)/I	0.075	UJ (LOD)/I	0.073	UJ (LOD)/I	ND	ND
PCB-1232 (Aroclor 1232)	11141-16-5	0.17	0.72	mg/kg	0.03	U (LOD)	0.027	U (LOD)	0.027	U (LOD)	ND	ND	0.031	UJ (LOD)/I	0.029	UJ (LOD)/I	0.028	UJ (LOD)/I	ND	ND
PCB-1242 (Aroclor 1242)	53469-21-9	0.23	0.95	mg/kg	0.047	U (LOD)	0.043	U (LOD)	0.043	U (LOD)	ND	ND	0.049	UJ (LOD)/I	0.045	UJ (LOD)/I	0.044	UJ (LOD)/I	ND	ND
PCB-1248 (Aroclor 1248)	12672-29-6	0.23	0.95	mg/kg	0.095		0.084		0.087		6.41	0.103	0.015	UJ (LOD)/I	0.014	UJ (LOD)/I	0.014	UJ (LOD)/I	ND	ND
PCB-1254 (Aroclor 1254)	11097-69-1	0.12	0.97	mg/kg	0.032	U (LOD)	0.03	U (LOD)	0.03	U (LOD)	ND	ND	0.034	UJ (LOD)/I	0.031	UJ (LOD)/I	0.03	UJ (LOD)/I	ND	ND
PCB-1260 (Aroclor 1260)	11096-82-5	0.24	0.99	mg/kg	0.044	J/TR	0.041	J/TR	0.048	J/TR	7.92	0.0532	0.0068	UJ (LOD)/I/V2	0.0063	UJ (LOD)/I/V2	0.0031	J-/I/TR/V2/P1	37.2	0.0105
PCB-1262 (Aroclor 1262)	37324-23-5	NS	NS	mg/kg	0.016	U (LOD)	0.014	U (LOD)	0.014	U (LOD)	ND	ND	0.016	UJ (LOD)/I	0.015	UJ (LOD)/I	0.015	UJ (LOD)/I	ND	ND
PCB-1268 (Aroclor 1268)	11100-14-4	NS	NS	mg/kg	0.0065	UJ (LOD)/V2	0.0059	UJ (LOD)/V2	0.0059	UJ (LOD)/V2	ND	ND	0.0068	UJ (LOD)/I	0.0063	UJ (LOD)/I	0.0061	UJ (LOD)/I	ND	ND
Explosives Residues																				
1,3,5-Trinitrobenzene (TNB)	99-35-4	220	3,200	mg/kg	0.038	U (LOD)	0.037	UJ (LOD)/I	0.037	U (LOD)	ND	ND	0.038	U (LOD)	0.038	U (LOD)	0.038	U (LOD)	ND	ND
1,3-Dinitrobenzene (DNB)	99-65-0	0.63	8.2	mg/kg	0.038	UJ (LOD)-/C	0.037	UJ (LOD)-/I/C	0.037	UJ (LOD)-/C	ND	ND	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	ND	ND
2,4,6-Trinitrotoluene (TNT)	118-96-7	3.6	51	mg/kg	0.096	UJ (LOD)-/C	0.093	UJ (LOQ)-/I/C	0.092	UJ (LOQ)-/C	ND	ND	0.095	UJ (LOQ)-/C	0.095	UJ (LOQ)-/C	0.096	UJ (LOQ)-/C	ND	ND
2,4-Dinitrotoluene (24DNT)	121-14-2	1.7	7.4	mg/kg	0.038	UJ (LOD)-/C	0.037	UJ (LOD)-/I/C	0.037	UJ (LOD)-/C	ND	ND	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	ND	ND
2,6-Dinitrotoluene (26DNT)	606-20-2	0.36	1.5	mg/kg	0.038	UJ (LOD)-/C	0.037	UJ (LOD)-/I/C	0.037	UJ (LOD)-/C	ND	ND	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	ND	ND
2-Amino-4,6-dinitrotoluene (2AMDNT)	35572-78-2	0.77	11	mg/kg	0.096	U (LOQ)	0.093	UJ (LOQ)/I	0.092	U (LOQ)	ND	ND	0.095	U (LOQ)	0.095	U (LOQ)	0.096	UJ (LOQ)/I	ND	ND
2-Nitrotoluene (2NT)	88-72-2	3.2	15	mg/kg	0.096	U (LOD)	0.093	UJ (LOD)/I	0.092	U (LOD)	ND	ND	0.095	U (LOD)	0.095	U (LOD)	0.096	U (LOD)	ND	ND
3,5-Dinitroaniline	618-87-1	NS	NS	mg/kg	0.019	U (LOD)	0.019	UJ (LOD)/I	0.018	U (LOD)	ND	ND	0.019	U (LOD)	0.019	U (LOD)	0.019	U (LOD)	ND	ND
3-Nitrotoluene (3NT)	99-08-1	0.63	8.2	mg/kg	0.19	UJ (LOQ)-/C	0.19	UJ (LOQ)-/I/C	0.18	UJ (LOQ)-/C	ND	ND	0.19	UJ (LOQ)-/C	0.19	UJ (LOQ)-/C	0.19	UJ (LOQ)-/C	ND	ND
4-Amino-2,6-dinitrotoluene (4AMDNT)	19406-51-0	0.77	11	mg/kg	0.096	U (LOQ)	0.093	UJ (LOQ)/I	0.092	U (LOQ)	ND	ND	0.095	U (LOQ)	0.095	U (LOQ)	0.096	U (LOQ)	ND	ND
4-Nitrotoluene (4NT)	99-99-0	25	140	mg/kg	0.096	UJ (LOD)-/C	0.093	UJ (LOD)-/I/C	0.092	UJ (LOD)-/C	ND	ND	0.095	UJ (LOD)-/C	0.095	UJ (LOD)-/C	0.096	UJ (LOD)-/C	ND	ND
Hexahydro-1,3,5-trinitro-1,3,5-triazine	121-82-4	8.3	38	mg/kg	0.096	U (LOD)	0.093	U (LOD)	0.092	U (LOD)	ND	ND	0.095	U (LOD)	0.095	U (LOD)	0.096	U (LOD)	ND	ND

Table A-2 DU-17 Through DU-19 Phase I Incremental Soil Sampling Analytical Results Compared to Human Health Screening Criteria

Location					DU-17 (AOC #2 - Former Building 121 [Incinerator], AOC #16 - Area D - Dumping Area, and Previous Sampling Locations IX-121-B1 and II-EA-SD-02-02															
Sample ID					IINY-DU-17A-SSIS-20200331		IINY-DU-17B-SSIS-20200331		IINY-DU-17C-SSIS-20200331		%RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-17A-SBIS1-20200331		IINY-DU-17B-SBIS1-20200331		IINY-DU-17C-SBIS1-20200331		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)					0-6		0-6		0-6				6-36		6-36		6-36			
Matrix					Surface Soil		Surface Soil		Surface Soil				Subsurface Soil		Subsurface Soil		Subsurface Soil			
Sample Date					3/31/2020 8:15		3/31/2020 8:15		3/31/2020 8:15				3/31/2020 8:45		3/31/2020 8:45		3/31/2020 8:45			
Analyte	CAS #	Residential Soil RSL (mg/kg)[1,2]	Industrial Soil RSL (mg/kg)[1]	Unit																
Nitrobenzene (NB)	98-95-3	5.1	22	mg/kg	0.19	UJ (LOD)-/C	0.19	UJ (LOD)-/I/C	0.18	UJ (LOD)-/C	ND	ND	0.19	UJ (LOD)-/C	0.19	UJ (LOD)-/C	0.19	UJ (LOD)-/C	ND	ND
Nitroglycerin (NG)	55-63-0	0.63	8.2	mg/kg	0.67	U (LOD)	0.65	UJ (LOD)/I	0.64	U (LOD)	ND	ND	0.67	U (LOD)	0.67	U (LOD)	0.67	U (LOD)	ND	ND
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	390	5,700	mg/kg	0.067	U (LOD)	0.065	UJ (LOD)/I	0.064	U (LOD)	ND	ND	0.067	U (LOD)	0.067	U (LOD)	0.067	U (LOD)	ND	ND
Pentaerythritol tetranitrate (PETN)	78-11-5	13	160	mg/kg	0.96	U (LOD)	0.93	UJ (LOD)/I	0.92	U (LOD)	ND	ND	0.95	U (LOD)	0.95	U (LOD)	0.96	U (LOD)	ND	ND
Tetryl	479-45-8	0.16	230	mg/kg	0.096	UJ (LOD)-/C	0.093	UJ (LOD)-/I/C	0.092	UJ (LOD)-/C	ND	ND	0.095	UJ (LOD)-/C	0.095	UJ (LOD)-/C	0.096	UJ (LOD)-/C	ND	ND

1. EPA Regional Screening Levels Table, EPA, November 2019. Value shown is equal to HI=0.1. Carcinogenic values equal to $1x10^{-6}$.
2. A deed restriction is in place noting that there is to be no residential development at the site (USACE 1995); however, EPA residential soil RSLs are included to assess for children receptors including site visitation for nature walks and potential camping.

NOTES:
mg/kg = milligrams per kilogram
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
PCB = Polychlorinated biphenyl
RSL = regional screening level
U = Analyte not detected Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate
- Bias low
+ Bias high
Red concentrations exceed EPA Residential Soil RSL.
Concentrations highlighted in yellow exceed EPA Industrial Soil RSL.

Validation Reason Codes:
A Serial dilution
C LCS Recovery
D MS RPD
H2 Prep Hold Time
I Surrogate recovery outside project limits
L Lab Blank
M MS Recovery
M2 Post Spike
P1 Column RPD
TR Trace Level Detect
V2 CCV

Table A-2 DU-17 Through DU-19 Phase I Incremental Soil Sampling Analytical Results Compared to Human Health Screening Criteria

Location					DU-18 (AOC #16 - Area D - Dumping Area and Previous Sampling Locations IX DMP-B22 and IXDMP-B1)															
Sample ID					IINY-DU-18A-SSIS-20200331		IINY-DU-18B-SSIS-20200331		IINY-DU-18C-SSIS-20200331		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-18A-SBIS1-20200331		IINY-DU-18B-SBIS1-20200331		IINY-DU-18B-SBIS1-20200331		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)					0-6		0-6		0-6				6-36		6-36		6-36			
Matrix					Surface Soil		Surface Soil		Surface Soil				Subsurface Soil		Subsurface Soil		Subsurface Soil			
Sample Date					3/31/2020 13:45		3/31/2020 13:45		3/31/2020 13:45				3/31/2020 14:20		3/31/2020 14:20		3/31/2020 14:20			
Analyte	CAS #	Residential Soil RSL (mg/kg)[1,2]	Industrial Soil RSL (mg/kg)[1]	Unit																
Soil pH																				
pH	N/A	N/A	N/A	N/A	7.5		8.0		7.8		3.24	8.4	8.1		8.1		8		0.716	8
Mercury																				
Mercury	7439-97-6	1.1	4.6	mg/kg	4.3		2.3		1.5		53	6.33	0.71		2.1		0.71		68	3.19
Target Analyte List Metals																				
Aluminum	7429-90-5	7,700	110,000	mg/kg	11,000		11,000		6,500		27	16,000	4,300		4,800		5,900		16	7,060
Antimony	7440-36-0	3.1	47	mg/kg	6.5		6.2		6.9		5.38	7.42	11		13		5.5		39.5	19.6
Arsenic	7440-38-2	0.68	3	mg/kg	7.8		15		15		33	23.1	17		19		16		8.81	21.2
Barium	7440-39-3	1,500	22,000	mg/kg	360		230		240		26.1	459	330		310		270		10.1	380
Beryllium	7440-41-7	16	230	mg/kg	0.56		0.55		0.66		10.3	0.743	0.64		0.69		0.63		4.92	0.734
Cadmium	7440-43-9	7.1	98	mg/kg	5.2		4.2		4.5		11.1	5.92	7.6		24		4.7		86	38.3
Calcium	7440-70-2	NS	NS	mg/kg	12,000		12,000		13,000		4.68	13,800	44,000		32,000		20,000		37.5	62,200
Total Chromium, Total	7440-47-3	12,000	180,000	mg/kg	14		33		240		131	411	33		32		29		6.64	36.6
Cobalt	7440-48-4	2.3	35	mg/kg	7.6		7		7.2		4.2	8.04	7.5		5		6.5		19.9	9.5
Copper	7440-50-8	310	4,700	mg/kg	40		1,700		1,000		91.2	3,010	5,500		5,600		5,100		4.9	6,070
Iron	7439-89-6	5,500	82,000	mg/kg	35,000		35,000		27,000		14.3	44,000	43000		36000		33000		13.7	50,200
Lead	7439-92-1	400	800	mg/kg	1,500		1,400		1,400		4.03	1,580	2,900		2,000		2,400		18.5	3,570
Magnesium	7439-95-4	NS	NS	mg/kg	7900		7800		7,900		0.734	8,010	24,000		17,000		11,000		37.5	33,700
Manganese	7439-96-5	180	2,600	mg/kg	540		550		450		10.7	652	480		450		510		6.25	555
Nickel	7440-02-0	150	2,200	mg/kg	16		29		30		31.2	44.7	79		64		52		20.8	99
Potassium	2023695	NS	NS	mg/kg	2,300		2,300		920		43.3	3,850	480		590		1100		45.7	1560
Selenium	7782-49-2	39	580	mg/kg	0.36	J/TR	0.74		0.58		34.1	1.04	0.79		0.95		0.86		9.25	1.07
Silver	7440-22-4	39	580	mg/kg	0.92		0.63		0.85		18.9	1.18	1.5		2.1		0.83		43	3.08
Sodium	7440-23-5	NS	NS	mg/kg	810		810		590		17.2	1060	420	J/TR	430	J/TR	430	J/TR	1.35	441
Thallium	7440-28-0	0.078	1.2	mg/kg	0.13		0.21		0.2		24.2	0.29	0.35		0.31		0.27		12.9	0.411
Vanadium	7440-62-2	39	580	mg/kg	29		24		29	J/A	10.6	34.6	17		18		18		3.27	19.1
Zinc	7440-66-6	2,300	35,000	mg/kg	83		1,800		1,600		80.9	3,520	5,600		5,000		3,100		28.6	7,850
Polycyclic Aromatic Hydrocarbons																				
1-Methylnaphthalene	90-12-0	18	73	mg/kg	0.04		0.04	J-/I	0.041	J-/I	1.43	0.0418	0.1	J-/I	0.08	J-/I	0.086	J-/I	11.6	0.114
2-Methylnaphthalene	91-57-6	24	300	mg/kg	0.07		0.06	J-/I	0.072	J-/I	9.550	0.0835	0.12	J-/I	0.095	J-/I	0.1	J-/I	12.600	0.138
Acenaphthene	83-32-9	360	4,500	mg/kg	0.046		0.055	J-/I	0.052	J-/I	8.990	0.0625	0.23	J-/I	0.18	J-/I	0.18	J-/I	14.700	0.269
Acenaphthylene	208-96-8	NS	NS	mg/kg	0.059		0.074	J-/I	0.12	J-/I	37.700	0.164	0.041	J-/I	0.063	J-/I	0.066	J-/I	24.100	0.091
Anthracene	120-12-7	1,800	23,000	mg/kg	0.13		0.17	J-/I	0.21	J-/I	23.500	0.271	0.12	J-/I	0.16	J-/I	0.23	J-/I	32.800	0.31
Benzo(a)anthracene	56-55-3	1.1	21	mg/kg	0.49	J-/I	0.63	J-/I	1		37.300	1.37	0.28	J-/I	0.44	J-/I	0.79		51.800	1.16
Benzo(a)pyrene	50-32-8	0.11	2.1	mg/kg	0.44	J-/I	0.58	J-/I	0.92		38.200	1.27	0.15	J-/I	0.28	J-/I	0.64		71.200	0.995
Benzo(b)fluoranthene	205-99-2	1.1	21	mg/kg	0.86	J-/I	1.1	J-/I	1.6		31.800	2.14	0.44	J-/I	0.77	J-/I	1.3		51.900	1.93
Benzo(g,h,i)perylene	191-24-2	NS	NS	mg/kg	0.3		0.41	J-/I	0.64		38.600	0.887	0.14	J-/I	0.24	J-/I	0.51		64.500	0.778
Benzo(k)fluoranthene	207-08-9	11	210	mg/kg	0.21		0.31	J-/I	0.45		37.300	0.627	0.075	J-/I	0.14	J-/I	0.28		63.500	0.429
Chrysene	218-01-9	110	2,100	mg/kg	0.86	J-/I	1.1	J-/I	1.5		28.000	1.97	0.65	J-/I	1.1	J-/I	1.7		45.800	2.48
Dibenz(a,h)anthracene	53-70-3	0.11	2.1	mg/kg	0.11		0.16	J-/I	0.19	J-/I	26.400	0.255	0.064	J-/I	0.1	J-/I	0.2	J-/I	58.100	0.299
Fluoranthene	206-44-0	240	3,000	mg/kg	0.97	J-/I	1.2	J-/I	1.7		28.900	2.23	0.72	J-/I	0.93	J-/I	1.4		34.200	1.89
Fluorene	86-73-7	240	3,000	mg/kg	0.061		0.071	J-/I	0.068	J-/I	7.700	0.0796	0.15	J-/I	0.14	J-/I	0.16	J-/I	6.670	0.175
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	21	mg/kg	0.31		0.45	J-/I	0.71		41.400	1	0.1	J-/I	0.22	J-/I	0.45		69.300	0.704
Naphthalene	91-20-3	2	8.6	mg/kg	0.24		0.2	J-/I	0.24	J-/I	10.200	0.285	0.71	J-/I	0.46	J-/I	0.51		23.600	0.893
Phenanthrene	85-01-8	NS	NS	mg/kg	0.62	J-/I	0.78	J-/I	0.9		18.300	1.12	0.66	J-/I	0.86	J-/I	1.4		39.300	1.94
Pyrene	129-00-0	180	2,300	mg/kg	0.87	J-/I	1.1	J-/I	1.7		35.000	2.3	0.62	J-/I	0.89	J-/I	1.3		36.600	1.8
Total LMW PAHs	N/A	NS	NS	mg/kg	1.266		1.45		1.703		14.900	2.03	2.131		2.038		2.732		16.400	3.25
Total HMW PAHs	N/A	NS	NS	mg/kg	5.42		7.04		10.41		33.400	14	3.239		5.11		8.57		48.000	12.4
Polychlorinated Biphenyls																				
PCB, Total	1336-36-3	0.23	0.94	mg/kg	0.29		0.17		0.4	J-/I	40.1	0.576	0.15		0.1		0.057	J	45.5	0.219
PCB-1016 (Aroclor 1016)	12674-11-2	0.41	5.1	mg/kg	0.029	U (LOD)	0.028	U (LOD)	0.029	UJ (LOD)/I	ND	ND	0.03	U (LOD)	0.028	U (LOD)	0.029	U (LOD)	ND	ND
PCB-1221 (Aroclor 1221)	11104-28-2	0.2	0.83	mg/kg	0.075	U (LOD)	0.074	U (LOD)	0.076	UJ (LOD)/I	ND	ND	0.078	U (LOD)	0.072	U (LOD)	0.075	U (LOD)	ND	ND
PCB-1232 (Aroclor 1232)	11141-16-5	0.17	0.72	mg/kg	0.029	U (LOD)	0.028	U (LOD)	0.029	UJ (LOD)/I	ND	ND	0.03	U (LOD)	0.028	U (LOD)	0.029	U (LOD)	ND	ND
PCB-1242 (Aroclor 1242)	53469-21-9	0.23	0.95	mg/kg	0.045	U (LOD)	0.044	U (LOD)	0.046	UJ (LOD)/I	ND	ND	0.047	U (LOD)	0.043	U (LOD)	0.045	U (LOD)	ND	ND
PCB-1248 (Aroclor 1248)	12672-29-6	0.23	0.95	mg/kg	0.13		0.099		0.14	J-/I	17.4	0.177	0.015	U (LOD)	0.013	U (LOD)	0.014	U (LOD)	ND	ND
PCB-1254 (Aroclor 1254)	11097-69-1	0.12	0.97	mg/kg	0.031	U (LOD)	0.031	U (LOD)	0.032	UJ (LOD)/I	ND	ND	0.032	U (LOD)	0.03	U (LOD)	0.031	U (LOD)	ND	ND
PCB-1260 (Aroclor 1260)	11096-82-5	0.24	0.99	mg/kg	0.16		0.074		0.25	J-/I	54.6	0.383	0.0065	U (LOD)	0.006	U (LOD)	0.0062	U (LOD)	ND	ND
PCB-1262 (Aroclor 1262)	37324-23-5	NS	NS	mg/kg	0.015	U (LOD)	0.015	U (LOD)	0.015	UJ (LOD)/I	ND	ND	0.15	J/V2	0.1	J/V2	0.057	J/V2	45.5	0.219
PCB-1268 (Aroclor 1268)	11100-14-4	NS	NS	mg/kg	0.0063	UJ (LOD)/V2	0.0061	UJ (LOD)/V2	0.0063	UJ (LOD)/I/V2	ND	ND	0.0065	U (LOD)	0.006	U (LOD)	0.0062	U (LOD)	ND	ND
Explosives Residues																				
1,3,5-Trinitrobenzene (TNB)	99-35-4	220	3,200	mg/kg	0.037	U (LOD)	0.039	U (LOD)	0.038	U (LOD)	ND	ND	0.039	UJ (LOD)/I	0.039	UJ (LOD)/I	0.038	UJ (LOD)/I	ND	ND
1,3-Dinitrobenzene (DNB)	99-65-0	0.63	8.2	mg/kg	0.037	UJ (LOD)-/C	0.039	UJ (LOD)-/C	0.038	UJ (LOD)-/C	ND	ND	0.039	UJ (LOD)-/I/C	0.039	UJ (LOD)-/I/C	0.038	UJ (LOD)-/I/C	ND	ND
2,4,6-Trinitrotoluene (TNT)	118-96-7	3.6	51	mg/kg	0.094	UJ (LOQ)-/C	0.098	UJ (LOQ)-/C	0.096	UJ (LOQ)-/C	ND	ND	0.096	UJ (LOQ)-/I/C	0.096	UJ (LOQ)-/I/C	0.094	UJ (LOQ)-/I/C	ND	ND
2,4-Dinitrotoluene (24DNT)	121-14-2	1.7	7.4	mg/kg	0.037	UJ (LOD)-/C	0.039	UJ (LOD)-/C	0.038	UJ (LOD)-/C	ND	ND	0.039	UJ (LOD)-/I/C	0.039	UJ (LOD)-/I/C	0.038	UJ (LOD)-/I/C	ND	ND
2,6-Dinitrotoluene (26DNT)	606-20-2	0.36	1.5	mg/kg	0.037	UJ (LOD)-/C	0.039	UJ (LOD)-/C	0.038	UJ (LOD)-/C	ND	ND	0.039	UJ (LOD)-/I/C	0.039	UJ (LOD)-/I/C	0.038	UJ (LOD)-/I/C	ND	ND
2-Amino-4,6-dinitrotoluene (2AMDNT)	35572-78-2	0.77	11	mg/kg	0.094	U (LOQ)	0.098	U (LOQ)	0.096	U (LOQ)	ND	ND	0.096	UJ (LOQ)/I	0.096	UJ (LOQ)/I	0.094	UJ (LOQ)/I	ND	ND
2-Nitrotoluene (2NT)	88-72-2	3.2	15	mg/kg	0.094	U (LOD)	0.098	U (LOD)	0.096	U (LOD)	ND	ND	0.096	UJ (LOD)/I	0.096	UJ (LOD)/I	0.094	UJ (LOD)/I	ND	ND
3,5-Dinitroaniline	618-87-1	NS	NS	mg/kg	0.019	U (LOD)	0.02	U (LOD)	0.019	U (LOD)	ND	ND	0.019	UJ (LOD)/I	0.019	UJ (LOD)/I	0.019	UJ (LOD)/I	ND	ND
3-Nitrotoluene (3NT)	99-08-1	0.63	8.2	mg/kg	0.19	UJ (LOQ)-/C	0.2	UJ (LOQ)-/C	0.19	UJ (LOQ)-/C	ND	ND	0.19	UJ (LOQ)-/I/C	0.19	UJ (LOQ)-/I/C	0.19	UJ (LOQ)-/I/C	ND	ND
4-Amino-2,6-dinitrotoluene (4AMDNT)	19406-51-0	0.77	11	mg/kg	0.094	U (LOQ)	0.098	U (LOQ)	0.096	U (LOQ)	ND	ND	0.096	UJ (LOQ)/I	0.096	UJ (LOQ)/I	0.094	UJ (LOQ)/I	ND	ND
4-Nitrotoluene (4NT)	99-99-0	25	140	mg/kg	0.094	UJ (LOD)-/C	0.098	UJ (LOD)-/C	0.096	UJ (LOD)-/C	ND	ND	0.096	UJ (LOD)-/I/C	0.096	UJ (LOD)-/I/C	0.094	UJ (LOD)-/I/C	ND	ND
Hexahydro-1,3,5-trinitro-1,3,5-triazine	121-82-4	8.3	38	mg/kg	0.094	UJ (LOD)/I	0.098	U (LOD)	0.096	UJ (LOD)/I	ND	ND	0.096	UJ (LOD)/I	0.096	UJ (LOD)/I	0.094	UJ (LOD)/I	ND	ND

Table A-2 DU-17 Through DU-19 Phase I Incremental Soil Sampling Analytical Results Compared to Human Health Screening Criteria

Location					DU-18 (AOC #16 - Area D - Dumping Area and Previous Sampling Locations IX DMP-B22 and IXDMP-B1)																	
Sample ID					IINY-DU-18A-SSIS-20200331		IINY-DU-18B-SSIS-20200331		IINY-DU-18C-SSIS-20200331		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-18A-SBIS1-20200331		IINY-DU-18B-SBIS1-20200331		IINY-DU-18B-SBIS1-20200331		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)					0-6		0-6		0-6				6-36		6-36		6-36			
Matrix					Surface Soil		Surface Soil		Surface Soil				Subsurface Soil		Subsurface Soil		Subsurface Soil			
Sample Date					3/31/2020 13:45		3/31/2020 13:45		3/31/2020 13:45				3/31/2020 14:20		3/31/2020 14:20		3/31/2020 14:20			
Analyte	CAS #	Residential Soil RSL (mg/kg)[1,2]	Industrial Soil RSL (mg/kg)[1]	Unit																
Nitrobenzene (NB)	98-95-3	5.1	22	mg/kg	0.19	UJ (LOD)-/C	0.2	UJ (LOD)-/C	0.19	UJ (LOD)-/C	ND	ND	0.19	UJ (LOD)-/I/C	0.19	UJ (LOD)-/I/C	0.19	UJ (LOD)-/I/C	ND	ND
Nitroglycerin (NG)	55-63-0	0.63	8.2	mg/kg	0.65	U (LOD)	0.68	U (LOD)	0.67	U (LOD)	ND	ND	0.68	UJ (LOD)/I	0.67	UJ (LOD)/I	0.66	UJ (LOD)/I	ND	ND
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	390	5,700	mg/kg	0.065	U (LOD)	0.068	U (LOD)	0.067	U (LOD)	ND	ND	0.068	UJ (LOD)/I	0.067	UJ (LOD)/I	0.066	UJ (LOD)/I	ND	ND
Pentaerythritol tetranitrate (PETN)	78-11-5	13	160	mg/kg	0.94	U (LOD)	0.98	U (LOD)	0.96	U (LOD)	ND	ND	0.96	UJ (LOD)/I	0.96	UJ (LOD)/I	0.94	UJ (LOD)/I	ND	ND
Tetryl	479-45-8	0.16	230	mg/kg	0.094	UJ (LOD)-/I/C	0.098	UJ (LOD)-/C	0.096	UJ (LOD)-/C	ND	ND	0.096	UJ (LOD)-/I/C	0.096	UJ (LOD)-/I/C	0.094	UJ (LOD)-/I/C	ND	ND

(a) EPA Regional Screening Levels Table, EPA, November 2019. Value shown is equal to HI=0.1. Carcinogenic values equal to $1x10^{-6}$.
(b) A deed restriction is in place noting that there is to be no residential development at the site (USACE 1995); however, EPA residential soil RSLs are included to assess for children receptors including site visitation for nature walks and potential camping.

NOTES:
mg/kg = milligrams per kilogram
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
PCB = Polychlorinated biphenyl
RSL = regional screening level
U = Analyte not detected Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate
- Bias low
+ Bias high
Red concentrations exceed EPA Residential Soil RSL.
Concentrations highlighted in yellow exceed EPA Industrial Soil RSL.

Validation Reason Codes:
A Serial dilution
C LCS Recovery
D MS RPD
H2 Prep Hold Time
I Surrogate recovery outside project limits
L Lab Blank
M MS Recovery
M2 Post Spike
P1 Column RPD
TR Trace Level Detect
V2 CCV

Table A-2 DU-17 Through DU-19 Phase I Incremental Soil Sampling Analytical Results Compared to Human Health Screening Criteria

Location					DU-19 (AOC #16 - Area D - Dumping Area and Previous Sampling Location II-EA-SS-02-16															
Sample ID					IINY-DU-19A-SSIS-20200331		IINY-DU-19B-SSIS-20200331		IINY-DU-19C-SSIS-20200331		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-19A-SBIS1-20200331		IINY-DU-19B-SBIS1-20200331		IINY-DU-19C-SBIS1-20200331		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)					0-6		0-6		0-6				6-36		6-36		6-36			
Matrix					Surface Soil		Surface Soil		Surface Soil				Subsurface Soil		Subsurface Soil		Subsurface Soil			
Sample Date					3/31/2020 10:45		3/31/2020 10:45		3/31/2020 10:45				3/31/2020 11:00		3/31/2020 11:00		3/31/2020 11:00			
Analyte	**CAS #**	**Residential Soil RSL (mg/kg)[1,2]**	**Industrial Soil RSL (mg/kg)[1]**	**Unit**																
Soil pH																				
pH	N/A	N/A	N/A	N/A	7.7		7.5		7.4		2.03	7.92	7		7.4		7.7		5	8.25
Mercury																				
Mercury	7439-97-6	1.1	4.6	mg/kg	0.46	J-/M	0.11	J-/M	0.43	J-/M	58	0.822	0.12		0.23		0.27		38	0.402
Target Analyte List Metals																				
Aluminum	7429-90-5	7,700	110,000	mg/kg	16,000		25,000		20,000		22	31,700	25,000		20,000		21,000		12	28,700
Antimony	7440-36-0	3.1	47	mg/kg	0.5	J-/M	0.28	J-/M	0.5	J-/M	29.8	0.746	0.12	J/TR	0.11	J/TR	0.11	J/TR	5.09	0.128
Arsenic	7440-38-2	0.68	3	mg/kg	9.6	J+/M/D	6.8	J+/M/D	12	J+/M/D	27.5	16	2.8		2.9		2.6		5.52	3.15
Barium	7440-39-3	1,500	22,000	mg/kg	81	J/D/M2	63	J/D	83	J/D	14.6	103	34	J/M2	37		35		4.32	39.2
Beryllium	7440-41-7	16	230	mg/kg	0.42	J+/M/D	0.35	J+/M/D	0.45	J+/M/D	12.6	0.536	0.19		0.19		0.17		6.3	0.212
Cadmium	7440-43-9	7.1	98	mg/kg	0.33		0.25		0.3		13.8	0.395	0.097	J/TR	0.093	J/TR	0.087	J/TR	5.45	0.105
Calcium	7440-70-2	NS	NS	mg/kg	10,000	J/A	15,000		12,000		20	18,700	20,000		17,000		17,000		10	22,400
Total Chromium, Total	7440-47-3	12,000	180,000	mg/kg	10	J+/M	10	J+/M	11	J+/M	5.59	11.8	7.8		7.7		7.8		0.743	7.91
Cobalt	7440-48-4	2.3	35	mg/kg	14		19		15		16.5	22.7	18		16		17		5.88	19.5
Copper	7440-50-8	310	4,700	mg/kg	130		180		140		17.6	217	210		210		210		0	210
Iron	7439-89-6	5,500	82,000	mg/kg	23,000	J/A	36,000		29,000		22	45,700	36,000		33,000		35,000		4	38,500
Lead	7439-92-1	400	800	mg/kg	61		38		67		27.7	93.9	14		12		11		12.4	16.2
Magnesium	7439-95-4	NS	NS	mg/kg	5,700	J+/M	8,300	J+/M/A	6,700	J+/M	19	10,200	7,600		7,200		7,000		4	8,040
Manganese	7439-96-5	180	2,600	mg/kg	410	J/D/M2	410	J/D	470	J/D	8.06	517	270	J/M2	280		280		2.09	291
Nickel	7440-02-0	150	2,200	mg/kg	16	J-/M/D	17	J-/M/D	17	J-/M/D	3.46	18.1	14		14		14		0	14
Potassium	2023695	NS	NS	mg/kg	1,200		1,500		1,600		15	1,960	1,200		1,100		1,100		5	1,280
Selenium	7782-49-2	39	580	mg/kg	0.42	J/D/TR	0.35	J/D/TR	0.44	J/D/TR	11.7	0.522	0.23	J/TR	0.23	J/TR	0.23	J/TR	0	0.23
Silver	7440-22-4	39	580	mg/kg	0.12		0.12		0.13		4.68	0.138	0.11		0.097	J/TR	0.1		6.65	0.119
Sodium	7440-23-5	NS	NS	mg/kg	1,700		3,100		2,100		31	4,110	3,400		2,400		2,400		21	4,190
Thallium	7440-28-0	0.078	1.2	mg/kg	0.12	J+/M/D	0.12	J+/M/D	0.14	J+/M/D	9.12	0.156	0.07	J/TR	0.076	J/TR	0.071	J/TR	4.44	0.0804
Vanadium	7440-62-2	39	580	mg/kg	46		52		44		8.8	57.8	59		55		52		6.35	64.2
Zinc	7440-66-6	2,300	35,000	mg/kg	120	J/D	90	J/D	110	J/D	14.3	145	60		61		62		1.64	63.5
Polycyclic Aromatic Hydrocarbons																				
1-Methylnaphthalene	90-12-0	18	73	mg/kg	0.023		0.012		0.017		31.8	0.0312	0.0011	J-/TR	0.0012	J-/TR	0.00064	J-/TR	30.5	0.00173
2-Methylnaphthalene	91-57-6	24	300	mg/kg	0.035	J-/D	0.018	J-/D	0.028	J-/D	31.600	0.0485	0.0017	J-/TR	0.0019	J-/TR	0.00093	J-/TR	33.900	0.0028
Acenaphthene	83-32-9	360	4,500	mg/kg	0.06		0.026		0.027		51.400	0.0864	0.0024	J-/TR	0.0015	J-/TR	0.00087	J-/TR	48.400	0.00353
Acenaphthylene	208-96-8	NS	NS	mg/kg	0.27	J-/D	0.13	J-/D	0.21	J-/D	34.500	0.38	0.0066	J-/TR	0.0069	J-/TR	0.0034	J-/TR	34.400	0.0105
Anthracene	120-12-7	1,800	23,000	mg/kg	0.43		0.19		0.24		44.200	0.605	0.0067	J-/TR	0.0064	J-/TR	0.0032	J-/TR	35.700	0.0103
Benzo(a)anthracene	56-55-3	1.1	21	mg/kg	2.5		1.1		1.1		51.600	3.6	0.024		0.029		0.013		37.200	0.0426
Benzo(a)pyrene	50-32-8	0.11	2.1	mg/kg	1.9		0.9		0.98		44.100	2.66	0.029		0.031		0.015		34.900	0.0469
Benzo(b)fluoranthene	205-99-2	1.1	21	mg/kg	3.4		1.6		1.8		43.500	4.75	0.045		0.047		0.023		34.700	0.0718
Benzo(g,h,i)perylene	191-24-2	NS	NS	mg/kg	1.1		0.55		0.64		38.600	1.51	0.025		0.028		0.015		30.000	0.0398
Benzo(k)fluoranthene	207-08-9	11	210	mg/kg	1.2		0.59		0.59		44.400	1.68	0.013		0.015		0.0072	J-/TR	34.500	0.0219
Chrysene	218-01-9	110	2,100	mg/kg	2.3		0.98		1.1		50.000	3.3	0.027		0.033		0.014		39.400	0.0491
Dibenz(a,h)anthracene	53-70-3	0.11	2.1	mg/kg	0.41		0.26		0.27		26.800	0.524	0.0061	J-/TR	0.0067	J-/TR	0.0039	J-/TR	26.500	0.00928
Fluoranthene	206-44-0	240	3,000	mg/kg	4		1.6		1.7		55.800	5.85	0.046		0.053		0.023		38.600	0.0802
Fluorene	86-73-7	240	3,000	mg/kg	0.077	J-/M	0.028	J-/M	0.039	J-/M	53.600	0.113	0.0037	J-/TR	0.0028	J-/TR	0.0011	J-/TR	52.100	0.00586
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	21	mg/kg	1.5		0.77		0.82		39.600	2.06	0.027		0.029		0.014		34.900	0.0438
Naphthalene	91-20-3	2	8.6	mg/kg	0.083	J-/D	0.046	J-/D	0.068	J-/D	28.300	0.113	0.0019	J-/TR	0.0022	J-/TR	0.0019	U (LOD)	8.660	0.00244
Phenanthrene	85-01-8	NS	NS	mg/kg	1.5		0.52		0.58		63.400	2.25	0.022		0.023		0.0091	J-/TR	43.000	0.0375
Pyrene	129-00-0	180	2,300	mg/kg	3.2		1.3		1.4		54.400	4.66	0.044		0.052		0.023		37.800	0.0774
Total LMW PAHs	N/A	NS	NS	mg/kg	2.478		0.97		1.209		52.200	3.59	0.0461		0.0459		0.02114		38.100	0.0738
Total HMW PAHs	N/A	NS	NS	mg/kg	21.51		9.65		10.4		47.900	30.6	0.2861		0.3237		0.1511		35.800	0.482
Polychlorinated Biphenyls																				
PCB, Total	1336-36-3	0.23	0.94	mg/kg	0.011	J/TR	0.0071	J/TR	0.015	UJ (LOD)/I	35.8	0.021	0.05	J/TR	0.049	J/TR	0.054	J/TR	5.19	0.0577
PCB-1016 (Aroclor 1016)	12674-11-2	0.41	5.1	mg/kg	0.029	U (LOD)	0.028	U (LOD)	0.029	UJ (LOD)/I	ND	ND	0.03	U (LOD)	0.029	U (LOD)	0.03	U (LOD)	ND	ND
PCB-1221 (Aroclor 1221)	11104-28-2	0.2	0.83	mg/kg	0.076	U (LOD)	0.072	U (LOD)	0.075	UJ (LOD)/I	ND	ND	0.077	U (LOD)	0.076	U (LOD)	0.077	U (LOD)	ND	ND
PCB-1232 (Aroclor 1232)	11141-16-5	0.17	0.72	mg/kg	0.029	U (LOD)	0.028	U (LOD)	0.029	UJ (LOD)/I	ND	ND	0.03	U (LOD)	0.029	U (LOD)	0.03	U (LOD)	ND	ND
PCB-1242 (Aroclor 1242)	53469-21-9	0.23	0.95	mg/kg	0.046	U (LOD)	0.043	U (LOD)	0.045	UJ (LOD)/I	ND	ND	0.046	U (LOD)	0.046	U (LOD)	0.046	U (LOD)	ND	ND
PCB-1248 (Aroclor 1248)	12672-29-6	0.23	0.95	mg/kg	0.014	U (LOD)	0.013	U (LOD)	0.014	UJ (LOD)/I	ND	ND	0.015	U (LOD)	0.014	U (LOD)	0.015	U (LOD)	ND	ND
PCB-1254 (Aroclor 1254)	11097-69-1	0.12	0.97	mg/kg	0.032	U (LOD)	0.03	U (LOD)	0.031	UJ (LOD)/I	ND	ND	0.032	U (LOD)	0.032	U (LOD)	0.032	U (LOD)	ND	ND
PCB-1260 (Aroclor 1260)	11096-82-5	0.24	0.99	mg/kg	0.011	J-/M/TR/P1/V2	0.0071	J-/M/TR/P1/V2	0.0022	J-/M/I/TR/P1/V2	65.2	0.0179	0.05	J/TR/V2	0.049	J/TR/V2/P1	0.054	J/TR/V2	5.19	0.0577
PCB-1262 (Aroclor 1262)	37324-23-5	NS	NS	mg/kg	0.015	U (LOD)	0.014	U (LOD)	0.015	UJ (LOD)/I	ND	ND	0.015	U (LOD)	0.015	U (LOD)	0.015	U (LOD)	ND	ND
PCB-1268 (Aroclor 1268)	11100-14-4	NS	NS	mg/kg	0.0063	U (LOD)	0.006	U (LOD)	0.0063	UJ (LOD)/I	ND	ND	0.0065	U (LOD)	0.0064	U (LOD)	0.0065	U (LOD)	ND	ND
Explosives Residues																				
1,3,5-Trinitrobenzene (TNB)	99-35-4	220	3,200	mg/kg	0.039	U (LOD)	0.04	U (LOD)	0.039	U (LOD)	ND	ND	0.038	U (LOD)	0.038	U (LOD)	0.04	U (LOD)	ND	ND
1,3-Dinitrobenzene (DNB)	99-65-0	0.63	8.2	mg/kg	0.039	UJ (LOD)-/C	0.04	UJ (LOD)-/C	0.039	UJ (LOD)-/C	ND	ND	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	0.04	UJ (LOD)-/C	ND	ND
2,4,6-Trinitrotoluene (TNT)	118-96-7	3.6	51	mg/kg	0.099	UJ (LOQ)-/C	0.1	UJ (LOQ)-/C	0.098	UJ (LOQ)-/C	ND	ND	0.096	UJ (LOQ)-/C	0.096	UJ (LOQ)-/C	0.099	UJ (LOQ)-/C	ND	ND
2,4-Dinitrotoluene (24DNT)	121-14-2	1.7	7.4	mg/kg	0.039	UJ (LOD)-/C	0.04	UJ (LOD)-/C	0.039	UJ (LOD)-/C	ND	ND	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	0.04	UJ (LOD)-/C	ND	ND
2,6-Dinitrotoluene (26DNT)	606-20-2	0.36	1.5	mg/kg	0.039	UJ (LOD)-/C	0.04	UJ (LOD)-/C	0.039	UJ (LOD)-/C	ND	ND	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	0.04	UJ (LOD)-/C	ND	ND
2-Amino-4,6-dinitrotoluene (2AMDNT)	35572-78-2	0.77	11	mg/kg	0.099	U (LOQ)	0.1	U (LOQ)	0.098	U (LOQ)	ND	ND	0.096	U (LOQ)	0.096	U (LOQ)	0.099	U (LOQ)	ND	ND
2-Nitrotoluene (2NT)	88-72-2	3.2	15	mg/kg	0.099	U (LOD)	0.1	U (LOD)	0.098	U (LOD)	ND	ND	0.096	U (LOD)	0.096	U (LOD)	0.099	U (LOD)	ND	ND
3,5-Dinitroaniline	618-87-1	NS	NS	mg/kg	0.02	UJ (LOD)/M	0.02	UJ (LOD)/M	0.02	UJ (LOD)/M	ND	ND	0.019	U (LOD)	0.019	U (LOD)	0.02	U (LOD)	ND	ND
3-Nitrotoluene (3NT)	99-08-1	0.63	8.2	mg/kg	0.2	UJ (LOQ)-/C	0.2	UJ (LOQ)-/C	0.2	UJ (LOQ)-/C	ND	ND	0.19	UJ (LOQ)-/C	0.19	UJ (LOQ)-/C	0.2	UJ (LOQ)-/C	ND	ND
4-Amino-2,6-dinitrotoluene (4AMDNT)	19406-51-0	0.77	11	mg/kg	0.099	U (LOQ)	0.1	U (LOQ)	0.098	U (LOQ)	ND	ND	0.096	U (LOQ)	0.096	U (LOQ)	0.099	U (LOQ)	ND	ND
4-Nitrotoluene (4NT)	99-99-0	25	140	mg/kg	0.099	UJ (LOD)-/C	0.1	UJ (LOD)-/C	0.098	UJ (LOD)-/C	ND	ND	0.096	UJ (LOD)-/C	0.096	UJ (LOD)-/C	0.099	UJ (LOD)-/C	ND	ND
Hexahydro-1,3,5-trinitro-1,3,5-triazine	121-82-4	8.3	38	mg/kg	0.099	U (LOD)	0.1	U (LOD)	0.098	U (LOD)	ND	ND	0.096	U (LOD)	0.096	U (LOD)	0.099	U (LOD)	ND	ND

Table A-2 DU-17 Through DU-19 Phase I Incremental Soil Sampling Analytical Results Compared to Human Health Screening Criteria

Location					DU-19 (AOC #16 - Area D - Dumping Area and Previous Sampling Location II-EA-SS-02-16															
Sample ID					IINY-DU-19A-SSIS-20200331		IINY-DU-19B-SSIS-20200331		IINY-DU-19C-SSIS-20200331		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-19A-SBIS1-20200331		IINY-DU-19B-SBIS1-20200331		IINY-DU-19C-SBIS1-20200331		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)					0-6		0-6		0-6				6-36		6-36		6-36			
Matrix					Surface Soil		Surface Soil		Surface Soil				Subsurface Soil		Subsurface Soil		Subsurface Soil			
Sample Date					3/31/2020 10:45		3/31/2020 10:45		3/31/2020 10:45				3/31/2020 11:00		3/31/2020 11:00		3/31/2020 11:00			
Analyte	**CAS #**	**Residential Soil RSL (mg/kg)[1,2]**	**Industrial Soil RSL (mg/kg)[1]**	**Unit**																
Nitrobenzene (NB)	98-95-3	5.1	22	mg/kg	0.2	UJ (LOD)-/C	0.2	UJ (LOD)-/C	0.2	UJ (LOD)-/C	ND	ND	0.19	UJ (LOD)-/C	0.19	UJ (LOD)-/C	0.2	UJ (LOD)-/C	ND	ND
Nitroglycerin (NG)	55-63-0	0.63	8.2	mg/kg	0.69	U (LOD)	0.7	U (LOD)	0.69	U (LOD)	ND	ND	0.67	U (LOD)	0.67	U (LOD)	0.69	U (LOD)	ND	ND
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	390	5,700	mg/kg	0.069	U (LOD)	0.07	U (LOD)	0.069	U (LOD)	ND	ND	0.067	U (LOD)	0.067	U (LOD)	0.069	U (LOD)	ND	ND
Pentaerythritol tetranitrate (PETN)	78-11-5	13	160	mg/kg	0.99	U (LOD)	1	U (LOD)	0.98	U (LOD)	ND	ND	0.96	U (LOD)	0.96	U (LOD)	0.99	U (LOD)	ND	ND
Tetryl	479-45-8	0.16	230	mg/kg	0.099	UJ (LOD)-/C	0.1	UJ (LOD)-/C	0.098	UJ (LOD)-/C	ND	ND	0.096	UJ (LOD)-/C	0.096	UJ (LOD)-/C	0.099	UJ (LOD)-/C	ND	ND

(a) EPA Regional Screening Levels Table, EPA, November 2019. Value shown is equal to HI=0.1. Carcinogenic values equal to $1x10^{-6}$.
(b) A deed restriction is in place noting that there is to be no residential development at the site (USACE 1995); however, EPA residential soil RSLs are included to assess for children receptors including site visitation for nature walks and potential camping.

NOTES:
mg/kg = milligrams per kilogram
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
PCB = Polychlorinated biphenyl
RSL = regional screening level
U = Analyte not detected Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate
- Bias low
+ Bias high
Red concentrations exceed EPA Residential Soil RSL.
Concentrations highlighted in yellow exceed EPA Industrial Soil RSL.

Validation Reason Codes:
A Serial dilution
C LCS Recovery
D MS RPD
H2 Prep Hold Time
I Surrogate recovery outside project limits
L Lab Blank
M MS Recovery
M2 Post Spike
P1 Column RPD
TR Trace Level Detect
V2 CCV

Table A-3 DU-20 Through DU-22 Phase I Incremental Soil Sampling Analytical Results Compared to Human Health Screening Criteria

Location					DU-20 (AOC #13: Area A – One Former Fuel Oil AST [2,500 gallons] Located Near Former Building 223)															
Sample ID					IINY-DU-20A-SSIS-20200316		IINY-DU-20B-SSIS-20200316		IINY-DU-20C-SSIS-20200316		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-20A-SBIS1-20200317		IINY-DU-20B-SBIS1-20200317		IINY-DU-20C-SBIS1-20200317		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)					0-6		0-6		0-6				6-36		6-36		6-36			
Matrix					Surface Soil		Surface Soil		Surface Soil				Subsurface Soil		Subsurface Soil		Subsurface Soil			
Sample Date					3/16/2020 15:30		3/16/2020 15:30		3/16/2020 15:30				3/17/2020 9:30		3/17/2020 9:30		3/17/2020 9:30			
Analyte	**CAS #**	**Residential Soil RSL (mg/kg)[1,2]**	**Industrial Soil RSL (mg/kg)[1]**	**Unit**																
Soil pH																				
pH	N/A	N/A	N/A	N/A	6.1		6.5		6.6		4.13	7.07	6.8		6.9		6.8		0.845	6.98
Polycyclic Aromatic Hydrocarbons																				
1-Methylnaphthalene	90-12-0	18	73	mg/kg	0.0076	J/TR	0.011		0.0076	J/TR	22.5	0.0137	0.0049	J/TR	0.005	J/TR	0.0049	J/TR	1.17	0.00508
2-Methylnaphthalene	91-57-6	24	300	mg/kg	0.011		0.018		0.01		33.500	0.024	0.0078	J/TR	0.0069	J/TR	0.008	J/TR	7.740	0.00904
Acenaphthene	83-32-9	360	4,500	mg/kg	0.0063	J/TR	0.016		0.012		42.600	0.0237	0.0067	J/TR	0.0079	J/TR	0.0035	J/TR	37.700	0.0118
Acenaphthylene	208-96-8	NS	NS	mg/kg	0.029		0.041		0.032		18.400	0.0497	0.02		0.017		0.027		24.100	0.0342
Anthracene	120-12-7	1,800	23,000	mg/kg	0.035		0.046		0.043		13.800	0.0556	0.025		0.028		0.025		6.660	0.0304
Benzo(a)anthracene	56-55-3	1.1	21	mg/kg	0.14		0.15		0.15		3.940	0.161	0.074		0.074		0.071		2.370	0.0774
Benzo(a)pyrene	50-32-8	0.11	2.1	mg/kg	0.16		0.17		0.15		6.250	0.185	0.074		0.071		0.079		5.410	0.0848
Benzo(b)fluoranthene	205-99-2	1.1	21	mg/kg	0.25		0.28		0.23		9.930	0.317	0.11		0.11		0.12		5.090	0.128
Benzo(g,h,i)perylene	191-24-2	NS	NS	mg/kg	0.13		0.13		0.11		9.360	0.152	0.045		0.042		0.05		8.850	0.0558
Benzo(k)fluoranthene	207-08-9	11	210	mg/kg	0.081		0.093		0.072		12.800	0.109	0.033		0.032		0.036		6.180	0.0389
Chrysene	218-01-9	110	2,100	mg/kg	0.17		0.19		0.16		8.810	0.212	0.079		0.076		0.083		4.430	0.0882
Dibenz(a,h)anthracene	53-70-3	0.11	2.1	mg/kg	0.03		0.028		0.028		4.030	0.0316	0.013		0.013		0.015		8.450	0.0166
Fluoranthene	206-44-0	240	3,000	mg/kg	0.27		0.32		0.28		9.120	0.357	0.14	J+/M	0.14	J+/M	0.13	J+/M	4.220	0.151
Fluorene	86-73-7	240	3,000	mg/kg	0.0098	J/TR	0.02		0.016		33.700	0.0282	0.0087	J/TR	0.011		0.0072	J/TR	21.300	0.0138
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	21	mg/kg	0.13		0.15		0.12		11.500	0.172	0.049		0.045		0.053		8.160	0.0591
Naphthalene	91-20-3	2	8.6	mg/kg	0.012		0.017		0.011		24.100	0.0214	0.0072	J/TR	0.007	J/TR	0.0083	J/TR	9.330	0.00926
Phenanthrene	85-01-8	NS	NS	mg/kg	0.1		0.14		0.13		16.900	0.176	0.072		0.081		0.056		18.200	0.102
Pyrene	129-00-0	180	2,300	mg/kg	0.25		0.31		0.27		11.000	0.354	0.14	J+/M	0.14	J+/M	0.14	J+/M	0.000	0.14
Total LMW PAHs	N/A	NS	NS	mg/kg	0.2107		0.309		0.2616		18.900	0.384	0.1523		0.1638		0.1399		7.860	0.182
Total HMW PAHs	N/A	NS	NS	mg/kg	1.611		1.821		1.57		8.080	2.01	0.757		0.743		0.777		2.250	0.802
Benzene, Toluene, Ethylbenzene, and Xylenes																				
Benzene	71-43-2	1.2	5.1	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0018	U (LOD)	0.0015	U (LOD)	0.0017	U (LOD)	ND	ND
Ethylbenzene	100-41-4	5.8	25	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0009	U (LOD)	0.00077	U (LOD)	0.00083	U (LOD)	ND	ND
m,p-Xylene	108-38-3	55	240	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0018	U (LOD)	0.0015	U (LOD)	0.0017	U (LOD)	ND	ND
o-Xylene	95-47-6	65	280	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0009	U (LOD)	0.00077	U (LOD)	0.00083	U (LOD)	ND	ND
Toluene	108-88-3	490	4,700	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0009	U (LOD)	0.00077	U (LOD)	0.00083	U (LOD)	ND	ND
Xylenes, Total	1330-20-7	58	250	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0009	U (LOD)	0.00077	U (LOD)	0.00083	U (LOD)	ND	ND

1. EPA Regional Screening Levels Table, EPA, November 2019. Value shown is equal to HI=0.1. Carcinogenic values equal to $1x10^{-6}$.
2. A deed restriction is in place noting that there is to be no residential development at the site (USACE 1995); however, EPA residential soil RSLs are included to assess for children receptors including site visitation for nature walks and potential camping.

NOTES:
mg/kg = milligrams per kilogram
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
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- Bias low
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Red concentrations exceed EPA Residential Soil RSL.
Concentrations highlighted in yellow exceed EPA Industrial Soil RSL.

Validation Reason Codes:
A Serial dilution
C LCS Recovery
D MS RPD
H2 Prep Hold Time
I Surrogate recovery outside project limits
L Lab Blank
M MS Recovery
M2 Post Spike
P1 Column RPD
TR Trace Level Detect
V2 CCV

Table A-3 DU-20 Through DU-22 Phase I Incremental Soil Sampling Analytical Results Compared to Human Health Screening Criteria

Location					DU-21 (AOC #14: Area B – One Former Fuel Oil AST [Size Unknown] Located Near Dock 131)															
Sample ID					IINY-DU-21A-SSIS-20200317		IINY-DU-21B-SSIS-20200317		IINY-DU-21C-SSIS-20200317		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-21A-SBIS1-20200317		IINY-DU-21B-SBIS1-20200317		IINY-DU-21C-SBIS1-20200317		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)					0-6		0-6		0-6				6-36		6-36		6-36			
Matrix					Surface Soil		Surface Soil		Surface Soil				Subsurface Soil		Subsurface Soil		Subsurface Soil			
Sample Date					3/17/2020 12:40		3/17/2020 12:40		3/17/2020 12:40				3/17/2020 11:45		3/17/2020 11:45		3/17/2020 11:45			
Analyte	**CAS #**	**Residential Soil RSL (mg/kg)[a,b]**	**Industrial Soil RSL (mg/kg)[a]**	**Unit**																
Soil pH																				
pH	N/A	N/A	N/A	N/A	6.3		6.8		6.8		4.35	7.36	7.0		7.1		7.3		2.14	7.52
Polycyclic Aromatic Hydrocarbons																				
1-Methylnaphthalene	90-12-0	18	73	mg/kg	0.0083	J/TR	0.0044	J/TR	0.0041	J/TR	41.8	0.0115	0.0063	J/TR	0.0053	J/TR	0.0052	J/TR	10.9	0.00713
2-Methylnaphthalene	91-57-6	24	300	mg/kg	0.01		0.0067	J/TR	0.0063	J/TR	26.500	0.0128	0.0083	J/TR	0.0081	J/TR	0.0074	J/TR	5.960	0.00912
Acenaphthene	83-32-9	360	4,500	mg/kg	0.025		0.0051	J/TR	0.0049	J/TR	99.000	0.0407	0.0067	J/TR	0.004	J/TR	0.0038	J/TR	33.500	0.00891
Acenaphthylene	208-96-8	NS	NS	mg/kg	0.028		0.019		0.021		20.800	0.0346	0.012		0.0098		0.012		11.300	0.0145
Anthracene	120-12-7	1,800	23,000	mg/kg	0.08		0.019		0.023		83.900	0.127	0.021		0.013		0.013		29.500	0.0273
Benzo(a)anthracene	56-55-3	1.1	21	mg/kg	0.26		0.088		0.098		64.900	0.392	0.073		0.061		0.066		9.040	0.0818
Benzo(a)pyrene	50-32-8	0.11	2.1	mg/kg	0.22		0.089		0.1		53.300	0.319	0.073		0.061		0.069		9.030	0.083
Benzo(b)fluoranthene	205-99-2	1.1	21	mg/kg	0.35		0.15		0.18		47.600	0.498	0.13		0.11		0.13		9.360	0.152
Benzo(g,h,i)perylene	191-24-2	NS	NS	mg/kg	0.12		0.058		0.063		42.900	0.167	0.045		0.037		0.04		9.940	0.0508
Benzo(k)fluoranthene	207-08-9	11	210	mg/kg	0.12		0.05		0.057		51.000	0.173	0.043		0.036		0.036		10.500	0.0485
Chrysene	218-01-9	110	2,100	mg/kg	0.25		0.097		0.11		55.700	0.366	0.087		0.071		0.078		10.200	0.0989
Dibenz(a,h)anthracene	53-70-3	0.11	2.1	mg/kg	0.038		0.016		0.019		49.000	0.0544	0.013		0.011		0.012		8.330	0.0145
Fluoranthene	206-44-0	240	3,000	mg/kg	0.47		0.16		0.18		64.300	0.707	0.15		0.11		0.12		16.400	0.179
Fluorene	86-73-7	240	3,000	mg/kg	0.03		0.0068	J/TR	0.0077	J/TR	88.600	0.0479	0.0074	J/TR	0.0051	J/TR	0.0046	J/TR	26.200	0.00946
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	21	mg/kg	0.15		0.07		0.074		46.000	0.211	0.053		0.042		0.047		11.600	0.0612
Naphthalene	91-20-3	2	8.6	mg/kg	0.012		0.008	J/TR	0.007	J/TR	29.400	0.0157	0.0086	J/TR	0.0076	J/TR	0.0073	J/TR	8.690	0.00955
Phenanthrene	85-01-8	NS	NS	mg/kg	0.32		0.058		0.066		101.000	0.523	0.077		0.047		0.046		31.100	0.101
Pyrene	129-00-0	180	2,300	mg/kg	0.5		0.17		0.18		66.200	0.756	0.15		0.11		0.12		16.400	0.179
Total LMW PAHs	N/A	NS	NS	mg/kg	0.5133		0.127		0.14		84.300	0.812	0.1473		0.0999		0.0993		23.800	0.185
Total HMW PAHs	N/A	NS	NS	mg/kg	2.478		0.948		1.061		57.000	3.64	0.817		0.649		0.718		11.600	0.941
Benzene, Toluene, Ethylbenzene, and Xylenes																				
Benzene	71-43-2	1.2	5.1	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0026	U (LOD)	0.0018	U (LOD)	0.0026	U (LOD)	ND	ND
Ethylbenzene	100-41-4	5.8	25	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0013	U (LOD)	0.00089	U (LOD)	0.0013	U (LOD)	ND	ND
m,p-Xylene	108-38-3	55	240	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0026	U (LOD)	0.0018	U (LOD)	0.0026	U (LOD)	ND	ND
o-Xylene	95-47-6	65	280	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0013	U (LOD)	0.00089	U (LOD)	0.0013	U (LOD)	ND	ND
Toluene	108-88-3	490	4,700	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0013	U (LOD)	0.00089	U (LOD)	0.0013	U (LOD)	ND	ND
Xylenes, Total	1330-20-7	58	250	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0013	U (LOD)	0.00089	U (LOD)	0.0013	U (LOD)	ND	ND

(a) EPA Regional Screening Levels Table, EPA, November 2019. Value shown is equal to HI=0.1. Carcinogenic values equal to $1x10^{-6}$.
(b) A deed restriction is in place noting that there is to be no residential development at the site (USACE 1995); however, EPA residential soil RSLs are included to assess for children receptors including site visitation for nature walks and potential camping.

NOTES:
mg/kg = milligrams per kilogram
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
PCB = Polychlorinated biphenyl
RSL = regional screening level
U = Analyte not detected Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate
- Bias low
+ Bias high
Red concentrations exceed EPA Residential Soil RSL.
Concentrations highlighted in yellow exceed EPA Industrial Soil RSL.

Validation Reason Codes:

A	Serial dilution
C	LCS Recovery
D	MS RPD
H2	Prep Hold Time
I	Surrogate recovery outside project limits
L	Lab Blank
M	MS Recovery
M2	Post Spike
P1	Column RPD
TR	Trace Level Detect
V2	CCV

Table A-3 DU-20 Through DU-22 Phase I Incremental Soil Sampling Analytical Results Compared to Human Health Screening Criteria

Location					DU-22 (AOC #15: Area C – Two Former Fuel Oil ASTs [Size Unknown] Located Near Former Building 417							
Sample ID					IINY-DU-22A-SSIS-20200316		IINY-DU-22B-SSIS-20200316		IINY-DU-22C-SSIS-20200316		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)					0-6		0-6		0-6			
Matrix					Surface Soil		Surface Soil		Surface Soil			
Sample Date					3/16/2020 16:45		3/16/2020 16:45		3/16/2020 16:45			
Analyte	**CAS #**	**Residential Soil RSL (mg/kg)[a,b]**	**Industrial Soil RSL (mg/kg)[a]**	**Unit**								
Soil pH												
pH	N/A	N/A	N/A	N/A	6.7		6.8		6.8			
Polycyclic Aromatic Hydrocarbons												
1-Methylnaphthalene	90-12-0	18	73	mg/kg	0.041		0.04		0.041		1.420	0.042
2-Methylnaphthalene	91-57-6	24	300	mg/kg	0.064		0.057		0.063		6.170	0.071
Acenaphthene	83-32-9	360	4,500	mg/kg	0.1		0.11		0.077		17.700	0.138
Acenaphthylene	208-96-8	NS	NS	mg/kg	0.26	J/TR	0.18		0.15		28.900	0.340
Anthracene	120-12-7	1,800	23,000	mg/kg	0.44		0.29		0.27		27.900	0.567
Benzo(a)anthracene	56-55-3	1.1	21	mg/kg	2		1.3		1.2		29.100	2.600
Benzo(a)pyrene	50-32-8	0.11	2.1	mg/kg	1.9		1.3		1.1		29.000	2.480
Benzo(b)fluoranthene	205-99-2	1.1	21	mg/kg	3.1		1.9		1.8		31.900	4.090
Benzo(g,h,i)perylene	191-24-2	NS	NS	mg/kg	1		0.78		0.64		22.500	1.260
Benzo(k)fluoranthene	207-08-9	11	210	mg/kg	1.1		0.62		0.56		38.900	1.500
Chrysene	218-01-9	110	2,100	mg/kg	2.2		1.4		1.2		33.100	2.930
Dibenz(a,h)anthracene	53-70-3	0.11	2.1	mg/kg	0.38		0.23		0.2		35.700	0.513
Fluoranthene	206-44-0	240	3,000	mg/kg	3.5		2.4		1.9		31.500	4.660
Fluorene	86-73-7	240	3,000	mg/kg	0.13		0.12		0.069		30.800	0.189
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	21	mg/kg	1.2		0.92		0.73		24.900	1.550
Naphthalene	91-20-3	2	8.6	mg/kg	0.066		0.053		0.063		11.200	0.078
Phenanthrene	85-01-8	NS	NS	mg/kg	1.4		1.1		0.71		32.300	1.940
Pyrene	129-00-0	180	2,300	mg/kg	3.5		2.4		2		29.500	4.590
Total LMW PAHs	N/A	NS	NS	mg/kg	2.501		1.95		1.443		26.900	3.3
Total HMW PAHs	N/A	NS	NS	mg/kg	19.88		13.25		11.33		30.300	26.1
Benzene, Toluene, Ethylbenzene, and Xylenes												
Benzene	71-43-2	1.2	5.1	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A
Ethylbenzene	100-41-4	5.8	25	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A
m,p-Xylene	108-38-3	55	240	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A
o-Xylene	95-47-6	65	280	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A
Toluene	108-88-3	490	4,700	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A
Xylenes, Total	1330-20-7	58	250	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A

(a) EPA Regional Screening Levels Table, EPA, November 2019. Value shown is equal to HI=0.1. Carcinogenic values equal to $1x10^{-6}$.
(b) A deed restriction is in place noting that there is to be no residential development at the site (USACE 1995); however, EPA residential soil RSLs are included to assess for children receptors including site visitation for nature walks and

NOTES:
mg/kg = milligrams per kilogram
CAS = Chemical Abstracts Service
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- Bias low
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Red concentrations exceed EPA Residential Soil RSL.
Concentrations highlighted in yellow exceed EPA Industrial Soil RSL.

Validation Reason Codes:
A Serial dilution
C LCS Recovery
D MS RPD
H2 Prep Hold Time
I Surrogate recovery outside project limits
L Lab Blank
M MS Recovery
M2 Post Spike
P1 Column RPD
TR Trace Level Detect
V2 CCV

Table A-4 DU-23 and DU-25 Phase I Incremental Soil Sampling Analytical Results Compared to Human Health Screening Criteria

Location					DU-23 (T1 Northwest of Building 406)								DU-25 (T3 Northeast of Building 220)							
Sample ID					IINY-DU-23A-SSIS-20200320		IINY-DU-23B-SSIS-20200320		IINY-DU-23C-SSIS-20200320		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-25A-SSIS-20200320		IINY-DU-25B-SSIS-20200320		IINY-DU-25C-SSIS-20200320		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)					0-6		0-6		0-6				0-6		0-6		0-6			
Matrix					Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date					3/20/2020 9:15		3/20/2020 9:15		3/20/2020 9:15				3/20/2020 10:30		3/20/2020 10:30		3/20/2020 10:30			
Analyte	**CAS #**	**Residential Soil RSL (mg/kg)[1,2]**	**Industrial Soil RSL (mg/kg)[1]**	**Unit**																
Soil pH																				
pH	N/A	N/A	N/A	N/A	6.0		5.4		5.5		5.71	6.44	6.2		6.4		6.4		1.82	6.62
Polychlorinated Biphenyls																				
PCB, Total	1336-36-3	0.23	0.94	mg/kg	0.034	J/TR	0.025	J/TR	0.019	J/TR	29.000	0.045	0.011	J/TR	0.016	J/TR	0.012	J/TR	20.400	0.020
PCB-1016 (Aroclor 1016)	12674-11-2	0.41	5.1	mg/kg	0.03	U (LOD)	0.03	U (LOD)	0.03	U (LOD)	ND	ND	0.03	U (LOD)	0.03	U (LOD)	0.029	U (LOD)	ND	ND
PCB-1221 (Aroclor 1221)	11104-28-2	0.2	0.83	mg/kg	0.077	U (LOD)	0.077	U (LOD)	0.079	U (LOD)	ND	ND	0.078	U (LOD)	0.077	U (LOD)	0.076	U (LOD)	ND	ND
PCB-1232 (Aroclor 1232)	11141-16-5	0.17	0.72	mg/kg	0.03	U (LOD)	0.03	U (LOD)	0.03	U (LOD)	ND	ND	0.03	U (LOD)	0.03	U (LOD)	0.029	U (LOD)	ND	ND
PCB-1242 (Aroclor 1242)	53469-21-9	0.23	0.95	mg/kg	0.046	U (LOD)	0.046	U (LOD)	0.047	U (LOD)	ND	ND	0.047	U (LOD)	0.046	U (LOD)	0.046	U (LOD)	ND	ND
PCB-1248 (Aroclor 1248)	12672-29-6	0.23	0.95	mg/kg	0.015	U (LOD)	0.015	U (LOD)	0.015	U (LOD)	ND	ND	0.015	U (LOD)	0.014	U (LOD)	0.014	U (LOD)	ND	ND
PCB-1254 (Aroclor 1254)	11097-69-1	0.12	0.97	mg/kg	0.032	U (LOD)	0.032	U (LOD)	0.033	U (LOD)	ND	ND	0.032	U (LOD)	0.032	U (LOD)	0.032	U (LOD)	ND	ND
PCB-1260 (Aroclor 1260)	11096-82-5	0.24	0.99	mg/kg	0.034	J/TR/P1	0.025	J/TR/P1	0.019	J/TR/P1	29.000	0.045	0.011	J/TR/P1	0.016	J/TR	0.012	J/TR	20.400	0.020
PCB-1262 (Aroclor 1262)	37324-23-5	NS	NS	mg/kg	0.015	U (LOD)	0.015	U (LOD)	0.016	U (LOD)	ND	ND	0.016	U (LOD)	0.015	U (LOD)	0.015	U (LOD)	ND	ND
PCB-1268 (Aroclor 1268)	11100-14-4	NS	NS	mg/kg	0.0065	U (LOD)	0.0065	U (LOD)	0.0066	U (LOD)	ND	ND	0.0065	U (LOD)	0.0064	U (LOD)	0.0063	U (LOD)	ND	ND

1. EPA Regional Screening Levels Table, EPA, November 2019. Value shown is equal to HI=0.1. Carcinogenic values equal to $1x10^{-6}$.
2. A deed restriction is in place noting that there is to be no residential development at the site (USACE 1995); however, EPA residential soil RSLs are included to assess for children receptors including site visitation for nature walks and potential camping.

DU-24 (T2 near AOC #16 – Area Dumping Area) was not sampled. The majority of DU-24 contained exposed bedrock with little to thin soil cover. Any PCBs that may have been released from former transformers would have been transported via runoff and overland flow across the bedrock outcrop of Round Island to the Hudson River. While sediment and soil was noted along the northeastern edge of DU-24 off the bedrock outcrop of Round Island, this sediment/soil was along the shoreline of the tidally influenced Hudson River. The Hudson River itself is a PCB source. Therefore, collecting PCBs from soil/sediment along the Hudson River would not provide information that could be used to evaluate a potential release related to former transformers.

NOTES:
mg/kg = milligrams per kilogram
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
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U = Analyte not detected Numerical value is LOD or LOQ, as indicated
- Bias low
+ Bias high

Validation Reason Codes:
A Serial dilution
C LCS Recovery
D MS RPD
H2 Prep Hold Time
I Surrogate recovery outside project limits
L Lab Blank
M MS Recovery
M2 Post Spike
P1 Column RPD
TR Trace Level Detect
V2 CCV

Red concentrations exceed EPA Residential Soil RSL.
Concentrations highlighted in yellow exceed EPA Industrial Soil RSL.

Table A-5 EXDU-1 Through EXDU-7 Phase I Incremental Soil Sampling Analytical Results Compared to Human Health Screening Criteria

Location					EXDU-1 (Building 609 – Mine Loading Plant)								EXDU-2 (Building 506 – Filling House #3)								EXDU-3 (Building 503 – Filling House #6)							
Sample ID					IINY-EXDU-1A-SSIS-20200317		IINY-EXDU-1B-SSIS-20200317		IINY-EXDU-1C-SSIS-20200317		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-EXDU-2A-SSIS-20200317		IINY-EXDU-2B-SSIS-20200317		IINY-EXDU-2C-SSIS-20200317		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-EXDU-3A-SSIS-20200318		IINY-EXDU-3B-SSIS-20200318		IINY-EXDU-3C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)					0-6		0-6		0-6				0-6		0-6		0-6				0-6		0-6		0-6			
Matrix					Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date					3/17/2020 15:35		3/17/2020 15:35		3/17/2020 15:35				3/17/2020 16:10		3/17/2020 16:10		3/17/2020 16:10				3/18/2020 8:00		3/18/2020 8:00		3/18/2020 8:00			
Analyte	CAS #	Residential Soil RSL (mg/kg)[1,2]	Industrial Soil RSL (mg/kg)[1]	Unit																								
Soil pH																												
pH	N/A	N/A	N/A	N/A	7.0		6.9		6.9		0.833	7.08	7.0		6.8		6.9		1.5	7.2	6.3		6.5		5.5		8.7	7.4
Explosives Residues																												
1,3,5-Trinitrobenzene (TNB)	99-35-4	220	3,200	mg/kg	0.039	U (LOD)	0.04	U (LOD)	0.029	J/TR/P1	16.9	0.0513	0.04	U (LOD)	0.041	U (LOD)	0.04	U (LOD)	ND	ND	0.037	U (LOD)	0.039	U (LOD)	0.038	U (LOD)	ND	ND
1,3-Dinitrobenzene (DNB)	99-65-0	0.63	8.2	mg/kg	0.038	J/TR	0.039	J/TR	0.051	J/TR/P1	17	0.0609	0.04	U (LOD)	0.041	U (LOD)	0.04	U (LOD)	ND	ND	0.037	U (LOD)	0.039	U (LOD)	0.038	U (LOD)	ND	ND
2,4,6-Trinitrotoluene (TNT)	118-96-7	3.6	51	mg/kg	0.28	J-/C	0.21	J-/C	0.37	J-/C	28	0.489	0.099	UJ (LOQ)-/C	0.1	UJ (LOQ)-/C	0.1	UJ (LOQ)-/C	ND	ND	0.093	UJ (LOQ)-/C	0.097	UJ (LOQ)-/C	0.096	UJ (LOQ)-/C	ND	ND
2,4-Dinitrotoluene (24DNT)	121-14-2	1.7	7.4	mg/kg	0.063	J/TR	0.06	J/TR/P1	0.22		80	0.345	0.04	U (LOD)	0.041	U (LOD)	0.04	U (LOD)	ND	ND	0.037	U (LOD)	0.039	U (LOD)	0.038	U (LOD)	ND	ND
2,6-Dinitrotoluene (26DNT)	606-20-2	0.36	1.5	mg/kg	0.039	U (LOD)	0.04	U (LOD)	0.04	U (LOD)	ND	ND	0.04	U (LOD)	0.041	U (LOD)	0.04	U (LOD)	ND	ND	0.037	U (LOD)	0.039	U (LOD)	0.038	U (LOD)	ND	ND
2-Amino-4,6-dinitrotoluene (2AMDNT)	35572-78-2	0.77	11	mg/kg	0.097	U (LOQ)	0.1	U (LOQ)	0.1	U (LOQ)	ND	ND	0.099	U (LOQ)	0.1	U (LOQ)	0.1	U (LOQ)	ND	ND	0.093	U (LOQ)	0.097	U (LOQ)	0.096	U (LOQ)	ND	ND
2-Nitrotoluene (2NT)	88-72-2	3.2	15	mg/kg	0.097	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.099	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.093	U (LOD)	0.097	U (LOD)	0.096	U (LOD)	ND	ND
3,5-Dinitroaniline	618-87-1	NS	NS	mg/kg	0.019	U (LOD)	0.02	U (LOD)	0.02	U (LOD)	ND	ND	0.02	U (LOD)	0.02	U (LOD)	0.02	U (LOD)	ND	ND	0.019	U (LOD)	0.019	U (LOD)	0.019	U (LOD)	ND	ND
3-Nitrotoluene (3NT)	99-08-1	0.63	8.2	mg/kg	0.19	U (LOQ)	0.2	U (LOQ)	0.2	U (LOQ)	ND	ND	0.2	U (LOQ)	0.2	U (LOQ)	0.2	U (LOQ)	ND	ND	0.19	U (LOQ)	0.19	U (LOQ)	0.19	U (LOQ)	ND	ND
4-Amino-2,6-dinitrotoluene (4AMDNT)	19406-51-0	0.77	11	mg/kg	0.097	U (LOQ)	0.1	U (LOQ)	0.1	U (LOQ)	ND	ND	0.099	U (LOQ)	0.1	U (LOQ)	0.1	U (LOQ)	ND	ND	0.093	U (LOQ)	0.097	U (LOQ)	0.096	U (LOQ)	ND	ND
4-Nitrotoluene (4NT)	99-99-0	25	140	mg/kg	0.097	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.099	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.093	U (LOD)	0.097	U (LOD)	0.096	U (LOD)	ND	ND
Hexahydro-1,3,5-trinitro-1,3,5-triazine	121-82-4	8.3	38	mg/kg	0.097	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.099	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.093	U (LOD)	0.097	U (LOD)	0.096	U (LOD)	ND	ND
Nitrobenzene (NB)	98-95-3	5.1	22	mg/kg	0.19	U (LOD)	0.2	U (LOD)	0.2	U (LOD)	ND	ND	0.2	U (LOD)	0.2	U (LOD)	0.2	U (LOD)	ND	ND	0.19	U (LOD)	0.19	U (LOD)	0.19	U (LOD)	ND	ND
Nitroglycerin (NG)	55-63-0	0.63	8.2	mg/kg	0.68	U (LOD)	0.7	U (LOD)	0.7	U (LOD)	ND	ND	0.69	U (LOD)	0.72	U (LOD)	0.71	U (LOD)	ND	ND	0.65	U (LOD)	0.68	U (LOD)	0.67	U (LOD)	ND	ND
Octahydro-1,3,5,7-tetranitro-1,3,5,7-	2691-41-0	390	5,700	mg/kg	0.068	U (LOD)	0.07	U (LOD)	0.07	U (LOD)	ND	ND	0.069	U (LOD)	0.072	U (LOD)	0.071	U (LOD)	ND	ND	0.065	U (LOD)	0.068	U (LOD)	0.067	U (LOD)	ND	ND
Pentaerythritol tetranitrate (PETN)	78-11-5	13	160	mg/kg	0.97	U (LOD)	1	U (LOD)	1	U (LOD)	ND	ND	0.99	U (LOD)	1	U (LOD)	1	U (LOD)	ND	ND	0.93	U (LOD)	0.97	U (LOD)	0.96	U (LOD)	ND	ND
N-Methyl-2,4,6-trinitrophenylnitramine	479-45-8	0.16	230	mg/kg	0.097	UJ (LOD)-/C	0.1	UJ (LOD)-/C	0.1	UJ (LOD)-/C	ND	ND	0.099	UJ (LOD)-/C	0.1	UJ (LOD)-/C	0.1	UJ (LOD)-/C	ND	ND	0.093	UJ (LOD)-/C	0.097	UJ (LOD)-/C	0.096	UJ (LOD)-/C	ND	ND

1. EPA Regional Screening Levels Table, EPA, November 2019. Value shown is equal to HI=0.1. Carcinogenic values equal to $1x10^{-6}$.
2. A deed restriction is in place noting that there is to be no residential development at the site (USACE 1995); however, EPA residential soil RSLs are included to assess for children receptors including site visitation for nature walks and potential camping.

NOTES:
mg/kg = milligrams per kilogram
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
RSL = regional screening level
U = Analyte not detected Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate
- Bias low
+ Bias high

Validation Reason Codes:
A Serial dilution
C LCS Recovery
D MS RPD
H2 Prep Hold Time
I Surrogate recovery outside project limits
L Lab Blank
M MS Recovery
M2 Post Spike
P1 Column RPD
TR Trace Level Detect
V2 CCV

Red concentrations exceed EPA Residential Soil RSL.
Concentrations highlighted in yellow exceed EPA Industrial Soil RSL.

Table A-5 EXDU-1 Through EXDU-7 Phase I Incremental Soil Sampling Analytical Results Compared to Human Health Screening Criteria

Location					EXDU-4 (Building 404 – Filling House #1)								EXDU-5 (Building 307 – Filling House #5)							
Sample ID					IINY-EXDU-4A-SSIS-20200317		IINY-EXDU-4B-SSIS-20200317		IINY-EXDU-4C-SSIS-20200317		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-EXDU-5A-SSIS-20200318		IINY-EXDU-5B-SSIS-20200318		IINY-EXDU-5C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)					0-6		0-6		0-6				0-6		0-6		0-6			
Matrix					Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date					3/17/2020 14:30		3/17/2020 14:30		3/17/2020 14:30				3/18/2020 9:30		3/18/2020 9:30		3/18/2020 9:30			
Analyte	**CAS #**	**Residential Soil RSL (mg/kg)[1,2]**	**Industrial Soil RSL (mg/kg)[1]**	**Unit**																
Soil pH																				
pH	N/A	N/A	N/A	N/A	6.5		6.3		6.8		3.85	7.17	7.1		7.2		7.3		1.39	7.45
Explosives Residues																				
1,3,5-Trinitrobenzene (TNB)	99-35-4	220	3,200	mg/kg	0.039	U (LOD)	0.04	U (LOD)	0.04	U (LOD)	ND	ND	0.039	U (LOD)	0.037	U (LOD)	0.037	U (LOD)	ND	ND
1,3-Dinitrobenzene (DNB)	99-65-0	0.63	8.2	mg/kg	0.039	U (LOD)	0.04	U (LOD)	0.04	U (LOD)	ND	ND	0.039	U (LOD)	0.037	U (LOD)	0.037	U (LOD)	ND	ND
2,4,6-Trinitrotoluene (TNT)	118-96-7	3.6	51	mg/kg	0.098	UJ (LOQ)-/C	0.1	UJ (LOQ)-/C	0.1	UJ (LOQ)-/C	ND	ND	0.097	UJ (LOQ)-/C	0.093	UJ (LOQ)-/C	0.092	UJ (LOQ)-/C	ND	ND
2,4-Dinitrotoluene (24DNT)	121-14-2	1.7	7.4	mg/kg	0.039	U (LOD)	0.04	U (LOD)	0.04	U (LOD)	ND	ND	0.039	U (LOD)	0.037	U (LOD)	0.037	U (LOD)	ND	ND
2,6-Dinitrotoluene (26DNT)	606-20-2	0.36	1.5	mg/kg	0.039	U (LOD)	0.04	U (LOD)	0.04	U (LOD)	ND	ND	0.039	U (LOD)	0.037	U (LOD)	0.037	U (LOD)	ND	ND
2-Amino-4,6-dinitrotoluene (2AMDNT)	35572-78-2	0.77	11	mg/kg	0.098	U (LOQ)	0.1	U (LOQ)	0.1	U (LOQ)	ND	ND	0.097	U (LOQ)	0.093	U (LOQ)	0.092	U (LOQ)	ND	ND
2-Nitrotoluene (2NT)	88-72-2	3.2	15	mg/kg	0.098	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.097	U (LOD)	0.093	U (LOD)	0.092	U (LOD)	ND	ND
3,5-Dinitroaniline	618-87-1	NS	NS	mg/kg	0.02	UJ (LOD)/M	0.02	UJ (LOD)/M	0.02	UJ (LOD)/M	ND	ND	0.019	U (LOD)	0.019	U (LOD)	0.018	U (LOD)	ND	ND
3-Nitrotoluene (3NT)	99-08-1	0.63	8.2	mg/kg	0.2	U (LOQ)	0.2	U (LOQ)	0.2	U (LOQ)	ND	ND	0.19	U (LOQ)	0.19	U (LOQ)	0.18	U (LOQ)	ND	ND
4-Amino-2,6-dinitrotoluene (4AMDNT)	19406-51-0	0.77	11	mg/kg	0.098	U (LOQ)	0.1	U (LOQ)	0.1	U (LOQ)	ND	ND	0.097	U (LOQ)	0.093	U (LOQ)	0.092	U (LOQ)	ND	ND
4-Nitrotoluene (4NT)	99-99-0	25	140	mg/kg	0.098	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.097	U (LOD)	0.093	U (LOD)	0.092	U (LOD)	ND	ND
Hexahydro-1,3,5-trinitro-1,3,5-triazine	121-82-4	8.3	38	mg/kg	0.098	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.097	U (LOD)	0.093	U (LOD)	0.092	U (LOD)	ND	ND
Nitrobenzene (NB)	98-95-3	5.1	22	mg/kg	0.2	U (LOD)	0.2	U (LOD)	0.2	U (LOD)	ND	ND	0.19	U (LOD)	0.19	U (LOD)	0.18	U (LOD)	ND	ND
Nitroglycerin (NG)	55-63-0	0.63	8.2	mg/kg	0.69	U (LOD)	0.7	U (LOD)	0.71	U (LOD)	ND	ND	0.68	U (LOD)	0.65	U (LOD)	0.65	U (LOD)	ND	ND
Octahydro-1,3,5,7-tetranitro-1,3,5,7-	2691-41-0	390	5,700	mg/kg	0.069	U (LOD)	0.07	U (LOD)	0.071	U (LOD)	ND	ND	0.068	U (LOD)	0.065	U (LOD)	0.065	U (LOD)	ND	ND
Pentaerythritol tetranitrate (PETN)	78-11-5	13	160	mg/kg	0.98	U (LOD)	1	U (LOD)	1	U (LOD)	ND	ND	0.97	U (LOD)	0.93	U (LOD)	0.92	U (LOD)	ND	ND
N-Methyl-2,4,6-trinitrophenylnitramine	479-45-8	0.16	230	mg/kg	0.098	UJ (LOD)-/C	0.1	UJ (LOD)-/C	0.1	UJ (LOD)-/C	ND	ND	0.097	UJ (LOD)-/C	0.093	UJ (LOD)-/C	0.092	UJ (LOD)-/C	ND	ND

Table A-5 EXDU-1 Through EXDU-7 Phase I Incremental Soil Sampling Analytical Results Compared to Human Health Screening Criteria

Location					EXDU-6 (Building 306 – Filling House #2)								EXDU-7 (Building 202 – Shell House #5 and D Plant)							
Sample ID					IINY-EXDU-6A-SSIS-20200318		IINY-EXDU-6B-SSIS-20200318		IINY-EXDU-6C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-EXDU-7A-SSIS-20200318		IINY-EXDU-7B-SSIS-20200318		IINY-EXDU-7C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in)					0-6		0-6		0-6				0-6		0-6		0-6			
Matrix					Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date					3/18/2020 10:15		3/18/2020 10:15		3/18/2020 10:15				3/18/2020 11:45		3/18/2020 11:45		3/18/2020 11:45			
Analyte	**CAS #**	**Residential Soil RSL (mg/kg)[1,2]**	**Industrial Soil RSL (mg/kg)[1]**	**Unit**																
Soil pH																				
pH	N/A	N/A	N/A	N/A	7.2		7.3		7.3		0.795	7.41	7.0		7.0		7.1		0.821	7.18
Explosives Residues																				
1,3,5-Trinitrobenzene (TNB)	99-35-4	220	3,200	mg/kg	0.038	U (LOD)	0.039	U (LOD)	0.039	U (LOD)	ND	ND	0.038	U (LOD)	0.039	U (LOD)	0.037	U (LOD)	ND	ND
1,3-Dinitrobenzene (DNB)	99-65-0	0.63	8.2	mg/kg	0.038	U (LOD)	0.039	U (LOD)	0.039	U (LOD)	ND	ND	0.038	U (LOD)	0.039	U (LOD)	0.037	U (LOD)	ND	ND
2,4,6-Trinitrotoluene (TNT)	118-96-7	3.6	51	mg/kg	0.094	UJ (LOQ)-/C	0.096	UJ (LOQ)-/C	0.099	UJ (LOQ)-/C	ND	ND	0.094	UJ (LOQ)-/C	0.099	UJ (LOQ)-/C	0.093	UJ (LOQ)-/C	ND	ND
2,4-Dinitrotoluene (24DNT)	121-14-2	1.7	7.4	mg/kg	0.038	U (LOD)	0.039	U (LOD)	0.039	U (LOD)	ND	ND	0.038	U (LOD)	0.039	U (LOD)	0.037	U (LOD)	ND	ND
2,6-Dinitrotoluene (26DNT)	606-20-2	0.36	1.5	mg/kg	0.038	U (LOD)	0.039	U (LOD)	0.039	U (LOD)	ND	ND	0.038	U (LOD)	0.039	U (LOD)	0.037	U (LOD)	ND	ND
2-Amino-4,6-dinitrotoluene (2AMDNT)	35572-78-2	0.77	11	mg/kg	0.094	U (LOQ)	0.096	U (LOQ)	0.099	U (LOQ)	ND	ND	0.094	U (LOQ)	0.099	U (LOQ)	0.093	U (LOQ)	ND	ND
2-Nitrotoluene (2NT)	88-72-2	3.2	15	mg/kg	0.094	U (LOD)	0.096	U (LOD)	0.099	U (LOD)	ND	ND	0.094	U (LOD)	0.099	U (LOD)	0.093	U (LOD)	ND	ND
3,5-Dinitroaniline	618-87-1	NS	NS	mg/kg	0.019	U (LOD)	0.019	U (LOD)	0.02	U (LOD)	ND	ND	0.019	U (LOD)	0.02	U (LOD)	0.019	U (LOD)	ND	ND
3-Nitrotoluene (3NT)	99-08-1	0.63	8.2	mg/kg	0.19	U (LOQ)	0.19	U (LOQ)	0.2	U (LOQ)	ND	ND	0.19	U (LOQ)	0.2	U (LOQ)	0.19	U (LOQ)	ND	ND
4-Amino-2,6-dinitrotoluene (4AMDNT)	19406-51-0	0.77	11	mg/kg	0.094	U (LOQ)	0.096	U (LOQ)	0.099	U (LOQ)	ND	ND	0.094	U (LOQ)	0.099	U (LOQ)	0.093	U (LOQ)	ND	ND
4-Nitrotoluene (4NT)	99-99-0	25	140	mg/kg	0.094	U (LOD)	0.096	U (LOD)	0.099	U (LOD)	ND	ND	0.094	U (LOD)	0.099	U (LOD)	0.093	U (LOD)	ND	ND
Hexahydro-1,3,5-trinitro-1,3,5-triazine	121-82-4	8.3	38	mg/kg	0.094	U (LOD)	0.096	U (LOD)	0.099	U (LOD)	ND	ND	0.094	U (LOD)	0.099	U (LOD)	0.093	U (LOD)	ND	ND
Nitrobenzene (NB)	98-95-3	5.1	22	mg/kg	0.19	U (LOD)	0.19	U (LOD)	0.2	U (LOD)	ND	ND	0.19	U (LOD)	0.2	U (LOD)	0.19	U (LOD)	ND	ND
Nitroglycerin (NG)	55-63-0	0.63	8.2	mg/kg	0.66	U (LOD)	0.67	U (LOD)	0.69	U (LOD)	ND	ND	0.66	U (LOD)	0.69	U (LOD)	0.65	U (LOD)	ND	ND
Octahydro-1,3,5,7-tetranitro-1,3,5,7-	2691-41-0	390	5,700	mg/kg	0.066	U (LOD)	0.067	U (LOD)	0.069	U (LOD)	ND	ND	0.066	U (LOD)	0.069	U (LOD)	0.065	U (LOD)	ND	ND
Pentaerythritol tetranitrate (PETN)	78-11-5	13	160	mg/kg	0.94	U (LOD)	0.96	U (LOD)	0.99	U (LOD)	ND	ND	0.94	U (LOD)	0.99	U (LOD)	0.93	U (LOD)	ND	ND
N-Methyl-2,4,6-trinitrophenylnitramine	479-45-8	0.16	230	mg/kg	0.094	UJ (LOD)-/C	0.096	UJ (LOD)-/C	0.099	UJ (LOD)-/C	ND	ND	0.094	UJ (LOD)-/C	0.099	UJ (LOD)-/C	0.093	UJ (LOD)-/C	ND	ND

Table A-6 BADU-1 Through BADU-8 Phase I Incremental Soil Sampling Analytical Results Compared to Human Health Screening Criteria

Location					BADU-1		BADU-2		BADU-3		BADU-4		BADU-5		BADU-6		BADU-7		BADU-8		95% Upper Confidence Limit Chebychev Test
Sample ID					IINY-BADU-1		IINY-BADU-2		IINY-BADU-3		IINY-BADU-4		IINY-BADU-5		IINY-BADU-6		IINY-BADU-7		IINY-BADU-8		
Depth (in)					0-6		0-6		0-6		0-6		0-6		0-6		0-6		0-6		
Matrix					Surface Soil		Surface Soil		Surface Soil		Surface Soil		Surface Soil		Surface Soil		Surface Soil		Surface Soil		
Sample Date / Time					4/1/2020 11:45		4/1/2020 12:15		4/1/2020 12:45		4/1/2020 13:20		4/1/2020 9:55		4/1/2020 9:20		4/1/2020 9:00		4/1/2020 9:25		
Analyte	**CAS #**	**Residential Soil RSL (mg/kg)[1,2]**	**Industrial Soil RSL (mg/kg)[1]**	**Unit**																	
Soil pH																					
pH	N/A	N/A	N/A	N/A	6.3		6.7		6		6.1		6.1		5.9		6.1		6		6.54
Mercury																					
Mercury	7439-97-6	1.1	4.6	mg/kg	0.290		0.310		0.260		0.200		0.120		0.320		0.200		0.120		0.351
Target Analyte List Metals																					
Aluminum	7429-90-5	7,700	110,000	mg/kg	14,000		15,000		11,000		7,300		10,000		11,000		15,000		14,000		16,400
Antimony	7440-36-0	3.1	47	mg/kg	1.2		1.2		1.1		0.94		0.53		1.2		0.89		0.83		1.35
Arsenic	7440-38-2	0.68	3	mg/kg	4.3		4		3.5		2.1		6.3		7.5		7.1		7.8		8.59
Barium	7440-39-3	1,500	22,000	mg/kg	28		21		17		13		47		47		47		47		56.7
Beryllium	7440-41-7	16	230	mg/kg	0.31		0.23		0.11		0.057	J/TR	0.92		0.7		0.62		0.57		0.914
Cadmium	7440-43-9	7.1	98	mg/kg	0.22		0.14		0.13		0.11		0.23		0.29		0.16		0.12		0.274
Calcium	7440-70-2	NS	NS	mg/kg	2,100		900		1,300		980		2,000		1,100		750		650		2,070
Total Chromium, Total	7440-47-3	12,000	180,000	mg/kg	7.4		6.4		6.9		3.6		22	J+/M	20		20		31		29.9
Cobalt	7440-48-4	2.3	35	mg/kg	2.1		1.7		1.1		0.59		6.4		5.3		5.5		7.3		7.83
Copper	7440-50-8	310	4,700	mg/kg	11	J/TR	8.5	J/TR	7	J/TR	4.9	J/TR	25		21	J/TR	16	J/TR	26		27.7
Iron	7439-89-6	5,500	82,000	mg/kg	12,000		13,000		13,000		8,600		14,000		15,000		17,000		21,000		19,800
Lead	7439-92-1	400	800	mg/kg	53		57		50		33		49		94		58		46		82.1
Magnesium	7439-95-4	NS	NS	mg/kg	1,400		1,300		1,000		600		2,100	J/M2/A	1,900		2,300		3,100		2,940
Manganese	7439-96-5	180	2,600	mg/kg	330		200		75		37		340		200		230		280		381
Nickel	7440-02-0	150	2,200	mg/kg	5.7		4.8		4		2.7		22		23		19		23		27.6
Potassium	2023695	NS	NS	mg/kg	840		710		840		700		620		720		670		720		846
Selenium	7782-49-2	39	580	mg/kg	0.91		0.92		0.9		0.65		1.1		1.2		1.1		0.9		1.22
Silver	7440-22-4	39	580	mg/kg	0.33		0.28		0.4		0.28		0.14		0.33		0.25		0.17		0.405
Sodium	7440-23-5	NS	NS	mg/kg	52	J/TR	38	J/TR	34	J/TR	36	J/TR	63	J-/M/TR	44	J/TR	36	J/TR	47	J/TR	59.1
Thallium	7440-28-0	0.078	1.2	mg/kg	0.1		0.099		0.082	J/TR	0.043	J/TR	0.2		0.18		0.17		0.16		0.215
Vanadium	7440-62-2	39	580	mg/kg	23		21		22		13		37	J+/M/M2	40		47		56		55.3
Zinc	7440-66-6	2,300	35,000	mg/kg	35		28		21	J/TR	30		60		72		45		48		69.1
Polycyclic Aromatic Hydrocarbons																					
1-Methylnaphthalene	90-12-0	18	73	mg/kg	0.028	J-/H2/TR	0.015	J-/H2/I/TR	0.012	J-/H2/I/TR	0.0099	J-/H2/I/TR	0.018	J-/H2/I/TR	0.015	J-/H2/I/TR	0.0053	J-/H2/I/TR	0.0039	J-/H2/I/TR	0.0252
2-Methylnaphthalene	91-57-6	24	300	mg/kg	0.022	J-/H2/TR	0.015	J-/H2/I/TR	0.013	J-/H2/I/TR	0.011	J-/H2/I/TR	0.017	J-/H2/I/TR	0.012	J-/H2/I/TR	0.0052	J-/H2/I/TR	0.0039	J-/H2/I/TR	0.0215
Acenaphthene	83-32-9	360	4,500	mg/kg	0.097	J-/H2	0.034	J-/H2/I/TR	0.024	J-/H2/I/TR	0.021	J-/H2/I/TR	0.049	J-/H2/M/I	0.072	J-/H2/I	0.0081	J-/H2/I/TR	0.0048	J-/H2/I/TR	0.0883
Acenaphthylene	208-96-8	NS	NS	mg/kg	0.05	J-/H2/TR	0.034	J-/H2/I/TR	0.028	J-/H2/I/TR	0.025	J-/H2/I/TR	0.081	J-/H2/I	0.028	J-/H2/I/TR	0.013	J-/H2/I	0.009	J-/H2/I/TR	0.0688
Anthracene	120-12-7	1,800	23,000	mg/kg	0.12	J-/H2	0.049	J-/H2/I	0.039	J-/H2/I	0.028	J-/H2/I/TR	0.12	J-/H2/M/I	0.094	J-/H2/I	0.015	J-/H2/I	0.0084	J-/H2/I/TR	0.13
Benzo(a)anthracene	56-55-3	1.1	21	mg/kg	0.68	J-/H2	0.21	J-/H2/I	0.17	J-/H2/I	0.1	J-/H2/I	0.51	J-/H2/I	0.68	J-/H2/I	0.067	J-/H2/I	0.043	J-/H2/I	0.727
Benzo(a)pyrene	50-32-8	0.11	2.1	mg/kg	0.79	J-/H2	0.22	J-/H2/I	0.19	J-/H2/I	0.12	J-/H2/I	0.52	J-/H2/I	0.69	J-/H2/I	0.063	J-/H2/I	0.045	J-/H2/I	0.783
Benzo(b)fluoranthene	205-99-2	1.1	21	mg/kg	1.3	J-/H2	0.38	J-/H2/I	0.31	J-/H2/I	0.19	J-/H2/I	0.73	J-/H2/I	1.1	J-/H2/I	0.11	J-/H2/I	0.072	J-/H2/I	1.24
Benzo(g,h,i)perylene	191-24-2	NS	NS	mg/kg	0.68	J-/H2	0.18	J-/H2/I	0.15	J-/H2/I	0.091	J-/H2/I	0.39	J-/H2/I	0.52	J-/H2/I	0.049	J-/H2/I	0.035	J-/H2/I	0.632
Benzo(k)fluoranthene	207-08-9	11	210	mg/kg	0.46	J-/H2	0.14	J-/H2/I	0.11	J-/H2/I	0.074	J-/H2/I	0.27	J-/H2/I	0.41	J-/H2/I	0.039	J-/H2/I	0.028	J-/H2/I	0.451
Chrysene	218-01-9	110	2,100	mg/kg	1	J-/H2	0.31	J-/H2/I	0.25	J-/H2/I	0.16	J-/H2/I	0.62	J-/H2/I	0.9	J-/H2/I	0.093	J-/H2/I	0.061	J-/H2/I	0.992
Dibenz(a,h)anthracene	53-70-3	0.11	2.1	mg/kg	0.15	J-/H2	0.042	J-/H2/I	0.036	J-/H2/I	0.027	R (LOD)/H2/I	0.092	J-/H2/I	0.13	J-/H2/I	0.013	J-/H2/I	0.0063	UJ (LOD)/H2/I	0.161
Fluoranthene	206-44-0	240	3,000	mg/kg	2.2	J-/H2	0.7	J-/H2/I	0.54	J-/H2/I	0.31	J-/H2/I	1.3	J-/H2/I	1.9	J-/H2	0.19	J-/H2/I	0.12	J-/H2/I	2.14
Fluorene	86-73-7	240	3,000	mg/kg	0.1	J-/H2	0.087	J-/H2/I	0.056	J-/H2/I	0.06	J-/H2/I	0.065	J-/H2/M/I	0.061	J-/H2/I	0.01	J-/H2/I	0.0058	J-/H2/I/TR	0.107
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	21	mg/kg	0.74	J-/H2	0.2	J-/H2/I	0.17	J-/H2/I	0.1	J-/H2/I	0.42	J-/H2/I	0.58	J-/H2/I	0.053	J-/H2/I	0.037	J-/H2/I	0.692
Naphthalene	91-20-3	2	8.6	mg/kg	0.031	J-/H2/TR	0.023	J-/H2/I/TR	0.017	J-/H2/I/TR	0.017	J-/H2/I/TR	0.022	J-/H2/I/TR	0.017	J-/H2/I/TR	0.0074	J-/H2/I/TR	0.0063	J-/H2/I/TR	0.0301
Phenanthrene	85-01-8	NS	NS	mg/kg	1.1	J-/H2	0.36	J-/H2/I	0.28	J-/H2/I	0.17	J-/H2/I/TR	0.58	J-/H2/I	0.86	J-/H2/I	0.09	J-/H2/I	0.061	J-/H2/I	1.02
Pyrene	129-00-0	180	2,300	mg/kg	1.9	J-/H2	0.6	J-/H2/I	0.46	J-/H2/I	0.27	J-/H2/I/TR	1.1	J-/H2/I	1.5	J-/H2	0.16	J-/H2/I	0.11	J-/H2/I	1.79
Total LMW PAHs	N/A	NS	NS	mg/kg	1.548		0.617		0.469		0.3419		0.952		1.159		0.154		0.1031		1.46
Total HMW PAHs	N/A	NS	NS	mg/kg	9.9		2.982		2.386		1.415		5.952		8.41		0.837		0.551		9.59

1. EPA Regional Screening Levels Table, EPA, November 2019. Value shown is equal to HI=0.1. Carcinogenic values equal to $1x10^{-6}$.
2. A deed restriction is in place noting that there is to be no residential development at the site (USACE 1995); however, EPA residential soil RSLs are included to assess for children receptors including site visitation for nature walks and potential camping.

NOTES:
mg/kg = milligrams per kilogram
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
NS = No standard
PCB = Polychlorinated biphenyl
R = The data are unusable The sample results are rejected due to serious deficiencies in meeting the QC criteria The analyte may or may not be present in the sample
RSL = regional screening level
U = Analyte not detected Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate
- Bias low
+ Bias high

Red concentrations exceed EPA Residential Soil RSL.
Concentrations highlighted in yellow exceed EPA Industrial Soil RSL.

Validation Reason Codes:

A	Serial dilution
C	LCS Recovery
D	MS RPD
H2	Prep Hold Time
I	Surrogate recovery outside project limits
L	Lab Blank
M	MS Recovery
M2	Post Spike
P1	Column RPD
TR	Trace Level Detect
V2	CCV

Table A-7 Phase II AOC #16 – Area D (former Dumping Area) Surface Water Analytical Results Compared to Human Health Screening Levels

Location					AOC #16 – Area D (former Dumping Area)																							
Sample ID					IINY-DUMP-SW-01-041922		IINY-DUMP-SW-02-041922		IINY-DUMP-SW-03-041922		IINY-DUMP-SW-04-041922		IINY-DUMP-SW-05-041922		IINY-DUMP-SW-06-041922		IINY-DUMP-SW-07-041922		IINY-DUMP-SW-08-041922		IINY-DUMP-SW-09-041922		IINY-DUMP-SW-10-041922	
Matrix					Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
Sample Date					4/19/2022 16:10		4/19/2022 15:00		4/19/2022 14:15		4/19/2022 15:50		4/19/2022 15:25		4/19/2022 14:55		4/19/2022 14:05		4/19/2022 13:30		4/19/2022 15:45		4/19/2022 15:20	
Analyte	**CAS #**	**EPA Tapwater RSLs[1]**	**EPA MCLs[2]**	**Unit**																				
Dissolved Target Analyte List Metals																								
Aluminum	7429-90-5	2,000	NS	µg/L	24.0	J, TR	33.0	J, TR	70.0	U	21.0	J, TR	70.0	U	70.0	U	30.0	J, TR	70.0	U	21.0	J, TR	18.0	J, TR
Antimony	7440-36-0	0.78	6	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Arsenic	7440-38-2	0.052	10	µg/L	1.00	U	1.00	U	0.400	J, TR	1.00	U	1.00	U	1.00	U	1.00	U	0.340	J, TR	0.370	J, TR	0.390	J, TR
Barium	7440-39-3	380	2,000	µg/L	13.0		10.0		12.0		14.0		14.0		11.0		12.0		9.00		14.0		15.0	
Beryllium	7440-41-7	2.5	4	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U
Cadmium	7440-43-9	0.18	5	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U
Calcium	7440-70-2	NS	NS	µg/L	22,000		14,000		15,000		22,000		18,000		16,000		17,000		13,000		22,000		18,000	
Total Chromium	7440-47-3	2,200	100	µg/L	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U
Cobalt	7440-48-4	0.6	NS	µg/L	0.350	U	0.350	U	0.350	U	0.350	U	0.120	J, TR	0.350	U	0.350	U	0.350	U	0.350	U	0.140	J, TR
Copper	7440-50-8	80	1,300	µg/L	2.40		2.10		2.80		2.30		3.60		1.30	J, TR	1.50	J, TR	3.30		2.50		3.60	
Iron	7439-89-6	1,400	NS	µg/L	100	U, L	100	U, L	100	U, L	34.0	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L
Lead	7439-92-1	15	15	µg/L	0.700	U	0.300	J, TR	0.470	J, TR	0.700	U	1.00	J, TR	0.700	U	0.250	J, TR	0.700	U	0.700	U	0.890	J, TR
Magnesium	7439-95-4	NS	NS	µg/L	3,800		6,500		6,400		3,700		5,300		6,500		7,000		6,300		3,700		5,300	
Manganese	7439-96-5	43	NS	µg/L	8.80		7.30		5.30		7.30		17.0		7.80		7.30		4.60		8.00		18.0	
Mercury	7439-97-6	0.063	2	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U
Nickel	7440-02-0	39	NS	µg/L	0.450	J, TR	1.00	U	0.410	J, TR	0.330	J, TR	0.540	J, TR	0.330	J, TR	0.390	J, TR	1.00	U	0.560	J, TR	0.410	J, TR
Potassium	2023695	NS	NS	µg/L	1,500	J, TR	3,000		2,600	J, TR	1,400	J, TR	1,900	J, TR	2,700	J, TR	2,700	J, TR	2,600	J, TR	1,400	J, TR	1,900	J, TR
Selenium	7782-49-2	10	50	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Silver	7440-22-4	9.4	NS	µg/L	0.100	U, L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
Sodium	7440-23-5	NS	NS	µg/L	15,000		31,000		30,000		15,000		17,000		30,000		33,000		29,000		15,000		17,000	
Thallium	7440-28-0	0.02	2	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Vanadium	7440-62-2	8.6	NS	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U
Zinc	7440-66-6	600	NS	µg/L	2.00	J, TR	11.0	J, TR	11.0	J, TR	8.00	U	35.0		7.20	J, TR	5.70	J, TR	4.00	J, TR	3.10	J, TR	37.0	

1. EPA Regional Screening Levels Table, EPA, May 2022. Value shown is equal to HI=0.1. Carcinogenic values equal to $1x10^{-6}$.
2. EPA Maximum Contaminant Levels.

NOTES:
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
RSL = regional screening level
U = Analyte not detected. Numerical value is LOD or LOQ, as indicated
Red concentrations exceed EPA Tapwater RSL.
Concentrations highlighted in yellow exceed EPA Tapwater RSL and MCL.

Validation Reason Codes:

A	Serial dilution
L	Lab Blank
TR	Trace Level Detect

Table A-7 Phase II AOC #16 – Area D (former Dumping Area) Surface Water Analytical Results Compared to Human Health Screening Levels

Location					AOC #16 – Area D (former Dumping Area)																											
Sample ID					IINY-DUMP-SW-11-041922		IINY-DUMP-SW-12-041922		IINY-DUMP-SW-13-041922		IINY-DUMP-SW-14-041922		IINY-DUMP-SW-15-041922		IINY-DUMP-SW-16-041922		IINY-DUMP-SW-17-041922		IINY-DUMP-SW-18-041922		IINY-DUMP-SW-FD1-041922 (Duplicate of DUMP-SW-18)		IINY-DUMP-SW-19-041922		IINY-DUMP-SW-20-041922	
Matrix					Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
Sample Date					4/19/2022 14:50		4/19/2022 14:00		4/19/2022 13:25		4/19/2022 15:40		4/19/2022 15:15		4/19/2022 14:45		4/19/2022 13:50		4/19/2022 13:20		4/19/2022 8:00		4/19/2022 13:45		4/19/2022 15:35	
Analyte	**CAS #**	**EPA Tapwater RSLs[1]**	**EPA MCLs[2]**	**Unit**																						
Dissolved Target Analyte List Metals																										
Aluminum	7429-90-5	2,000	NS	µg/L	30.0	J, TR	19.0	J, TR	70.0	U	19.0	J, TR	70.0	U	70.0	U	70.0	U	70.0	U	70.0	U	70.0	U	18.0	J, TR
Antimony	7440-36-0	0.78	6	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.40	J, TR	1.30	J, TR
Arsenic	7440-38-2	0.052	10	µg/L	0.340	J, TR	1.00	U	0.340	J, TR	0.410	J, TR	0.340	J, TR	1.00	U	1.00	U	1.00	U	0.360	J, TR	0.610	J, TR	0.470	J, TR
Barium	7440-39-3	380	2,000	µg/L	13.0		13.0		12.0		15.0		13.0		13.0		14.0		13.0		12.0		12.0		12.0	
Beryllium	7440-41-7	2.5	4	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.320	J, TR	0.0880	J, TR
Cadmium	7440-43-9	0.92	5	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U
Calcium	7440-70-2	NS	NS	µg/L	18,000		17,000		16,000		22,000		17,000		18,000		17,000		17,000	J, A	17,000		17,000		12,000	
Total Chromium	7440-47-3	2,200	100	µg/L	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	0.500	J, TR
Cobalt	7440-48-4	0.6	NS	µg/L	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.200	J, TR	0.120	J, TR
Copper	7440-50-8	80	1,300	µg/L	2.00		1.60	J, TR	2.10		2.70		4.00		1.80	J, TR	1.50	J, TR	2.90		1.90	J, TR	2.10		7.10	
Iron	7439-89-6	1,400	NS	µg/L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L
Lead	7439-92-1	15	15	µg/L	0.200	J, TR	0.700	U	0.700	U	0.700	U	0.700	J, TR	0.700	U	0.700	U	0.210	J, TR	0.700	U	0.270	J, TR	1.00	J, TR
Magnesium	7439-95-4	NS	NS	µg/L	5,400		6,900		6,600		3,700		5,600		5,300		7,000		7,800		7,900		7,600		5,400	
Manganese	7439-96-5	43	NS	µg/L	4.50		4.50		2.10	J, TR	8.20		4.50		3.70		3.60		2.20	J, TR	2.00	J, TR	1.90	J, TR	7.90	
Mercury	7439-97-6	0.063	2	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U
Nickel	7440-02-0	39	NS	µg/L	0.440	J, TR	0.390	J, TR	0.330	J, TR	0.630	J, TR	0.510	J, TR	1.00	U	1.00	U	0.360	J, TR	0.510	J, TR	0.350	J, TR	0.420	J, TR
Potassium	2023695	NS	NS	µg/L	2,000	J, TR	2,700	J, TR	2,500	J, TR	1,500	J, TR	2,200	J, TR	1,900	J, TR	2,700	J, TR	2,600	J, TR	2,600	J, TR	2,500	J, TR	2,500	J, TR
Selenium	7782-49-2	10	50	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	0.370	J, TR	1.00	U
Silver	7440-22-4	9.4	NS	µg/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U, L	0.100	U, L
Sodium	7440-23-5	NS	NS	µg/L	20,000		33,000		30,000		15,000		21,000		20,000		35,000		37,000		38,000		36,000		23,000	
Thallium	7440-28-0	0.02	2	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.170	J, TR	0.200	U
Vanadium	7440-62-2	8.6	NS	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U
Zinc	7440-66-6	600	NS	µg/L	6.50	J, TR	4.60	J, TR	5.00	J, TR	3.50	J, TR	26.0		7.20	J, TR	3.50	J, TR	5.50	J, TR	3.30	J, TR	3.80	J, TR	44.0	

Table A-8 Phase II Iona Island Hudson River Shoreline Surface Water Analytical Results Compared to Human Health Screening Levels

Location					IHRS (Iona Island Hudson River shoreline along eastern boundary of AOC #16 – Area D)																							
Sample ID					IHRS-SW-01-041922		IHRS-SW-02-041922		IHRS-SW-03-041922		IHRS-SW-04-041922		IINY-IHRS-SW-FD1-041922 (Duplicate of IHRS-SW-04)		IHRS-SW-05-041922		IHRS-SW-06-041922		IHRS-SW-07-041922		IHRS-SW-08-041922		IHRS-SW-09-041922		IHRS-SW-10-041922	
Matrix					Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
Sample Date					4/19/2022 16:30		4/19/2022 16:32		4/19/2022 16:35		4/19/2022 16:38		4/19/2022 8:00		4/19/2022 16:42		4/19/2022 16:45		4/19/2022 16:48		4/19/2022 16:53		4/19/2022 16:56		4/19/2022 17:00	
Analyte	**CAS #**	**EPA Tapwater RSLs[1]**	**EPA MCLs[2]**	**Unit**																						
Dissolved Target Analyte List Metals																										
Aluminum	7429-90-5	2,000	NS	µg/L	19.0	J, TR	70.0	U	70.0	U	70.0	U	20.0	J, TR	70.0	U	26.0	J, TR	70.0	U	70.0	U	70.0	U	70.0	U
Antimony	7440-36-0	0.78	6	µg/L	0.950	J, TR	1.00	U	1.00	U	1.00	U	1.30	J, TR	0.480	J, TR	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Arsenic	7440-38-2	0.052	10	µg/L	0.400	J, TR	0.520	J, TR	0.540	J, TR	0.520	J, TR	0.590	J, TR	0.640	J, TR	0.610	J, TR	0.460	J, TR	0.490	J, TR	0.430	J, TR	0.450	J, TR
Barium	7440-39-3	380	2,000	µg/L	14.0		17.0		14.0		14.0		12.0		14.0		14.0		14.0		13.0		14.0		14.0	
Beryllium	7440-41-7	2.5	4	µg/L	0.300	U	0.300	U, L	0.300	U	0.300	U	1.00	U, L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U
Cadmium	7440-43-9	0.92	5	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U
Calcium	7440-70-2	NS	NS	µg/L	14,000		23,000		23,000		23,000		22,000		23,000		23,000		22,000		22,000		23,000		23,000	
Total Chromium	7440-47-3	2,200	100	µg/L	1.80	U	0.560	J, TR	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U
Cobalt	7440-48-4	0.6	NS	µg/L	0.350	U	0.350	U	0.350	U	0.350	U	0.180	J, TR	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U
Copper	7440-50-8	80	1,300	µg/L	8.00		3.40		3.70		4.40	J, D3	2.30	J, D3	6.40		2.70		3.10		3.30		2.90		3.50	
Iron	7439-89-6	1,400	NS	µg/L	100	U, L	34.0	U, L	34.0	U, L	34.0	U, L	100	U, L	100	U, L	100	U, L	34.0	U, L	100	U, L	34.0	U, L	34.0	U, L
Lead	7439-92-1	15	15	µg/L	3.00	U, L	0.700	U	0.700	U	0.700	U	0.240	J, TR	0.200	J, TR	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U
Magnesium	7439-95-4	NS	NS	µg/L	5,700		3,800		3,900		3,900		3,600		3,900		3,700		3,700		3,800		3,900		3,900	
Manganese	7439-96-5	43	NS	µg/L	12.0		9.40		8.10		8.30		11.0		8.60		8.50		8.00		7.80		7.20		7.60	
Mercury	7439-97-6	0.063	2	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U
Nickel	7440-02-0	39	NS	µg/L	1.00	U	0.470	J, TR	0.450	J, TR	0.370	J, TR	0.550	J, TR	0.480	J, TR	0.310	J, TR	0.520	J, TR	0.330	J, TR	0.530	J, TR	0.390	J, TR
Potassium	2023695	NS	NS	µg/L	2,500	J, TR	1,500	J, TR	1,500	J, TR	1,500	J, TR	1,500	J, TR	1,500	J, TR	1,500	J, TR	1,500	J, TR	1,500	J, TR	1,500	J, TR	1,600	J, TR
Selenium	7782-49-2	10	50	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	0.480	J, TR	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Silver	7440-22-4	9.4	NS	µg/L	0.100	U	0.0460	J, TR	0.100	U	0.100	U	0.0710	J, TR	0.460	J, TR	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
Sodium	7440-23-5	NS	NS	µg/L	22000		15000		15000		15000		14000		15000		15000		15000		16000		16000		16000	
Thallium	7440-28-0	0.02	2	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.150	J, TR	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Vanadium	7440-62-2	8.6	NS	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U
Zinc	7440-66-6	600	NS	µg/L	60.0		3.10	J, TR	2.70	J, TR	3.20	J, TR	2.00	J, TR	3.00	J, TR	2.30	J, TR	2.60	J, TR	3.80	J, TR	8.00	U	8.00	U

1. EPA Regional Screening Levels Table, EPA, May 2022. Value shown is equal to HI=0.1. Carcinogenic values equal to $1x10^{-6}$.
2. EPA Maximum Contaminant Levels.

NOTES:
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
RSL = regional screening level
U = Analyte not detected. Numerical value is LOD or LOQ, as indicated
Red concentrations exceed EPA Tapwater RSL.
Concentrations highlighted in yellow exceed EPA Tapwater RSL and MCL.

Validation Reason Codes:
A Serial dilution
L Lab Blank
TR Trace Level Detect

Table A-8 Phase II Iona Island Hudson River Shoreline Surface Water Analytical Results Compared to Human Health Screening Levels

Location					IHRS (Iona Island Hudson River shoreline along eastern boundary of AOC #16 – Area D)																					
Sample ID					IHRS-SW-11-041922		IHRS-SW-12-041922		IHRS-SW-13-041922		IHRS-SW-14-041922		IHRS-SW-15-041922		IHRS-SW-16-041922		IHRS-SW-17-041922		IHRS-SW-18-041922		IHRS-SW-19-041922		IHRS-SW-20-041922	
Matrix					Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
Sample Date					4/19/2022 17:03		4/19/2022 17:07		4/19/2022 17:10		4/19/2022 17:14		4/19/2022 17:19		4/19/2022 17:22		4/19/2022 17:25		4/19/2022 17:30		4/19/2022 17:35		4/19/2022 17:40	
Analyte	CAS #	EPA Tapwater RSLs[1]	EPA MCLs[2]	Unit																				
Dissolved Target Analyte List Metals																								
Aluminum	7429-90-5	2,000	NS	µg/L	70.0	U	70.0	U	70.0	U	70.0	U	70.0	U	70.0	U	22.0	J, TR	22.0	J, TR	20.0	J, TR	22.0	J, TR
Antimony	7440-36-0	0.78	6	µg/L	1.00	U	1.00	U	0.510	J, TR	1.00	U	1.00	U	1.00	U	1.00	U	0.660	J, TR	0.510	J, TR	1.00	U
Arsenic	7440-38-2	0.052	10	µg/L	0.430	J, TR	0.470	J, TR	0.520	J, TR	0.560	J, TR	0.540	J, TR	0.450	J, TR	0.440	J, TR	0.500	J, TR	0.420	J, TR	0.430	J, TR
Barium	7440-39-3	380	2,000	µg/L	15.0		16.0		19.0		19.0		19.0		23.0		17.0		19.0		21.0		17.0	
Beryllium	7440-41-7	2.5	4	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U
Cadmium	7440-43-9	0.92	5	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U
Calcium	7440-70-2	NS	NS	µg/L	23,000		23,000		23,000		23,000		23,000		23,000		22,000		22,000		22,000		22,000	
Total Chromium	7440-47-3	2,200	100	µg/L	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U
Cobalt	7440-48-4	0.6	NS	µg/L	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U
Copper	7440-50-8	80	1,300	µg/L	5.10		10.0		8.90		9.10		8.20		5.10		3.30		8.30		11.0		8.20	
Iron	7439-89-6	1,400	NS	µg/L	34.0	U, L	34.0	U, L	34.0	U, L	100	U, L	34.0	U, L	34.0	U, L	100	U, L	100	U, L	34.0	U, L	110	
Lead	7439-92-1	15	15	µg/L	0.700	U	0.460	J, TR	0.320	J, TR	0.320	J, TR	0.280	J, TR	0.700	U	0.700	U	0.290	J, TR	0.370	J, TR	0.240	J, TR
Magnesium	7439-95-4	NS	NS	µg/L	4,000		4,200		5,000		5,200		4,900		5,900		4,500		4,500		5,800		4,800	
Manganese	7439-96-5	43	NS	µg/L	8.30		10.0		11.0		12.0		11.0		16.0		10.0		7.30		8.30		6.90	
Mercury	7439-97-6	0.063	2	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U
Nickel	7440-02-0	39	NS	µg/L	0.370	J, TR	0.310	J, TR	0.440	J, TR	0.520	J, TR	1.00	U	0.540	J, TR	0.480	J, TR	0.320	J, TR	0.480	J, TR	0.470	J, TR
Potassium	2023695	NS	NS	µg/L	1,500	J, TR	1,600	J, TR	1,900	J, TR	1,900	J, TR	1,900	J, TR	2,300	J, TR	1,800	J, TR	1,600	J, TR	2,200	J, TR	1,800	J, TR
Selenium	7782-49-2	10	50	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Silver	7440-22-4	9.4	NS	µg/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
Sodium	7440-23-5	NS	NS	µg/L	17000		19000		26000		28000		26000		34000		22000		21000		32000		23000	
Thallium	7440-28-0	0.02	2	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Vanadium	7440-62-2	8.6	NS	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U
Zinc	7440-66-6	600	NS	µg/L	8.00	U	3.80	J, TR	4.10	J, TR	3.60	J, TR	3.60	J, TR	7.70	J, TR	4.10	J, TR	5.00	J, TR	15.0	J, TR	6.40	J, TR

Table A-9 Phase II IIona Island Riprap Filled Drainage Swale and Tidal Wetland Swale Surface Water Analytical Results Compared to Human Health Screening Levels

Location					RRDS (Iona Marsh shoreline at outlet of riprap filled drainage swale)																			
Sample ID					RRDS-SW-01-042022		RRDS-SW-02-042022		RRDS-SW-03-042022		RRDS-SW-04-042022		RRDS-SW-05-042022		RRDS-SW-06-042022		RRDS-SW-07-042022		RRDS-SW-08-042022		RRDS-SW-09-042022		RRDS-SW-10-042022	
Matrix					Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
Sample Date					4/20/2022 15:00		4/20/2022 15:05		4/20/2022 15:10		4/20/2022 15:15		4/20/2022 15:20		4/20/2022 15:25		4/20/2022 15:30		4/20/2022 15:35		4/20/2022 15:40		4/20/2022 15:45	
Analyte	**CAS #**	**EPA Tapwater RSLs[1]**	**EPA MCLs[2]**	**Unit**																				
Dissolved Target Analyte List Metals																								
Aluminum	7429-90-5	2,000	NS	µg/L	19.0	J, TR	18.0	J, TR	23.0	J, TR	26.0	J, TR	70.0	U	18.0	J, TR	23.0	J, TR	19.0	J, TR	70.0	U	21.0	J, TR
Antimony	7440-36-0	0.78	6	µg/L	0.720	J, TR	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Arsenic	7440-38-2	0.052	10	µg/L	1.20	J, TR	0.490	J, TR	0.450	J, TR	0.560	J, TR	0.540	J, TR	0.500	J, TR	0.450	J, TR	0.470	J, TR	0.430	J, TR	0.500	J, TR
Barium	7440-39-3	380	2,000	µg/L	15.0		13.0		13.0		13.0		14.0		13.0		14.0		15.0		16.0		15.0	
Beryllium	7440-41-7	2.5	4	µg/L	0.300	U, L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U
Cadmium	7440-43-9	0.92	5	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U
Calcium	7440-70-2	NS	NS	µg/L	23000		21,000		21,000		21,000		21,000		22,000		22,000		22,000		21,000		22,000	
Total Chromium	7440-47-3	2,200	100	µg/L	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U
Cobalt	7440-48-4	0.6	NS	µg/L	0.0970	J, TR	0.350	U	0.0940	J, TR	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U
Copper	7440-50-8	80	1,300	µg/L	1.20	J, TR	1.20	J, TR	1.30	J, TR	1.20	J, TR	1.30	J, TR	1.40	J, TR	1.30	J, TR	1.20	J, TR	1.40	J, TR	1.30	J, TR
Iron	7439-89-6	1,400	NS	µg/L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L
Lead	7439-92-1	15	15	µg/L	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U
Magnesium	7439-95-4	NS	NS	µg/L	8500		3,800		3,700		4,000		4,000		3,900		3,900		3,900		3,500		3,700	
Manganese	7439-96-5	43	NS	µg/L	130		20.0		23.0		20.0		23.0		22.0		16.0		19.0		18.0		16.0	
Mercury	7439-97-6	0.063	2	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U
Nickel	7440-02-0	39	NS	µg/L	0.380	J, TR	0.370	J, TR	0.370	J, TR	0.490	J, TR	0.450	J, TR	0.560	J, TR	0.440	J, TR	0.410	J, TR	0.460	J, TR	0.510	J, TR
Potassium	2023695	NS	NS	µg/L	3,100		1,400	J, TR	1,300	J, TR	1,400	J, TR	1,500	J, TR	1,400	J, TR	1,400	J, TR	1,500	J, TR	1,400	J, TR	1,400	J, TR
Selenium	7782-49-2	10	50	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Silver	7440-22-4	9.4	NS	µg/L	0.100	U, L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
Sodium	7440-23-5	NS	NS	µg/L	51,000		16,000		16,000		18,000		17,000		17,000		17,000		17,000		16,000		17,000	
Thallium	7440-28-0	0.02	2	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Vanadium	7440-62-2	8.6	NS	µg/L	1.20	J, TR	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U
Zinc	7440-66-6	600	NS	µg/L	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U

1. EPA Regional Screening Levels Table, EPA, May 2022. Value shown is equal to HI=0.1. Carcinogenic values equal to $1x10^{-6}$.
2. EPA Maximum Contaminant Levels.

NOTES:
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
RSL = regional screening level
U = Analyte not detected. Numerical value is LOD or LOQ, as indicated

Red concentrations exceed EPA Tapwater RSL.
Concentrations highlighted in yellow exceed EPA Tapwater RSL and MCL.

Validation Reason Codes:
A Serial dilution
L Lab Blank
TR Trace Level Detect

Table A-9 Phase II Iona Island Riprap Filled Drainage Swale and Tidal Wetland Swale Surface Water Analytical Results Compared to Human Health Screening Levels

					TWS (Iona Marsh shoreline at outlet of tidal wetland swale)																					
				Sample ID	IINY-RRDS-SW-FD1-042022		TWS-SW-01-042022		TWS-SW-02-042022		TWS-SW-03-042022		TWS-SW-04-042022		TWS-SW-05-042022		TWS-SW-06-042022		TWS-SW-07-042022		TWS-SW-08-042022		TWS-SW-09-042022		TWS-SW-10-042022	
				Matrix	Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
				Sample Date	4/20/2022 8:00		4/20/2022 13:40		4/20/2022 13:45		4/20/2022 13:50		4/20/2022 13:55		4/20/2022 14:00		4/20/2022 14:05		4/20/2022 14:10		4/20/2022 14:15		4/20/2022 14:20		4/20/2022 14:25	
Analyte	**CAS #**	**EPA Tapwater RSLs[1]**	**EPA MCLs[2]**	**Unit**																						
Dissolved Target Analyte List Metals																										
Aluminum	7429-90-5	2,000	NS	µg/L	70.0	U	18.0	J, TR	19.0	J, TR	70.0	U	70.0	U	70.0	U	27.0	J, TR	70.0	U	70.0	U	70.0	U	33.0	J, TR
Antimony	7440-36-0	0.78	6	µg/L	1.00	U	0.530	J, TR	0.430	J, TR	0.580	J, TR	1.00	U	0.420	J, TR	1.00	U	1.20	J, TR	0.540	J, TR	0.420	J, TR	1.00	U
Arsenic	7440-38-2	0.052	10	µg/L	0.480	J, TR	1.40	J, TR	1.10	J, TR	0.910	J, TR	1.10	J, TR	1.00	J, TR	0.830	J, TR	0.870	J, TR	0.950	J, TR	0.820	J, TR	0.720	J, TR
Barium	7440-39-3	380	2,000	µg/L	15.0		15.0		13.0		14.0		14.0		14.0		13.0		14.0		13.0		14.0		13.0	
Beryllium	7440-41-7	2.5	4	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.130	J, TR	0.220	J, TR	0.300	U	0.100	J, TR	0.300	U
Cadmium	7440-43-9	0.92	5	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U
Calcium	7440-70-2	NS	NS	µg/L	21,000		23,000		23,000		23,000		23,000		22,000		22,000		22,000		23,000		22,000		22,000	
Total Chromium	7440-47-3	2,200	100	µg/L	1.80	U	1.80	U	1.80	U	1.80	U	0.580	J, TR	1.80	U	1.80	U	0.690	J, TR	1.80	U	1.80	U	1.80	U
Cobalt	7440-48-4	0.6	NS	µg/L	0.110	J, TR	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.0940	J, TR	0.120	J, TR	0.110	J, TR	0.350	U	0.120	J, TR
Copper	7440-50-8	80	1,300	µg/L	1.60	J, TR	1.00	J, TR	1.30	J, TR	1.30	J, TR	1.10	J, TR	1.10	J, TR	1.10	J, TR	1.40	J, TR	1.20	J, TR	1.50	J, TR	1.50	J, TR
Iron	7439-89-6	1,400	NS	µg/L	34.0	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L
Lead	7439-92-1	15	15	µg/L	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U
Magnesium	7439-95-4	NS	NS	µg/L	3,600		8,100		6,800		7,200		6,700		6,800		5,900		5,800		6,200		6,500		6,400	
Manganese	7439-96-5	43	NS	µg/L	18.0		120		70.0		50.0		85.0		64.0		51.0		51.0		57.0		16.0		17.0	
Mercury	7439-97-6	0.063	2	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U
Nickel	7440-02-0	39	NS	µg/L	0.340	J, TR	0.370	J, TR	0.390	J, TR	0.370	J, TR	0.470	J, TR	0.630	J, TR	0.390	J, TR	0.570	J, TR	0.360	J, TR	0.350	J, TR	0.540	J, TR
Potassium	2023695	NS	NS	µg/L	1,300	J, TR	3,000		2,700	J, TR	2,800	J, TR	2,600	J, TR	2,600	J, TR	2,200	J, TR	2,200	J, TR	2,400	J, TR	2,500	J, TR	2,500	J, TR
Selenium	7782-49-2	10	50	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Silver	7440-22-4	9.4	NS	µg/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U, L	0.100	U, L	0.100	U	0.100	U	0.100	U
Sodium	7440-23-5	NS	NS	µg/L	16,000		50,000		41,000		44,000		40,000		41,000		34,000		33,000		36,000		39,000		38,000	
Thallium	7440-28-0	0.02	2	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.110	J, TR	0.200	U	0.200	U	0.200	U
Vanadium	7440-62-2	8.6	NS	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U
Zinc	7440-66-6	600	NS	µg/L	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U	3.90	J, TR	8.00	U	8.00	U	8.00	U

Table A-10 Phase II Con Hook Hudson River Shoreline Surface Water Analytical Results Compared to Human Health Screening Levels

Location					Con Hook Hudson River Shoreline																					
Sample ID					IINY-CHHRS-SW-01-042122		IINY-CHHRS-SW-02-042122		IINY-CHHRS-SW-FD1-042122 (Duplicate of CHHRS-SW-02)		IINY-CHHRS-SW-03-042122		IINY-CHHRS-SW-04-042122		IINY-CHHRS-SW-05-042122		IINY-CHHRS-SW-06-042122		IINY-CHHRS-SW-07-042122		IINY-CHHRS-SW-08-042122		IINY-CHHRS-SW-09-042122		IINY-CHHRS-SW-10-042122	
Matrix					Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
Sample Date					4/21/2022 9:55		4/21/2022 10:05		4/21/2022 8:00		4/21/2022 10:15		4/21/2022 10:25		4/21/2022 10:50		4/21/2022 11:00		4/21/2022 11:15		4/21/2022 11:40		4/21/2022 12:00		4/21/2022 12:10	
Analyte	**CAS #**	**EPA Tapwater RSLs[1]**	**EPA MCLs[2]**	**Unit**																						
Dissolved Target Analyte List Metals																										
Aluminum	7429-90-5	2,000	NS	µg/L	20.0	J, TR	18.0	J, TR	23.0	J, TR	20.0	J, TR	18.0	J, TR	19.0	J, TR	21.0	J, TR	19.0	J, TR	22.0	J, TR	21.0	J, TR	36.0	J, TR
Antimony	7440-36-0	0.78	6	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Arsenic	7440-38-2	0.052	10	µg/L	0.380	J, TR	0.340	J, TR	0.400	J, TR	0.350	J, TR	0.370	J, TR	1.00	U	0.330	J, TR	0.360	J, TR	0.440	J, TR	0.340	J, TR	0.460	J, TR
Barium	7440-39-3	380	2,000	µg/L	12.0		12.0		12.0		12.0		12.0		13.0		13.0		12.0		13.0		12.0		13.0	
Beryllium	7440-41-7	2.5	4	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U
Cadmium	7440-43-9	0.92	5	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U
Calcium	7440-70-2	NS	NS	µg/L	21,000		22,000		21,000		22,000		22,000		22,000		22,000		22,000		22,000		22,000		22,000	
Total Chromium	7440-47-3	2,200	100	µg/L	1.80	U	1.80	U	0.550	J, TR	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U
Cobalt	7440-48-4	0.6	NS	µg/L	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U
Copper	7440-50-8	80	1,300	µg/L	1.00	J, TR	1.10	J, TR	1.20	J, TR	0.950	J, TR	1.00	J, TR	1.10	J, TR	1.00	J, TR	1.10	J, TR	1.30	J, TR	3.40		1.20	J, TR
Iron	7439-89-6	1,400	NS	µg/L	100	U, L	35.0	J, TR	100	U, L	42.0	J, TR	31.0	J, TR	34.0	J, TR	37.0	J, TR	32.0	J, TR	90.0	J, TR	54.0	J, TR	84.0	J, TR
Lead	7439-92-1	15	15	µg/L	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U
Magnesium	7439-95-4	NS	NS	µg/L	3,800		3,700		3,400		3,800		3,700		3,800		3,800		3,800		3,800		3,700		3,800	
Manganese	7439-96-5	43	NS	µg/L	37.0		23.0		23.0		7.00		9.20		4.70		4.50		4.60		4.90		6.30		79.0	
Mercury	7439-97-6	0.063	2	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U
Nickel	7440-02-0	39	NS	µg/L	1.00	U	0.320	J, TR	0.380	J, TR	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	0.400	J, TR	1.00	U	0.330	J, TR
Potassium	2023695	NS	NS	µg/L	1,300	J, TR	1,200	J, TR	1,200	J, TR	1,300	J, TR	1,100	J, TR	1,200	J, TR	1,400	J, TR	1,200	J, TR	1,200	J, TR	1,200	J, TR	1,200	J, TR
Selenium	7782-49-2	10	50	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Silver	7440-22-4	9.4	NS	µg/L	0.100	U	0.100	U	0.100	U, L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
Sodium	7440-23-5	NS	NS	µg/L	18,000		15,000		15,000		16,000		15,000		15,000		16,000		16,000		15,000		15,000		15,000	
Thallium	7440-28-0	0.02	2	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Vanadium	7440-62-2	8.6	NS	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U
Zinc	7440-66-6	600	NS	µg/L	8.00	U	8.00	UJ, D	3.00	J, TR	8.00	U	8.00	U	8.00	U	8.00	U	90.0		8.00	U	3.00	J, TR	8.00	U

1. EPA Regional Screening Levels Table, EPA, May 2022. Value shown is equal to HI=0.1. Carcinogenic values equal to $1x10^{-6}$.
2. EPA Maximum Contaminant Levels.

NOTES:
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
RSL = regional screening level
U = Analyte not detected. Numerical value is LOD or LOQ, as indicated
Red concentrations exceed EPA Tapwater RSL.
Concentrations highlighted in yellow exceed EPA Tapwater RSL and MCL.

Validation Reason Codes:

A	Serial dilution
L	Lab Blank
TR	Trace Level Detect

Table A-10 Phase II Con Hook Hudson River Shoreline Surface Water Analytical Results Compared to Human Health Screening Levels

Location					Con Hook Hudson River Shoreline																			
Sample ID					IINY-CHHRS-SW-11-042122		IINY-CHHRS-SW-12-042122		IINY-CHHRS-SW-13-042122		IINY-CHHRS-SW-14-042122		IINY-CHHRS-SW-15-042122		IINY-CHHRS-SW-16-042122		IINY-CHHRS-SW-17-042122		IINY-CHHRS-SW-18-042122		IINY-CHHRS-SW-19-042122		IINY-CHHRS-SW-20-042122	
Matrix					Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
Sample Date					4/21/2022 12:35		4/21/2022 13:00		4/21/2022 13:15		4/21/2022 13:25		4/21/2022 13:35		4/21/2022 13:45		4/21/2022 14:00		4/21/2022 14:10		4/21/2022 14:20		4/21/2022 14:30	
Analyte	**CAS #**	**EPA Tapwater RSLs[1]**	**EPA MCLs[2]**	**Unit**																				
Dissolved Target Analyte List Metals																								
Aluminum	7429-90-5	2,000	NS	µg/L	21.0	J, TR	20.0	J, TR	21.0	J, TR	20.0	J, TR	20.0	J, TR	18.0	J, TR	18.0	J, TR	19.0	J, TR	20.0	J, TR	19.0	J, TR
Antimony	7440-36-0	0.78	6	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Arsenic	7440-38-2	0.052	10	µg/L	0.350	J, TR	0.400	J, TR	1.00	U	1.00	U	0.350	J, TR	0.370	J, TR	0.400	J, TR	1.00	U	0.330	J, TR	0.450	J, TR
Barium	7440-39-3	380	2,000	µg/L	12.0		12.0		12.0		12.0		13.0		13.0		13.0		12.0		12.0		12.0	
Beryllium	7440-41-7	2.5	4	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U
Cadmium	7440-43-9	0.92	5	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U
Calcium	7440-70-2	NS	NS	µg/L	23,000		23,000		23,000		23,000		22,000		22,000		22,000		22,000		22,000		23,000	
Total Chromium	7440-47-3	2,200	100	µg/L	1.80	U	1.80	U	1.80	U, L	1.80	U	1.80	U	1.80	U	1.80	U, L	1.80	U	1.80	U	1.80	U
Cobalt	7440-48-4	0.6	NS	µg/L	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.0930	J, TR	0.350	U	0.350	U	0.350	U
Copper	7440-50-8	80	1,300	µg/L	1.20	J, TR	1.10	J, TR	1.00	J, TR	1.10	J, TR	2.70		1.10	J, TR	2.50		1.00	J, TR	1.20	J, TR	1.20	J, TR
Iron	7439-89-6	1,400	NS	µg/L	46.0	J, TR	28.0	J, TR	150		310		38.0	J, TR	43.0	J, TR	50.0	J, TR	39.0	J, TR	71.0	J, TR	51.0	J, TR
Lead	7439-92-1	15	15	µg/L	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.610	J, TR	0.700	U	0.700	U	0.700	U
Magnesium	7439-95-4	NS	NS	µg/L	3,900		4,000		3,900		3,900		3,800		3,800		3,900		3,800		3,800		3,900	
Manganese	7439-96-5	43	NS	µg/L	5.00		5.10		5.20		6.90		8.70		7.90		7.50		8.00		8.60		10.0	
Mercury	7439-97-6	0.063	2	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U
Nickel	7440-02-0	39	NS	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	J, TR	1.00	U	1.00	U	0.310	J, TR
Potassium	2023695	NS	NS	µg/L	1,200	J, TR	1,300	J, TR	1,200	J, TR	1,200	J, TR	1,200	J, TR	1,200	J, TR	1,200	J, TR	1,200	J, TR	1,200	J, TR	1,200	J, TR
Selenium	7782-49-2	10	50	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Silver	7440-22-4	9.4	NS	µg/L	0.100	U	0.100	U, L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
Sodium	7440-23-5	NS	NS	µg/L	16,000		16,000		16,000		16,000		16,000		16,000		16,000		15,000		15,000		16,000	
Thallium	7440-28-0	0.02	2	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Vanadium	7440-62-2	8.6	NS	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U
Zinc	7440-66-6	600	NS	µg/L	8.00	U	8.00	U, L	8.00	U, L	8.00	U	8.00	U	8.00	U, L	8.00	U	8.00	U, L	8.00	U	8.00	U

Table 6-13a Phase II Con Hook Marsh Shoreline Surface Water Analytical Results Compared to Human Health Screening Levels

Location					Con Hook Marsh Shoreline																	
Sample ID					IINY-CHMS-SW-01-042122		IINY-CHMS-SW-02-042122		IINY-CHMS-SW-03-042122		IINY-CHMS-SW-04-042122		IINY-CHMS-SW-05-042122		IINY-CHMS-SW-06-042122		IINY-CHMS-SW-07-042122		IINY-CHMS-SW-08-042122		IINY-CHMS-SW-09-042122		IINY-CHMS-SW-10-042122	
Matrix					Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
Sample Date					4/21/2022 17:30		4/21/2022 17:25		4/21/2022 17:15		4/21/2022 17:10		4/21/2022 17:05		4/21/2022 16:40		4/21/2022 16:35		4/21/2022 16:32		4/21/2022 16:31		4/21/2022 16:30	
Analyte	**CAS #**	**EPA Tapwater RSLs[1]**	**EPA MCLs[2]**	**Unit**																				
Dissolved Target Analyte List Metals																								
Aluminum	7429-90-5	2,000	NS	µg/L	22.0	J, TR	70.0	U	20.0	J, TR	23.0	J, TR	44.0	J, TR	31.0	J, TR	25.0	J, TR	39.0	J, TR	39.0	J, TR	20.0	J, TR
Antimony	7440-36-0	0.78	6	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Arsenic	7440-38-2	0.052	10	µg/L	0.380	J, TR	1.00	U	0.420	J, TR	0.480	J, TR	0.420	J, TR	0.900	J, TR	1.50	J, TR	2.70	J, TR	0.690	J, TR	0.590	J, TR
Barium	7440-39-3	380	2,000	µg/L	14.0		13.0		13.0		13.0		13.0		17.0		17.0		17.0		16.0		15.0	
Beryllium	7440-41-7	2.5	4	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U
Cadmium	7440-43-9	0.92	5	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U
Calcium	7440-70-2	NS	NS	µg/L	20,000		22,000		22,000		21,000		20,000		23,000		24,000		23,000		24,000		25,000	
Total Chromium	7440-47-3	2,200	100	µg/L	0.510	J, TR	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	0.500	J, TR	1.80	U	0.560	J, TR	0.540	J, TR
Cobalt	7440-48-4	0.6	NS	µg/L	0.110	J, TR	0.350	U	0.350	U	0.350	U	0.350	U	0.120	J, TR	0.150	J, TR	0.140	J, TR	0.150	J, TR	0.120	J, TR
Copper	7440-50-8	80	1,300	µg/L	0.710	J, TR	1.30	J, TR	1.30	J, TR	1.30	J, TR	1.30	J, TR	0.650	J, TR	0.680	J, TR	0.630	J, TR	0.700	J, TR	0.820	J, TR
Iron	7439-89-6	1,400	NS	µg/L	100	U, L	100	U, L	100	U, L	100	U, L	110	+J, L	140	+J, L	400		250		160	+J, L	160	+J, L
Lead	7439-92-1	15	15	µg/L	0.700	U	0.700	U	0.700	U	0.700	U	0.220	J, TR	0.700	U	0.230	J, TR	0.390	J, TR	0.700	U	0.700	U
Magnesium	7439-95-4	NS	NS	µg/L	6,500		4,100		3,900		4,200		4,100		11,000		11,000		12,000		11,000		11,000	
Manganese	7439-96-5	43	NS	µg/L	41.0		8.20		12.0		10.0		16.0		310		330		540		270		210	
Mercury	7439-97-6	0.063	2	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U
Nickel	7440-02-0	39	NS	µg/L	0.510	J, TR	1.00	U	0.410	J, TR	0.410	J, TR	0.330	J, TR	0.510	J, TR	0.460	J, TR	0.400	J, TR	0.460	J, TR	0.420	J, TR
Potassium	2023695	NS	NS	µg/L	1,800	J, TR	1,300	J, TR	1,200	J, TR	1,300	J, TR	1,400	J, TR	2,900	J, TR	3,000		3,200		2,900	J, TR	3,000	
Selenium	7782-49-2	10	50	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Silver	7440-22-4	9.4	NS	µg/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
Sodium	7440-23-5	NS	NS	µg/L	41,000		19,000		17,000		20,000		19,000		97,000		95,000		100,000		95,000		91,000	
Thallium	7440-28-0	0.02	2	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Vanadium	7440-62-2	8.6	NS	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U
Zinc	7440-66-6	600	NS	µg/L	2.50	J, TR	3.50	J, TR	3.70	J, TR	3.40	J, TR	4.20	J, TR	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U

1. EPA Regional Screening Levels Table, EPA, May 2022. Value shown is equal to HI=0.1. Carcinogenic values equal to $1x10^{-6}$.
2. EPA Maximum Contaminant Levels.

NOTES:
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
RSL = regional screening level
U = Analyte not detected. Numerical value is LOD or LOQ, as indicated

Red concentrations exceed EPA Tapwater RSL.
Concentrations highlighted in yellow exceed EPA Tapwater RSL and MCL.

Validation Reason Codes:
A Serial dilution
L Lab Blank
TR Trace Level Detect

Table A-11 Phase II Con Hook Marsh Shoreline Surface Water Analytical Results Compared to Human Health Screening Levels

Location					Con Hook Marsh Shoreline																									
Sample ID					IINY-CHMS-SW-11-042122		IINY-CHMS-SW-12-042122		IINY-CHMS-SW-13-042122		IINY-CHMS-SW-14-042122		IINY-CHMS-SW-15-042122		IINY-CHMS-SW-16-042122		IINY-CHMS-SW-17-042122		IINY-CHMS-SW-FD1-042122 (Duplicte of CHMS-SW-		IINY-CHMS-SW-18-042122		IINY-CHMS-SW-19-042122		IINY-CHMS-SW-20-042122	
Matrix					Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
Sample Date					4/21/2022 16:20		4/21/2022 16:15		4/21/2022 16:10		4/21/2022 16:00		4/21/2022 15:55		4/21/2022 15:40		4/21/2022 15:25		4/21/2022 8:00		4/21/2022 15:35		4/21/2022 15:15		4/21/2022 15:10	
Analyte	**CAS #**	**EPA Tapwater RSLs[1]**	**EPA MCLs[2]**	**Unit**																								
Dissolved Target Analyte List Metals																												
Aluminum	7429-90-5	2,000	NS	µg/L	51.0	J, TR	24.0	J, TR	26.0	J, TR	260		320		110		20.0	J, TR	70.0	U	25.0	J, TR	70.0	U	21.0	J, TR
Antimony	7440-36-0	0.78	6	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Arsenic	7440-38-2	0.052	10	µg/L	0.620	J, TR	0.480	J, TR	0.530	J, TR	0.730	J, TR	0.760	J, TR	0.740	J, TR	0.420	J, TR	0.400	J, TR	0.460	J, TR	0.400	J, TR	0.440	J, TR
Barium	7440-39-3	380	2,000	µg/L	16.0		17.0		18.0		7.00		4.80		7.90		11.0		10.0		10.0		10.0		12.0	
Beryllium	7440-41-7	2.5	4	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U
Cadmium	7440-43-9	0.92	5	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U
Calcium	7440-70-2	NS	NS	µg/L	23,000		26,000		27,000		8,900		7,600		12,000		20,000		20,000		20,000		20,000		18,000	
Total Chromium	7440-47-3	2,200	100	µg/L	0.640	J, TR	0.610	J, TR	0.550	J, TR	0.540	J, TR	0.600	J, TR	0.540	J, TR	1.80	U	1.80	U	0.520	J, TR	1.80	U	0.550	J, TR
Cobalt	7440-48-4	0.6	NS	µg/L	0.180	J, TR	0.130	J, TR	0.130	J, TR	0.120	J, TR	0.350	U	0.130	J, TR	0.350	U	0.350	U	0.350	U	0.350	U	0.100	J, TR
Copper	7440-50-8	80	1,300	µg/L	0.690	J, TR	0.730	J, TR	0.790	J, TR	0.790	J, TR	0.770	J, TR	0.610	J, TR	1.00	J, TR	0.970	J, TR	1.00	J, TR	0.960	J, TR	1.20	J, TR
Iron	7439-89-6	1,400	NS	µg/L	200	+J, L	150	+J, L	160	+J, L	310		320		230		100	U, L	100	U, L	100	U, L	100	U, L	100	U, L
Lead	7439-92-1	15	15	µg/L	0.700	U	0.700	U	0.700	U	0.300	J, TR	0.290	J, TR	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U
Magnesium	7439-95-4	NS	NS	µg/L	10,000		12,000		13,000		3,400		2,900		4,400		3,700		3,700		3,800		3,700		3,800	
Manganese	7439-96-5	43	NS	µg/L	290		180		200		89.0		120		180		17.0	-J, M	16.0		14.0		19.0		18.0	
Mercury	7439-97-6	0.063	2	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U
Nickel	7440-02-0	39	NS	µg/L	0.560	J, TR	0.390	J, TR	0.330	J, TR	0.440	J, TR	0.420	J, TR	0.420	J, TR	0.380	J, TR	0.450	J, TR	1.00	U	1.00	U	0.570	J, TR
Potassium	2023695	NS	NS	µg/L	2,700	J, TR	3,100		3,300		1,500	J, TR	1,400	J, TR	2,100	J, TR	1,200	J, TR	1,300	J, TR	1,300	J, TR	1,200	J, TR	1,300	J, TR
Selenium	7782-49-2	10	50	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Silver	7440-22-4	9.4	NS	µg/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U, L	0.100	U	0.100	U
Sodium	7440-23-5	NS	NS	µg/L	86,000		100,000		110,000		25,000		22,000		37,000		17,000		17,000		17,000		17,000		20,000	
Thallium	7440-28-0	0.02	2	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Vanadium	7440-62-2	8.6	NS	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U
Zinc	7440-66-6	600	NS	µg/L	2.90	J, TR	8.00	U	8.00	U	2.40	J, TR	8.00	U	2.50	J, TR	3.70	-J, M/TR	8.00	U	8.00	U	8.00	U	2.00	J, TR

Table A-12 Phase II Onsite ISM Sediment Analytical Results Compared to Human Health Screening Levels

Location					Iona Island Hudson River Shoreline											Rip Rap Drainage Swale											Tidal Wetland Swale										
Sample ID					IINY-IHRS-DU-01A-SEDIS-041922		IINY-IHRS-DU-01B-SEDIS-041922		IINY-IHRS-DU-01C-SEDIS-041922				95% Upper Confidence Limit (UCL)				IINY-RRDS-DU-01A-SEDIS-041922		IINY-RRDS-DU-01B-SEDIS-041922		IINY-RRDS-DU-01C-SEDIS-041922				95% Upper Confidence Limit (UCL)				IINY-TWS-DU-01A-SEDIS-041922		IINY-TWS-DU-01B-SEDIS-041922		IINY-TWS-DU-01C-SEDIS-041922				95% Upper Confidence Limit (UCL)			
Depth (in.)					0-6		0-6		0-6								0-6		0-6		0-6								0-6		0-6		0-6							
Matrix					Sediment		Sediment		Sediment								Sediment		Sediment		Sediment								Sediment		Sediment		Sediment							
Sample Date					4/19/2022 10:45		4/19/2022 10:45		4/19/2022 10:45								4/19/2022 11:30		4/19/2022 11:30		4/19/2022 11:30								4/19/2022 12:10		4/19/2022 12:10		4/19/2022 12:10							
Analyte	CAS #	Residential Soil RSL[a]	Industrial Soil RSL[b]	Unit							Mean	% Relative Standard Deviation (RSD)	Student's-t	Chebychev	Adj. CV of Increments	95% UCL							Mean	% Relative Standard Deviation (RSD)	Student's-t	Chebychev	Adj. CV of Increments	95% UCL							Mean	% Relative Standard Deviation (RSD)	Student's-t	Chebychev	Adj. CV of Increments	95% UCL
Target Analyte List Metals																																								
Aluminum	7429-90-5	7,700	110,000	mg/kg	6,900	J, A	5,700		6,300		6,300	9.52	7,310	7,810	0.766	7,310	20,000		19,000		15,000		18,000	14.7	22,500	24,700	1.21	22,500	16,000		16,000		15,000		15,700	3.69	16,600	17,100	0.294	16,600
Antimony	7440-36-0	3.1	47	mg/kg	110	J, A	89.0		110		103	11.8	123	134	0.956	123	0.770		0.730		0.730		0.743	3.11	0.782	0.801	0.247	0.782	1.00		0.730		0.790		0.84	16.9	1.08	1.2	1.41	1.08
Arsenic	7440-38-2	0.68	3	mg/kg	35.0	J, M	34.0		32.0		33.7	4.54	36.2	37.5	0.361	36.2	9.70		9.60		9.40		9.57	1.6	9.82	9.95	0.127	9.82	8.40		8.00		9.30		8.57	7.77	9.69	10.2	0.622	9.69
Barium	7440-39-3	1,500	22,000	mg/kg	370	J, D	510		470		450	16	572	631	1.33	572	110		100		110		107	5.41	116	121	0.432	116	95.0		95.0		92.0		94	1.84	96.9	98.4	0.147	96.9
Beryllium	7440-41-7	16	230	mg/kg	0.910		0.920		0.760		0.863	10.4	1.01	1.09	0.838	1.01	0.990		0.900		0.890		0.927	5.94	1.02	1.07	0.474	1.02	0.960		0.950		0.870		0.927	5.32	1.01	1.05	0.424	1.01
Cadmium	7440-43-9	0.71	10	mg/kg	9.60		9.30		8.90		9.27	3.79	9.86	10.2	0.302	9.86	0.960		0.940		0.910		0.937	2.69	0.979	1	0.214	0.979	1.20		0.840		2.20		1.41	49.9	2.6	3.19	6.41	3.19
Total Chromium, Total	7440-47-3	12,000	180,000	mg/kg	120	J, D	150		130		133	11.5	159	172	0.929	159	43.0		40.0		40.0		41	4.22	43.9	45.4	0.337	43.9	43.0		43.0		41.0		42.3	2.73	44.3	45.2	0.217	44.3
Cobalt	7440-48-4	2.3	35	mg/kg	14.0		14.0		12.0		13.3	8.66	15.3	16.2	0.695	15.3	15.0		15.0		14.0		14.7	3.94	15.6	16.1	0.314	15.6	14.0		13.0		13.0		13.3	4.33	14.3	14.8	0.345	14.3
Copper	7440-50-8	310	4,700	mg/kg	4,600	J, D	7,600		6,500		6,230	24.3	8,790	10,100	2.18	10,100	58.0	J, TR	53.0	J, TR	51.0	J, TR	54	6.68	60.1	63.1	0.533	60.1	59.0	J, TR	55.0	J, TR	72.0	J, TR	62	14.3	77	84.4	1.18	77
Iron	7439-89-6	5,500	82,000	mg/kg	180,000	J, A	140,000		150,000		157,000	13.3	192,000	209,000	1.09	192,000	37,000		35,000		35,000		35,700	3.24	37,600	38,600	0.258	37,600	29,000		29,000		36,000		31,300	12.9	38,100	41,500	1.05	38,100
Lead	7439-92-1	400	800	mg/kg	7,700	J, D/M2	14,000		8,000		9,900	35.9	15,900	18,800	3.71	18,800	67.0		60.0		56.0		61	9.13	70.4	75	0.733	70.4	79.0		65.0		97.0		80.3	20	107	121	1.71	121
Manganese	7439-96-5	180	2,600	mg/kg	1,200		1,200		1,200		1,200	0	1,200	1,200	0	1,200	2,700		2,600		2,800		2,700	3.7	2,870	2,950	0.295	2,870	1,100		1,000		1,200		1,100	9.09	1,270	1,350	0.73	1,270
Mercury	7439-97-6	1.1	4.6	mg/kg	0.0810		0.0730		0.0620		0.072	13.2	0.0881	0.096	1.08	0.0881	0.190		0.190		0.180		0.187	3.09	0.196	0.201	0.246	0.196	0.190		0.210		0.180		0.193	7.9	0.219	0.232	0.633	0.219
Nickel	7440-02-0	150	2,200	mg/kg	69.0		110		77.0		85.3	25.5	122	140	2.31	140	34.0		34.0		34.0		34	0	34	34	0	34	33.0		31.0		35.0		33	6.06	36.4	38	0.484	36.4
Selenium	7782-49-2	39	580	mg/kg	0.590	UJ, M/D	0.530	U	0.770	U	0.63	19.8	0.841	0.944	1.7	0.944	0.780	J, TR	0.760	J, TR	0.750	J, TR	0.763	2	0.789	0.802	0.16	0.789	0.740	J, TR	0.610	J, TR	0.630	J, TR	0.66	10.6	0.778	0.836	0.857	0.778
Silver	7440-22-4	39	580	mg/kg	1.00	J, M	2.00		1.40		1.47	34.3	2.32	2.73	3.47	2.73	0.330		0.310		0.310		0.317	3.65	0.336	0.346	0.29	0.336	0.330		0.360		0.280		0.323	12.5	0.391	0.425	1.02	0.391
Thallium	7440-28-0	0.078	1.2	mg/kg	0.0750	J, TR	0.0560	J, TR	0.0690	J, TR	0.0667	14.6	0.083	0.0911	1.2	0.083	0.200		0.180		0.190		0.19	5.26	0.207	0.215	0.42	0.207	0.180	J, TR	0.180	J, TR	0.180	J, TR	0.18	1.89E-14	0.18	0.18	1.51E-15	0.18
Vanadium	7440-62-2	39	580	mg/kg	37.0	J, M	32.0		30.0		33	10.9	39.1	42.1	0.884	39.1	31.0		29.0		29.0		29.7	3.89	31.6	32.6	0.31	31.6	35.0		35.0		33.0		34.3	3.36	36.3	37.2	0.268	36.3
Zinc	7440-66-6	2,300	35,000	mg/kg	3,800		3,800		3,600		3,730	3.09	3,930	4,020	0.246	3,930	190	J, TR	190	J, TR	200		193	2.99	203	208	0.238	203	360		230	J, TR	990		527	77.2	1,210	1,550	15.7	1,550

(a) EPA Regional Screening Levels Table, EPA, May 2022. Value shown is equal to HI=0.1. Carcinogenic values equal to $1x10^{-6}$.
(b) A deed restriction is in place noting that there is to be no residential development at the site (USACE 1995); however, EPA residential soil RSLs are included to assess for children receptors including site visitation for nature walks and potential camping.

NOTES:
mg/kg = milligrams per kilogram
mV = millivolts
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
RSL = regional screening level
U = Analyte not detected. Numerical value is LOD or LOQ, as indicated

Validation Reason Codes:
A Serial dilution
D MS RPD
M MS Recovery
M2 Post Spike
TR Trace Level Detect

Red concentrations exceed EPA Residential Soil RSL.
Concentrations highlighted in yellow exceed EPA Industrial Soil RSL.

Table A-13 Phase II Background ISM Sediment Analytical Results Compared to Human Health Screening Levels

| Location | | | | | Con Hook Hudson River Shoreline | | | | |

Table 6-17a Phase II Background ISM Sediment Analytical Results Compared to Human Health Screening Levels

| | | |

Table A-13 Phase II Background ISM Sediment Analytical Results Compared to Human Health Screening Levels

Location					Con Hook Hudson River Shoreline																															
Sample ID					IINY-CHHRS-SU-01-SEDIS-042122		IINY-CHHRS-SU-02-SEDIS-042122		IINY-CHHRS-SU-03-SEDIS-042122		IINY-CHHRS-SU-04-SEDIS-042122		IINY-CHHRS-SU-05-SEDIS-042122		IINY-CHHRS-SU-06-SEDIS-042122		IINY-CHHRS-SU-07-SEDIS-042122		IINY-CHHRS-SU-08-SEDIS-042122					95% Upper Confidence Limit (UCL)			
Depth (in.)					0-6		0-6		0-6		0-6		0-6		0-6		0-6		0-6																	
Matrix					Sediment		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment																	
Sample Date					4/21/2022 13:00		4/21/2022 12:40		4/21/2022 12:20		4/21/2022 11:40		4/21/2022 11:25		4/21/2022 10:40		4/21/2022 10:15		4/21/2022 10:05																	
Analyte	**CAS #**	**Residential Soil RSL[a]**	**Industrial Soil RSL[b]**	**Unit**																	Mean	Arithmetic Standard Deviation	% Relative Standard Deviation (RSD)	Student's-t	Chebychev	Adj. CV of Increments	95% UCL										
Target Analyte List Metals																																				
Aluminum	7429-90-5	7,700	110,000	mg/kg	15,000		15,000		15,000		15,000		18,000		8,200		13,000	J, A	8,800		13,500	3,370	25	15,800	18,700	2	18,700									
Antimony	7440-36-0	3.1	47	mg/kg	0.500		0.470		0.460		0.510		0.510		0.610		0.270	J, TR	0.510		0.48	0.0961	20	0.544	0.628	1.54	0.628									
Arsenic	7440-38-2	0.68	3	mg/kg	7.00		6.70		6.80		7.60		7.90		3.70		4.10	J, D	3.70		5.94	1.79	30.2	7.14	8.7	2.52	8.7									
Barium	7440-39-3	1,500	22,000	mg/kg	89.0		92.0		110		120		120		45.0		56.0	J+, M	53.0		85.6	30.7	35.9	106	133	3.21	133									
Beryllium	7440-41-7	16	230	mg/kg	0.970		1.00		0.870		0.870		0.920		0.360		1.60	J, D	0.520		0.889	0.367	41.3	1.13	1.45	3.98	1.45									
Cadmium	7440-43-9	0.71	10	mg/kg	1.10		1.10		1.00		0.850		0.920		0.170		0.330	J, D	0.220		0.711	0.401	56.4	0.98	1.33	6.95	1.33									
Total Chromium, Total	7440-47-3	12,000	180,000	mg/kg	41.0		42.0		41.0		43.0		43.0		15.0		20.0		18.0		32.9	12.7	38.6	41.4	52.4	3.58	52.4									
Cobalt	7440-48-4	2.3	35	mg/kg	13.0		13.0		14.0		14.0		14.0		4.10		6.60		5.60		10.5	4.3	40.8	13.4	17.2	3.91	17.2									
Copper	7440-50-8	310	4,700	mg/kg	42.0		44.0		43.0		40.0		39.0		20.0		33.0	J-, M	25.0		35.8	8.94	25	41.7	49.5	1.99	49.5									
Iron	7439-89-6	5,500	82,000	mg/kg	27,000		26,000		27,000		27,000		32,000		17,000		19,000	J, A	15,000		23,800	5,970	25	27,700	33,000	2	33,000									
Lead	7439-92-1	400	800	mg/kg	44.0		44.0		40.0		39.0		39.0		71.0		56.0		60.0		49.1	11.9	24.1	57.1	67.4	1.91	67.4									
Manganese	7439-96-5	180	2,600	mg/kg	840		890		1,200		1,800		1,800		550		630		430		1,020	537	53	1,380	1,850	6	1,850									
Mercury	7439-97-6	1.1	4.6	mg/kg	0.260		0.270		0.260		0.250		0.290		0.0350		0.0880		0.0670		0	0	56	0	0	7	0.354									
Nickel	7440-02-0	150	2,200	mg/kg	29.0		30.0		31.0		30.0		29.0		8.40		14.0		12.0		22.9	9.63	42	29.4	37.8	4.09	37.8									
Selenium	7782-49-2	39	580	mg/kg	0.610	J, TR	0.540	J, TR	0.500	J, TR	0.520	J, TR	0.530	J, TR	0.220	J, TR	0.350	J, D/TR	0.220	J, TR	0.436	0.152	34.8	0.538	0.671	3.08	0.671									
Silver	7440-22-4	39	580	mg/kg	0.350		0.370		0.350		0.310		0.320		0.0620	J, TR	0.140	J, TR	0.120	J, TR	0.253	0.124	49	0.336	0.443	5.32	0.443									
Thallium	7440-28-0	0.078	1.2	mg/kg	0.180		0.190		0.170	J, TR	0.160	J, TR	0.170	J, TR	0.0920	J, TR	0.130	J, D/TR	0.0990	J, TR	0.149	0.0373	25.1	0.174	0.206	2	0.206									
Vanadium	7440-62-2	39	580	mg/kg	25.0		26.0		25.0		26.0		28.0		11.0		19.0	J+, M	14.0		21.8	6.32	29.1	26	31.5	2.4	31.5									
Zinc	7440-66-6	2,300	35,000	mg/kg	140		140		140		140		140		45.0		67.0	J-, M	58.0		109	43.5	40	138	176	3.79	176									

(a) EPA Regional Screening Levels Table, EPA, May 2022. Value shown is equal to HI=0.1. Carcinogenic values equal to $1x10^{-6}$.
(b) A deed restriction is in place noting that there is to be no residential development at the site (USACE 1995); however, EPA residential soil RSLs are included to assess for children receptors including site visitation for nature walks and potential camping.

NOTES:
mg/kg = milligrams per kilogram
mV = millivolts
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
RSL = regional screening level
- Bias low
+ Bias high

Validation Reason Codes:
A Serial dilution
D MS RPD
M MS Recovery
M2 Post Spike
TR Trace Level Detect

Red concentrations exceed EPA Residential Soil RSL.
Concentrations highlighted in yellow exceed EPA Industrial Soil RSL.

Table A-13 Phase II Background ISM Sediment Analytical Results Compared to Human Health Screening Levels

| Location | | | | | Con Hook Marsh Shoreline | | | | |

ATTACHMENT 2

PERMUTATION TEST RESULTS

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Phase I Soil Background Comparison Permutation Tests

					Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-01	3	3	0.004608154	8	8	0.013412476	-0.008804321	0.96	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-02	3	3	0.052322388	8	8	0.013412476	0.038909912	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-03	3	3	0.010696411	8	8	0.013412476	-0.002716064	0.67	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-04	3	2	0.041000366	8	8	0.013412476	0.027587891	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-05	3	3	0.007843018	8	8	0.013412476	-0.005569458	0.88	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-09	3	3	0.00630188	8	8	0.013412476	-0.007110596	0.94	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-11	3	3	0.026000977	8	8	0.013412476	0.012588501	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-12	3	3	0.056671143	8	8	0.013412476	0.043258667	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-13	3	3	0.363327026	8	8	0.013412476	0.349914551	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-16	3	3	0.020568848	8	8	0.013412476	0.007156372	0.13	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-17	3	3	0.031005859	8	8	0.013412476	0.017593384	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-18	3	3	0.040328979	8	8	0.013412476	0.026916504	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-19	3	3	0.017333984	8	8	0.013412476	0.003921509	0.23	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-20	3	3	0.008728027	8	8	0.013412476	-0.004684448	0.84	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-21	3	3	0.005599976	8	8	0.013412476	-0.0078125	0.96	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-22	3	3	0.040664673	8	8	0.013412476	0.027252197	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-01	3	3	0.007095337	8	8	0.012390137	-0.0052948	0.93	Do Not Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-02	3	3	0.042007446	8	8	0.012390137	0.02961731	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-03	3	3	0.012268066	8	8	0.012390137	-0.00012207	0.55	Do Not Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-04	3	2	0.054000854	8	8	0.012390137	0.041610718	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-05	3	3	0.010131836	8	8	0.012390137	-0.002258301	0.72	Do Not Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-09	3	3	0.008651733	8	8	0.012390137	-0.003738403	0.84	Do Not Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-11	3	3	0.041000366	8	8	0.012390137	0.028610229	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-12	3	3	0.068664551	8	8	0.012390137	0.056274414	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-13	3	3	0.413330078	8	8	0.012390137	0.400939941	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-16	3	3	0.027404785	8	8	0.012390137	0.015014648	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-17	3	3	0.046340942	8	8	0.012390137	0.033950806	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-18	3	3	0.067337036	8	8	0.012390137	0.054946899	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-19	3	3	0.027008057	8	8	0.012390137	0.01461792	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-20	3	3	0.013000488	8	8	0.012390137	0.000610352	0.40	Do Not Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-21	3	3	0.007659912	8	8	0.012390137	-0.004730225	0.90	Do Not Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-22	3	3	0.061340332	8	8	0.012390137	0.048950195	<0.05	Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-01	3	3	0.006393433	8	8	0.038757324	-0.032363892	0.97	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-02	3	3	0.17666626	8	8	0.038757324	0.137908936	<0.05	Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-03	3	3	0.02633667	8	8	0.038757324	-0.012420654	0.68	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-04	3	3	0.101654053	8	8	0.038757324	0.062896729	0.09	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-05	3	3	0.016326904	8	8	0.038757324	-0.02243042	0.86	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-09	3	3	0.010604858	8	8	0.038757324	-0.028152466	0.94	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-11	3	3	0.021347046	8	8	0.038757324	-0.017410278	0.78	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-12	3	3	0.430007935	8	8	0.038757324	0.39125061	<0.05	Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-13	3	3	3.933334351	8	8	0.038757324	3.894577026	<0.05	Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-16	3	3	0.108657837	8	8	0.038757324	0.069900513	<0.05	Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-17	3	3	0.035675049	8	8	0.038757324	-0.003082275	0.54	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-18	3	3	0.050994873	8	8	0.038757324	0.012237549	0.28	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-19	3	3	0.037658691	8	8	0.038757324	-0.001098633	0.50	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-20	3	3	0.011444092	8	8	0.038757324	-0.027313232	0.94	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-21	3	3	0.011672974	8	8	0.038757324	-0.027084351	0.89	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-22	3	3	0.095657349	8	8	0.038757324	0.056900024	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-01	3	3	0.031326294	8	8	0.033493042	-0.002166748	0.52	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-02	3	3	0.11000061	8	8	0.033493042	0.076507568	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-03	3	3	0.039657593	8	8	0.033493042	0.006164551	0.31	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-04	3	3	0.209991455	8	8	0.033493042	0.176498413	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-05	3	3	0.019668579	8	8	0.033493042	-0.013824463	0.83	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-09	3	3	0.030670166	8	8	0.033493042	-0.002822876	0.45	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-11	3	3	0.186676025	8	8	0.033493042	0.153182983	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-12	3	3	0.059661865	8	8	0.033493042	0.026168823	0.06	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-13	3	1	0.566665649	8	8	0.033493042	0.533172607	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-16	3	3	0.031341553	8	8	0.033493042	-0.002151489	0.48	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-17	3	3	0.13999939	8	8	0.033493042	0.106506348	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-18	3	3	0.084335327	8	8	0.033493042	0.050842285	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-19	3	3	0.203338623	8	8	0.033493042	0.169845581	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-20	3	3	0.034011841	8	8	0.033493042	0.000518799	0.47	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-21	3	3	0.022659302	8	8	0.033493042	-0.01083374	0.76	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-22	3	3	0.196670532	8	8	0.033493042	0.16317749	<0.05	Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-01	3	3	11000	8	8	12162.5	-1162.5	0.76	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-02	3	3	13000	8	8	12162.5	837.5	0.40	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-03	3	3	13000	8	8	12162.5	837.5	0.38	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-04	3	3	10000	8	8	12162.5	-2162.5	0.87	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-05	3	3	13000	8	8	12162.5	837.5	0.41	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-06	3	3	10666.66667	8	8	12162.5	-1495.833328	0.83	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-07	3	3	10666.66667	8	8	12162.5	-1495.833328	0.87	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-09	3	3	10666.66667	8	8	12162.5	-1495.833328	0.87	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-10	3	3	10433.33333	8	8	12162.5	-1729.166672	0.89	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-11	3	3	10233.33333	8	8	12162.5	-1929.166672	0.91	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-12	3	3	11000	8	8	12162.5	-1162.5	0.76	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-13	3	3	11333.33333	8	8	12162.5	-829.1666718	0.68	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-14	3	3	10333.33333	8	8	12162.5	-1829.166672	0.91	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-15	3	3	11000	8	8	12162.5	-1162.5	0.78	Do Not Reject H0

Phase I Soil Background Comparison Permutation Tests

					Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-16	3	3	14000	8	8	12162.5	1837.5	0.21	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-17	3	3	5900	8	8	12162.5	-6262.5	1.00	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-18	3	3	9500	8	8	12162.5	-2662.5	0.91	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-19	3	3	20333.33334	8	8	12162.5	8170.833344	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-01	3	3	0.028320313	8	8	0.059188843	-0.03086853	0.83	Do Not Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-02	3	3	0.476669312	8	8	0.059188843	0.417480469	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-03	3	3	0.091339111	8	8	0.059188843	0.032150269	0.17	Do Not Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-04	3	3	0.313323975	8	8	0.059188843	0.254135132	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-05	3	3	0.060668945	8	8	0.059188843	0.001480103	0.52	Do Not Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-09	3	3	0.03666687	8	8	0.059188843	-0.022521973	0.70	Do Not Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-11	3	3	0.125671387	8	8	0.059188843	0.066482544	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-12	3	3	0.733337402	8	8	0.059188843	0.67414856	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-13	3	3	6.166656494	8	8	0.059188843	6.107467651	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-16	3	3	0.134338379	8	8	0.059188843	0.075149536	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-17	3	3	0.186660767	8	8	0.059188843	0.127471924	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-18	3	3	0.169998169	8	8	0.059188843	0.110809326	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-19	3	3	0.28666687	8	8	0.059188843	0.227478027	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-20	3	3	0.04133606	8	8	0.059188843	-0.017852783	0.73	Do Not Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-21	3	3	0.040664673	8	8	0.059188843	-0.01852417	0.72	Do Not Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-22	3	3	0.333328247	8	8	0.059188843	0.274139404	<0.05	Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-01	3	3	0.5	8	8	0.986236572	-0.486236572	1.00	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-02	3	3	0.636672974	8	8	0.986236572	-0.349563599	0.98	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-03	3	3	0.659988403	8	8	0.986236572	-0.326248169	0.98	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-04	3	3	1.699996948	8	8	0.986236572	0.713760376	<0.05	Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-05	3	3	0.516662598	8	8	0.986236572	-0.469573975	1.00	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-06	3	3	0.866653442	8	8	0.986236572	-0.11958313	0.76	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-07	3	3	1.616668701	8	8	0.986236572	0.630432129	0.07	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-09	3	3	0.433334351	8	8	0.986236572	-0.552902222	1.00	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-10	3	3	0.38999939	8	8	0.986236572	-0.596237183	1.00	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-11	3	3	0.82333374	8	8	0.986236572	-0.162902832	0.86	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-12	3	3	0.636672974	8	8	0.986236572	-0.349563599	0.98	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-13	3	3	1.699996948	8	8	0.986236572	0.713760376	<0.05	Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-14	3	3	0.583343506	8	8	0.986236572	-0.402893066	0.98	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-15	3	3	0.833328247	8	8	0.986236572	-0.152908325	0.83	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-16	3	3	0.419998169	8	8	0.986236572	-0.566238403	1.00	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-17	3	3	7.900009155	8	8	0.986236572	6.913772583	<0.05	Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-18	3	3	6.533325195	8	8	0.986236572	5.547088623	<0.05	Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-19	3	3	0.42666626	8	8	0.986236572	-0.559570313	1.00	Do Not Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-01	3	3	10.6333313	8	8	5.325012207	5.308319092	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-02	3	3	13.66667175	8	8	5.325012207	8.341659546	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-03	3	3	13.33334351	8	8	5.325012207	8.008331299	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-04	3	3	31.33334351	8	8	5.325012207	26.0083313	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-05	3	3	11.33332825	8	8	5.325012207	6.00831604	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-06	3	3	9.666656494	8	8	5.325012207	4.341644287	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-07	3	3	17.33332825	8	8	5.325012207	12.00831604	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-09	3	3	7.066665649	8	8	5.325012207	1.741653442	0.14	Do Not Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-10	3	3	7.066665649	8	8	5.325012207	1.741653442	0.15	Do Not Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-11	3	3	39.66665649	8	8	5.325012207	34.34164429	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-12	3	3	13.66667175	8	8	5.325012207	8.341659546	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-13	3	3	10.56666565	8	8	5.325012207	5.241653442	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-14	3	3	17	8	8	5.325012207	11.67498779	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-15	3	3	6.866668701	8	8	5.325012207	1.541656494	0.16	Do Not Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-16	3	3	7.033325195	8	8	5.325012207	1.708312988	0.13	Do Not Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-17	3	3	6.566665649	8	8	5.325012207	1.241653442	0.20	Do Not Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-18	3	3	12.6000061	8	8	5.325012207	7.274993896	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-19	3	3	9.466674805	8	8	5.325012207	4.141662598	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-01	3	3	67.33334351	8	8	33.375	33.95834351	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-02	3	3	73.66667175	8	8	33.375	40.29167175	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-03	3	3	79.66667175	8	8	33.375	46.29167175	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-04	3	3	85	8	8	33.375	51.625	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-05	3	3	72.66667175	8	8	33.375	39.29167175	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-06	3	3	65.66667175	8	8	33.375	32.29167175	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-07	3	3	104.3333282	8	8	33.375	70.95832825	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-09	3	3	61.66665649	8	8	33.375	28.29165649	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-10	3	3	57	8	8	33.375	23.625	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-11	3	3	77.66665649	8	8	33.375	44.29165649	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-12	3	3	80.66667175	8	8	33.375	47.29167175	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-13	3	3	90	8	8	33.375	56.625	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-14	3	3	78.33332825	8	8	33.375	44.95832825	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-15	3	3	60.33332825	8	8	33.375	26.95832825	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-16	3	3	58.66667175	8	8	33.375	25.29167175	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-17	3	3	133.3333435	8	8	33.375	99.95834351	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-18	3	3	276.6666718	8	8	33.375	243.2916718	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-19	3	3	75.66667175	8	8	33.375	42.29167175	<0.05	Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-01	3	3	0.130004883	8	8	0.307479858	-0.177474976	0.76	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-02	3	3	2.066665649	8	8	0.307479858	1.759185791	<0.05	Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-03	3	3	0.38999939	8	8	0.307479858	0.082519531	0.34	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-04	3	3	1.130004883	8	8	0.307479858	0.822525024	<0.05	Reject H0

Phase I Soil Background Comparison Permutation Tests

					Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-05	3	3	0.316665649	8	8	0.307479858	0.009185791	0.51	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-09	3	3	0.156661987	8	8	0.307479858	-0.150817871	0.72	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-11	3	3	0.720001221	8	8	0.307479858	0.412521362	<0.05	Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-12	3	3	1.933334351	8	8	0.307479858	1.625854492	<0.05	Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-13	3	3	14.1333313	8	8	0.307479858	13.82585144	<0.05	Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-16	3	3	0.383346558	8	8	0.307479858	0.075866699	0.38	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-17	3	3	0.649993896	8	8	0.307479858	0.342514038	0.05	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-18	3	3	0.706680298	8	8	0.307479858	0.399200439	0.07	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-19	3	3	1.566665649	8	8	0.307479858	1.259185791	<0.05	Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-20	3	3	0.14666748	8	8	0.307479858	-0.160812378	0.73	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-21	3	3	0.148666382	8	8	0.307479858	-0.158813477	0.80	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-22	3	3	1.5	8	8	0.307479858	1.192520142	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-01	3	3	0.149993896	8	8	0.329742432	-0.179748535	0.79	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-02	3	3	1.733322144	8	8	0.329742432	1.403579712	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-03	3	3	0.403335571	8	8	0.329742432	0.07359314	0.37	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-04	3	3	1.100006104	8	8	0.329742432	0.770263672	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-05	3	3	0.279998779	8	8	0.329742432	-0.049743652	0.59	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-09	3	3	0.17666626	8	8	0.329742432	-0.153076172	0.77	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-11	3	3	0.940002441	8	8	0.329742432	0.61026001	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-12	3	3	1.600006104	8	8	0.329742432	1.270263672	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-13	3	3	10.69999695	8	8	0.329742432	10.37025452	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-16	3	3	0.380004883	8	8	0.329742432	0.050262451	0.38	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-17	3	3	0.553329468	8	8	0.329742432	0.223587036	0.17	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-18	3	3	0.64666748	8	8	0.329742432	0.316925049	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-19	3	3	1.259994507	8	8	0.329742432	0.930252075	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-20	3	3	0.159988403	8	8	0.329742432	-0.169754028	0.76	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-21	3	3	0.13633728	8	8	0.329742432	-0.193405151	0.81	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-22	3	3	1.433334351	8	8	0.329742432	1.103591919	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-01	3	3	0.233337402	8	8	0.523986816	-0.290649414	0.76	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-02	3	3	2.466659546	8	8	0.523986816	1.942672729	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-03	3	3	0.593322754	8	8	0.523986816	0.069335938	0.42	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-04	3	3	2.566665649	8	8	0.523986816	2.042678833	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-05	3	3	0.410003662	8	8	0.523986816	-0.113983154	0.61	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-09	3	3	0.279998779	8	8	0.523986816	-0.243988037	0.74	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-11	3	3	1.300003052	8	8	0.523986816	0.776016235	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-12	3	3	2.333343506	8	8	0.523986816	1.809356689	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-13	3	3	14.56666565	8	8	0.523986816	14.04267883	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-16	3	3	0.563339233	8	8	0.523986816	0.039352417	0.46	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-17	3	3	0.96333313	8	8	0.523986816	0.439346313	0.09	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-18	3	3	1.186676025	8	8	0.523986816	0.662689209	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-19	3	3	2.266662598	8	8	0.523986816	1.742675781	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-20	3	3	0.253326416	8	8	0.523986816	-0.2706604	0.76	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-21	3	3	0.226669312	8	8	0.523986816	-0.297317505	0.76	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-22	3	3	2.266677856	8	8	0.523986816	1.74269104	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-01	3	3	0.116668701	8	8	0.261871338	-0.145202637	0.80	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-02	3	3	0.976669312	8	8	0.261871338	0.714797974	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-03	3	3	0.289993286	8	8	0.261871338	0.028121948	0.36	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-04	3	3	0.880004883	8	8	0.261871338	0.618133545	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-05	3	3	0.179992676	8	8	0.261871338	-0.081878662	0.67	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-09	3	3	0.120010376	8	8	0.261871338	-0.141860962	0.77	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-11	3	3	0.933334351	8	8	0.261871338	0.671463013	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-12	3	3	1.129989624	8	8	0.261871338	0.868118286	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-13	3	3	6.433334351	8	8	0.261871338	6.171463013	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-16	3	3	0.25	8	8	0.261871338	-0.011871338	0.53	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-17	3	3	0.35333252	8	8	0.261871338	0.091461182	0.23	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-18	3	3	0.449996948	8	8	0.261871338	0.18812561	0.14	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-19	3	3	0.763336182	8	8	0.261871338	0.501464844	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-20	3	3	0.123336792	8	8	0.261871338	-0.138534546	0.76	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-21	3	3	0.080337524	8	8	0.261871338	-0.181533813	0.88	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-22	3	3	0.806671143	8	8	0.261871338	0.544799805	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-01	3	3	0.077667236	8	8	0.191375732	-0.113708496	0.86	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-02	3	3	0.763336182	8	8	0.191375732	0.571960449	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-03	3	3	0.186676025	8	8	0.191375732	-0.004699707	0.49	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-04	3	3	0.803329468	8	8	0.191375732	0.611953735	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-05	3	3	0.133331299	8	8	0.191375732	-0.058044434	0.66	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-09	3	3	0.094665527	8	8	0.191375732	-0.096710205	0.76	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-11	3	3	0.453338623	8	8	0.191375732	0.261962891	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-12	3	3	0.89666748	8	8	0.191375732	0.705291748	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-13	3	3	5.866653442	8	8	0.191375732	5.67527771	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-16	3	3	0.203323364	8	8	0.191375732	0.011947632	0.41	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-17	3	3	0.300003052	8	8	0.191375732	0.108627319	0.17	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-18	3	3	0.32333374	8	8	0.191375732	0.131958008	0.12	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-19	3	3	0.793334961	8	8	0.191375732	0.601959229	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-20	3	3	0.082000732	8	8	0.191375732	-0.109375	0.78	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-21	3	3	0.075668335	8	8	0.191375732	-0.115707397	0.83	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-22	3	3	0.759994507	8	8	0.191375732	0.568618774	<0.05	Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-01	3	3	0.523330688	8	8	0.43963623	0.083694458	0.36	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-02	3	3	0.579986572	8	8	0.43963623	0.140350342	0.27	Do Not Reject H0

Phase I Soil Background Comparison Permutation Tests

					Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-03	3	3	0.556671143	8	8	0.43963623	0.117034912	0.27	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-04	3	3	0.483337402	8	8	0.43963623	0.043701172	0.46	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-05	3	3	0.580001831	8	8	0.43963623	0.140365601	0.23	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-06	3	3	0.529998779	8	8	0.43963623	0.090362549	0.36	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-07	3	3	0.53666687	8	8	0.43963623	0.09703064	0.34	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-09	3	3	0.496658325	8	8	0.43963623	0.057022095	0.44	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-10	3	3	0.553329468	8	8	0.43963623	0.113693237	0.29	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-11	3	3	0.550003052	8	8	0.43963623	0.110366821	0.29	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-12	3	3	0.64666748	8	8	0.43963623	0.20703125	0.18	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-13	3	3	0.599990845	8	8	0.43963623	0.160354614	0.24	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-14	3	3	0.550003052	8	8	0.43963623	0.110366821	0.30	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-15	3	3	0.479995728	8	8	0.43963623	0.040359497	0.44	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-16	3	3	0.576675415	8	8	0.43963623	0.137039185	0.29	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-17	3	3	0.35333252	8	8	0.43963623	-0.086303711	0.68	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-18	3	3	0.590011597	8	8	0.43963623	0.150375366	0.25	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-19	3	3	0.406661987	8	8	0.43963623	-0.032974243	0.58	Do Not Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-01	3	3	0.283325195	8	8	0.174987793	0.108337402	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-02	3	3	0.226669312	8	8	0.174987793	0.051681519	0.13	Do Not Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-03	3	3	0.253326416	8	8	0.174987793	0.078338623	0.06	Do Not Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-04	3	3	0.986679077	8	8	0.174987793	0.811691284	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-05	3	3	0.209991455	8	8	0.174987793	0.035003662	0.22	Do Not Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-06	3	0	1.7	8	8	0.174987793	1.525012207	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-07	3	3	0.563323975	8	8	0.174987793	0.388336182	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-09	3	3	0.236663818	8	8	0.174987793	0.061676025	0.12	Do Not Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-10	3	2	0.179992676	8	8	0.174987793	0.005004883	0.44	Do Not Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-11	3	3	0.366668701	8	8	0.174987793	0.191680908	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-12	3	3	0.35333252	8	8	0.174987793	0.178344727	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-13	3	3	0.753341675	8	8	0.174987793	0.578353882	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-14	3	3	0.276672363	8	8	0.174987793	0.10168457	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-15	3	3	0.513336182	8	8	0.174987793	0.338348389	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-16	3	3	0.283340454	8	8	0.174987793	0.108352661	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-17	3	3	13.66665649	8	8	0.174987793	13.4916687	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-18	3	3	4.633331299	8	8	0.174987793	4.458343506	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-19	3	3	0.293334961	8	8	0.174987793	0.118347168	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-01	3	3	4533.333328	8	8	1222.5	3310.833328	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-02	3	3	10600	8	8	1222.5	9377.5	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-03	3	3	6233.333344	8	8	1222.5	5010.833344	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-04	3	3	9666.666656	8	8	1222.5	8444.166656	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-05	3	3	3233.333344	8	8	1222.5	2010.833344	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-06	3	3	14333.33333	8	8	1222.5	13110.83333	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-07	3	3	16000	8	8	1222.5	14777.5	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-09	3	3	7366.666672	8	8	1222.5	6144.166672	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-10	3	3	15000	8	8	1222.5	13777.5	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-11	3	3	26666.66666	8	8	1222.5	25444.16666	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-12	3	3	11333.33334	8	8	1222.5	10110.83334	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-13	3	3	8866.666672	8	8	1222.5	7644.166672	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-14	3	3	8400	8	8	1222.5	7177.5	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-15	3	3	8166.666672	8	8	1222.5	6944.166672	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-16	3	3	7600	8	8	1222.5	6377.5	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-17	3	3	58333.33333	8	8	1222.5	57110.83333	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-18	3	3	12333.33333	8	8	1222.5	11110.83333	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-19	3	3	12333.33333	8	8	1222.5	11110.83333	<0.05	Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-01	3	3	13.33332825	8	8	14.6625061	-1.329177856	0.57	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-02	3	3	15	8	8	14.6625061	0.337493896	0.44	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-03	3	3	15.33332825	8	8	14.6625061	0.670822144	0.43	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-04	3	3	17	8	8	14.6625061	2.337493896	0.36	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-05	3	3	15	8	8	14.6625061	0.337493896	0.45	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-06	3	3	13	8	8	14.6625061	-1.662506104	0.62	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-07	3	3	16	8	8	14.6625061	1.337493896	0.40	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-09	3	3	13	8	8	14.6625061	-1.662506104	0.66	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-10	3	3	13.66667175	8	8	14.6625061	-0.995834351	0.55	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-11	3	3	15	8	8	14.6625061	0.337493896	0.45	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-12	3	3	15	8	8	14.6625061	0.337493896	0.45	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-13	3	3	14.66667175	8	8	14.6625061	0.004165649	0.46	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-14	3	3	13.66667175	8	8	14.6625061	-0.995834351	0.58	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-15	3	3	15	8	8	14.6625061	0.337493896	0.42	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-16	3	3	14.66667175	8	8	14.6625061	0.004165649	0.49	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-17	3	3	16.96665955	8	8	14.6625061	2.304153442	0.39	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-18	3	3	95.66667175	8	8	14.6625061	81.00416565	<0.05	Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-19	3	3	10.33332825	8	8	14.6625061	-4.329177856	0.80	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-01	3	3	0.143325806	8	8	0.424224854	-0.280899048	0.89	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-02	3	3	1.966674805	8	8	0.424224854	1.542449951	<0.05	Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-03	3	3	0.403335571	8	8	0.424224854	-0.020889282	0.51	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-04	3	3	1.833328247	8	8	0.424224854	1.409103394	<0.05	Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-05	3	3	0.313339233	8	8	0.424224854	-0.11088562	0.64	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-09	3	3	0.17666626	8	8	0.424224854	-0.247558594	0.81	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-11	3	3	1.003326416	8	8	0.424224854	0.579101563	<0.05	Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-12	3	3	2.033325195	8	8	0.424224854	1.609100342	<0.05	Reject H0

Phase I Soil Background Comparison Permutation Tests

					Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-13	3	3	13.7666626	8	8	0.424224854	13.34243774	<0.05	Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-16	3	3	0.380004883	8	8	0.424224854	-0.044219971	0.58	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-17	3	3	0.743331909	8	8	0.424224854	0.319107056	0.08	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-18	3	3	1.153335571	8	8	0.424224854	0.729110718	<0.05	Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-19	3	3	1.459991455	8	8	0.424224854	1.035766602	<0.05	Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-20	3	3	0.173339844	8	8	0.424224854	-0.25088501	0.83	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-21	3	3	0.152328491	8	8	0.424224854	-0.271896362	0.88	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-22	3	3	1.599990845	8	8	0.424224854	1.175765991	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-01	3	3	7.100006104	8	8	3.748733521	3.351272583	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-02	3	3	7.566665649	8	8	3.748733521	3.817932129	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-03	3	3	7.633331299	8	8	3.748733521	3.884597778	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-04	3	3	7.300003052	8	8	3.748733521	3.551269531	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-05	3	3	7.799987793	8	8	3.748733521	4.051254272	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-06	3	3	7.233337402	8	8	3.748733521	3.484603882	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-07	3	3	6.100006104	8	8	3.748733521	2.351272583	0.13	Do Not Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-09	3	3	7.433334351	8	8	3.748733521	3.68460083	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-10	3	3	7.800003052	8	8	3.748733521	4.051269531	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-11	3	3	6.800003052	8	8	3.748733521	3.051269531	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-12	3	3	7.666656494	8	8	3.748733521	3.917922974	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-13	3	3	8.433334351	8	8	3.748733521	4.68460083	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-14	3	3	7	8	8	3.748733521	3.251266479	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-15	3	3	6.766662598	8	8	3.748733521	3.017929077	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-16	3	3	8.300003052	8	8	3.748733521	4.551269531	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-17	3	3	5.933334351	8	8	3.748733521	2.18460083	0.12	Do Not Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-18	3	3	7.266662598	8	8	3.748733521	3.517929077	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-19	3	3	16	8	8	3.748733521	12.25126648	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-01	3	3	21.33332825	8	8	14.92500305	6.408325195	0.14	Do Not Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-02	3	3	27	8	8	14.92500305	12.07499695	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-03	3	3	26.66665649	8	8	14.92500305	11.74165344	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-04	3	3	56	8	8	14.92500305	41.07499695	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-05	3	3	24.66667175	8	8	14.92500305	9.741668701	0.07	Do Not Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-06	3	3	36.66665649	8	8	14.92500305	21.74165344	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-07	3	3	49	8	8	14.92500305	34.07499695	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-09	3	3	28.33334351	8	8	14.92500305	13.40834045	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-10	3	3	23	8	8	14.92500305	8.074996948	0.09	Do Not Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-11	3	3	33.33332825	8	8	14.92500305	18.4083252	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-12	3	3	48.66667175	8	8	14.92500305	33.7416687	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-13	3	3	360	8	8	14.92500305	345.0749969	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-14	3	3	24.66665649	8	8	14.92500305	9.741653442	0.06	Do Not Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-15	3	3	31.33334351	8	8	14.92500305	16.40834045	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-16	3	3	36.66665649	8	8	14.92500305	21.74165344	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-17	3	3	191	8	8	14.92500305	176.0749969	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-18	3	3	913.3333282	8	8	14.92500305	898.4083252	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-19	3	3	150	8	8	14.92500305	135.0749969	<0.05	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-01	3	3	0.030334473	7	6	0.06703186	-0.0367	0.82	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-02	3	3	0.316665649	7	6	0.06703186	0.249633789	0.01	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-03	3	3	0.076324463	7	6	0.06703186	0.00929	0.37	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-04	3	3	0.279998779	7	6	0.06703186	0.212966919	0.01	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-05	3	3	0.054000854	7	6	0.06703186	-0.013031006	0.65	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-09	3	3	0.030990601	7	6	0.06703186	-0.03604126	0.81	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-11	3	3	0.189987183	7	6	0.06703186	0.122955322	0.02	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-12	3	3	0.316665649	7	6	0.06703186	0.249633789	<0.01	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-13	3	3	1.966659546	7	6	0.06703186	1.899627686	<0.01	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-16	3	3	0.075683594	7	6	0.06703186	0.00865	0.44	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-17	3	3	0.120986938	7	6	0.06703186	0.053955078	0.10	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-18	3	3	0.153335571	7	6	0.06703186	0.086303711	0.04	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-19	3	3	0.313323975	7	6	0.06703186	0.246292114	<0.01	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-20	3	3	0.028671265	7	6	0.06703186	-0.038360596	0.81	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-21	3	3	0.024337769	7	6	0.06703186	-0.042694092	0.84	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-22	3	3	0.270004272	7	6	0.06703186	0.202972412	0.02	Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-01	3	3	0.233337402	8	8	0.907501221	-0.674163818	0.91	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-02	3	3	3.633346558	8	8	0.907501221	2.725845337	<0.05	Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-03	3	3	0.726669312	8	8	0.907501221	-0.180831909	0.61	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-04	3	3	4.466674805	8	8	0.907501221	3.559173584	<0.05	Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-05	3	3	0.539993286	8	8	0.907501221	-0.367507935	0.73	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-09	3	3	0.350006104	8	8	0.907501221	-0.557495117	0.85	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-11	3	3	1.03666687	8	8	0.907501221	0.129165649	0.41	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-12	3	3	3.866668701	8	8	0.907501221	2.95916748	<0.05	Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-13	3	3	31	8	8	0.907501221	30.09249878	<0.05	Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-16	3	3	0.790008545	8	8	0.907501221	-0.117492676	0.59	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-17	3	3	1.213348389	8	8	0.907501221	0.305847168	0.28	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-18	3	3	1.290008545	8	8	0.907501221	0.382507324	0.24	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-19	3	3	2.433334351	8	8	0.907501221	1.52583313	<0.05	Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-20	3	3	0.290008545	8	8	0.907501221	-0.617492676	0.89	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-21	3	3	0.269989014	8	8	0.907501221	-0.637512207	0.92	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-22	3	3	2.599990845	8	8	0.907501221	1.692489624	<0.05	Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-01	3	3	0.008239746	8	8	0.055587769	-0.047348022	0.97	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-02	3	3	0.150009155	8	8	0.055587769	0.094421387	<0.05	Reject H0

Phase I Soil Background Comparison Permutation Tests

					Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-03	3	3	0.027999878	8	8	0.055587769	-0.027587891	0.92	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-04	3	3	0.140991211	8	8	0.055587769	0.085403442	0.08	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-05	3	3	0.018325806	8	8	0.055587769	-0.037261963	0.96	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-09	3	3	0.013290405	8	8	0.055587769	-0.042297363	0.95	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-11	3	3	0.043991089	8	8	0.055587769	-0.01159668	0.67	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-12	3	3	0.346664429	8	8	0.055587769	0.29107666	<0.05	Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-13	3	3	3.033340454	8	8	0.055587769	2.977752686	<0.05	Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-16	3	3	0.075668335	8	8	0.055587769	0.020080566	0.18	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-17	3	3	0.04598999	8	8	0.055587769	-0.009597778	0.67	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-18	3	3	0.066665649	8	8	0.055587769	0.011077881	0.29	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-19	3	3	0.04800415	8	8	0.055587769	-0.007583618	0.66	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-20	3	3	0.015258789	8	8	0.055587769	-0.040328979	0.95	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-21	3	3	0.014831543	8	8	0.055587769	-0.040756226	0.98	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-22	3	3	0.106338501	8	8	0.055587769	0.050750732	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-01	3	3	1.558258057	8	8	4.054122925	-2.495864868	0.86	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-02	3	3	20.1000061	8	8	4.054122925	16.04588318	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-03	3	3	4.350631714	8	8	4.054122925	0.296508789	0.44	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-04	3	3	18.022995	8	8	4.054122925	13.96887207	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-05	3	3	3.140960693	8	8	4.054122925	-0.913162231	0.62	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-09	3	3	1.931427002	8	8	4.054122925	-2.122695923	0.78	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-11	3	3	9.054000854	8	8	4.054122925	4.99987793	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-12	3	3	21.84367371	8	8	4.054122925	17.78955078	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-13	3	3	157.843338	8	8	4.054122925	153.7892151	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-16	3	3	4.701965332	8	8	4.054122925	0.647842407	0.43	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-17	3	3	6.504333496	8	8	4.054122925	2.450210571	0.16	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-18	3	3	7.623336792	8	8	4.054122925	3.569213867	0.06	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-19	3	3	13.85333252	8	8	4.054122925	9.799209595	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-20	3	3	1.66734314	8	8	4.054122925	-2.386779785	0.80	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-21	3	3	1.495666504	8	8	4.054122925	-2.558456421	0.85	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-22	3	3	14.82000732	8	8	4.054122925	10.7658844	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-01	3	3	0.136657715	8	8	0.287521362	-0.150863647	0.77	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-02	3	3	1.14666748	8	8	0.287521362	0.859146118	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-03	3	3	0.306671143	8	8	0.287521362	0.01914978	0.45	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-04	3	3	1.033340454	8	8	0.287521362	0.745819092	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-05	3	3	0.210006714	8	8	0.287521362	-0.077514648	0.64	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-09	3	3	0.14666748	8	8	0.287521362	-0.140853882	0.72	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-11	3	3	0.873336792	8	8	0.287521362	0.58581543	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-12	3	3	1.220001221	8	8	0.287521362	0.932479858	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-13	3	3	7.333328247	8	8	0.287521362	7.045806885	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-16	3	3	0.306671143	8	8	0.287521362	0.01914978	0.43	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-17	3	3	0.399993896	8	8	0.287521362	0.112472534	0.27	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-18	3	3	0.490005493	8	8	0.287521362	0.202484131	0.15	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-19	3	3	1.030014038	8	8	0.287521362	0.742492676	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-20	3	3	0.133331299	8	8	0.287521362	-0.154190063	0.77	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-21	3	3	0.098007202	8	8	0.287521362	-0.18951416	0.88	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-22	3	3	0.949996948	8	8	0.287521362	0.662475586	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-01	3	3	15666.66667	8	8	14200	1466.666672	0.29	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-02	3	3	18666.66667	8	8	14200	4466.666672	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-03	3	3	18666.66667	8	8	14200	4466.666672	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-04	3	3	19333.33333	8	8	14200	5133.333328	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-05	3	3	19666.66667	8	8	14200	5466.666672	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-06	3	3	17333.33334	8	8	14200	3133.333344	0.12	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-07	3	3	18666.66667	8	8	14200	4466.666672	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-09	3	3	16333.33333	8	8	14200	2133.333328	0.19	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-10	3	3	17333.33333	8	8	14200	3133.333328	0.11	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-11	3	3	18333.33333	8	8	14200	4133.333328	0.05	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-12	3	3	17000	8	8	14200	2800	0.15	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-13	3	3	18333.33333	8	8	14200	4133.333328	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-14	3	3	16333.33333	8	8	14200	2133.333328	0.21	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-15	3	3	18333.33333	8	8	14200	4133.333328	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-16	3	3	21000	8	8	14200	6800	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-17	3	3	16333.33333	8	8	14200	2133.333328	0.23	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-18	3	3	32333.33333	8	8	14200	18133.33333	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-19	3	3	29333.33333	8	8	14200	15133.33333	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-01	3	3	64.33332825	8	8	55	9.333328247	0.27	Do Not Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-02	3	3	93.66667175	8	8	55	38.66667175	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-03	3	3	130	8	8	55	75	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-04	3	3	296.6666718	8	8	55	241.6666718	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-05	3	3	86	8	8	55	31	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-06	3	3	98.33332825	8	8	55	43.33332825	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-07	3	3	1086.666672	8	8	55	1031.666672	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-09	3	3	58.33334351	8	8	55	3.333343506	0.31	Do Not Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-10	3	3	34.33334351	8	8	55	-20.66665649	1.00	Do Not Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-11	3	3	123.3333282	8	8	55	68.33332825	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-12	3	3	84.66667175	8	8	55	29.66667175	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-13	3	3	166.6666718	8	8	55	111.6666718	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-14	3	3	108.6666565	8	8	55	53.66665649	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-15	3	3	126.6666718	8	8	55	71.66667175	<0.05	Reject H0

Phase I Soil Background Comparison Permutation Tests

					Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-16	3	3	42	8	8	55	-13	0.94	Do Not Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-17	3	3	1866.666672	8	8	55	1811.666672	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-18	3	3	1433.333328	8	8	55	1378.333328	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-19	3	3	55.33332825	8	8	55	0.333328247	0.41	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-01	3	3	0.306930542	8	8	0.668014526	-0.361083984	0.86	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-02	3	3	5.030014038	8	8	0.668014526	4.361999512	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-03	3	3	0.974304199	8	8	0.668014526	0.306289673	0.21	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-04	3	3	3.929672241	8	8	0.668014526	3.261657715	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-05	3	3	0.70362854	8	8	0.668014526	0.035614014	0.42	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-09	3	3	0.399108887	8	8	0.668014526	-0.26890564	0.77	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-11	3	3	1.604003906	8	8	0.668014526	0.93598938	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-12	3	3	6.513671875	8	8	0.668014526	5.845657349	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-13	3	3	52.07666016	8	8	0.668014526	51.40864563	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-16	3	3	1.369628906	8	8	0.668014526	0.70161438	0.06	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-17	3	3	1.107666016	8	8	0.668014526	0.439651489	0.10	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-18	3	3	1.473007202	8	8	0.668014526	0.804992676	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-19	3	3	1.552337646	8	8	0.668014526	0.88432312	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-20	3	3	0.260437012	8	8	0.668014526	-0.407577515	0.91	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-21	3	3	0.260101318	8	8	0.668014526	-0.407913208	0.86	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-22	3	3	1.964660645	8	8	0.668014526	1.296646118	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-01	3	3	4266.666656	8	8	1712.5	2554.166656	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-02	3	3	8766.666656	8	8	1712.5	7054.166656	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-03	3	3	6066.666672	8	8	1712.5	4354.166672	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-04	3	3	6466.666656	8	8	1712.5	4754.166656	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-05	3	3	4966.666656	8	8	1712.5	3254.166656	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-06	3	3	10333.33333	8	8	1712.5	8620.833328	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-07	3	3	11000	8	8	1712.5	9287.5	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-09	3	3	6000	8	8	1712.5	4287.5	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-10	3	3	10300	8	8	1712.5	8587.5	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-11	3	3	18000	8	8	1712.5	16287.5	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-12	3	3	7633.333344	8	8	1712.5	5920.833344	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-13	3	3	5533.333344	8	8	1712.5	3820.833344	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-14	3	3	6466.666672	8	8	1712.5	4754.166672	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-15	3	3	6533.333344	8	8	1712.5	4820.833344	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-16	3	3	6266.666672	8	8	1712.5	4554.166672	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-17	3	3	35000	8	8	1712.5	33287.5	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-18	3	3	7866.666672	8	8	1712.5	6154.166672	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-19	3	3	6900	8	8	1712.5	5187.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-01	3	3	473.3333282	8	8	211.5	261.8333282	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-02	3	3	640	8	8	211.5	428.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-03	3	3	626.6666565	8	8	211.5	415.1666565	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-04	3	3	473.3333282	8	8	211.5	261.8333282	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-05	3	3	730	8	8	211.5	518.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-06	3	3	690	8	8	211.5	478.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-07	3	3	523.3333282	8	8	211.5	311.8333282	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-09	3	3	493.3333282	8	8	211.5	281.8333282	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-10	3	3	546.6666718	8	8	211.5	335.1666718	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-11	3	3	600	8	8	211.5	388.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-12	3	3	850	8	8	211.5	638.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-13	3	3	976.6666565	8	8	211.5	765.1666565	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-14	3	3	696.6666718	8	8	211.5	485.1666718	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-15	3	3	440	8	8	211.5	228.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-16	3	3	440	8	8	211.5	228.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-17	3	3	406.6666565	8	8	211.5	195.1666565	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-18	3	3	513.3333282	8	8	211.5	301.8333282	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-19	3	3	430	8	8	211.5	218.5	<0.05	Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-01	3	3	0.080657959	8	8	0.227493286	-0.146835327	1.00	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-02	3	3	0.09765625	8	8	0.227493286	-0.129837036	1.00	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-03	3	3	0.126663208	8	8	0.227493286	-0.100830078	0.98	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-04	3	3	0.286651611	8	8	0.227493286	0.059158325	0.13	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-05	3	3	0.153335571	8	8	0.227493286	-0.074157715	0.92	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-09	3	3	0.076004028	8	8	0.227493286	-0.151489258	1.00	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-11	3	3	0.183334351	8	8	0.227493286	-0.044158936	0.81	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-12	3	3	0.243331909	8	8	0.227493286	0.015838623	0.40	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-13	3	3	0.316665649	8	8	0.227493286	0.089172363	0.07	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-14	3	3	0.17666626	8	8	0.227493286	-0.050827026	0.82	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-15	3	3	0.21333313	8	8	0.227493286	-0.014160156	0.63	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-16	3	3	0.096328735	8	8	0.227493286	-0.131164551	1.00	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-17	3	3	0.78666687	8	8	0.227493286	0.559173584	<0.05	Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-18	3	3	2.700012207	8	8	0.227493286	2.472518921	<0.05	Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-19	3	3	0.333343506	8	8	0.227493286	0.10585022	0.13	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-01	3	3	0.008270264	8	8	0.017593384	-0.00932312	0.95	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-02	3	3	0.055664063	8	8	0.017593384	0.038070679	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-03	3	3	0.015991211	8	8	0.017593384	-0.001602173	0.57	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-04	3	1	0.050994873	8	8	0.017593384	0.033401489	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-05	3	3	0.01399231	8	8	0.017593384	-0.003601074	0.76	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-09	3	3	0.011245728	8	8	0.017593384	-0.006347656	0.94	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-11	3	3	0.085998535	8	8	0.017593384	0.068405151	<0.05	Reject H0

Phase I Soil Background Comparison Permutation Tests

					Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-12	3	3	0.151992798	8	8	0.017593384	0.134399414	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-13	3	3	0.933334351	8	8	0.017593384	0.915740967	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-16	3	3	0.054992676	8	8	0.017593384	0.037399292	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-17	3	3	0.078674316	8	8	0.017593384	0.061080933	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-18	3	3	0.226669312	8	8	0.017593384	0.209075928	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-19	3	3	0.065673828	8	8	0.017593384	0.048080444	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-20	3	3	0.013320923	8	8	0.017593384	-0.004272461	0.82	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-21	3	3	0.008987427	8	8	0.017593384	-0.008605957	0.97	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-22	3	3	0.060653687	8	8	0.017593384	0.043060303	<0.05	Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-01	3	3	14	8	8	13.02500916	0.974990845	0.41	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-02	3	3	17	8	8	13.02500916	3.974990845	0.24	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-03	3	3	16.66667175	8	8	13.02500916	3.641662598	0.23	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-04	3	3	15.66665649	8	8	13.02500916	2.641647339	0.28	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-05	3	3	18	8	8	13.02500916	4.974990845	0.20	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-06	3	3	15	8	8	13.02500916	1.974990845	0.32	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-07	3	3	14	8	8	13.02500916	0.974990845	0.40	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-09	3	3	14.66667175	8	8	13.02500916	1.641662598	0.39	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-10	3	3	15.66667175	8	8	13.02500916	2.641662598	0.30	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-11	3	3	16	8	8	13.02500916	2.974990845	0.25	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-12	3	3	15	8	8	13.02500916	1.974990845	0.33	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-13	3	3	16.33332825	8	8	13.02500916	3.308319092	0.29	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-14	3	3	15.66667175	8	8	13.02500916	2.641662598	0.29	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-15	3	3	14.33332825	8	8	13.02500916	1.308319092	0.37	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-16	3	3	16	8	8	13.02500916	2.974990845	0.26	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-17	3	3	13.96665955	8	8	13.02500916	0.941650391	0.49	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-18	3	3	25	8	8	13.02500916	11.97499084	0.07	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-19	3	3	16.66667175	8	8	13.02500916	3.641662598	0.27	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-01	3	3	0.082672119	8	8	0.43762207	-0.354949951	0.97	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-02	3	3	1.899993896	8	8	0.43762207	1.462371826	<0.05	Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-03	3	3	0.36000061	8	8	0.43762207	-0.07762146	0.61	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-04	3	3	1.953338623	8	8	0.43762207	1.515716553	<0.05	Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-05	3	3	0.240005493	8	8	0.43762207	-0.197616577	0.75	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-09	3	3	0.125	8	8	0.43762207	-0.31262207	0.91	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-11	3	3	0.35333252	8	8	0.43762207	-0.084289551	0.60	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-12	3	3	2.733337402	8	8	0.43762207	2.295715332	<0.05	Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-13	3	3	22.66665649	8	8	0.43762207	22.22903442	<0.05	Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-16	3	3	0.533340454	8	8	0.43762207	0.095718384	0.34	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-17	3	3	0.543334961	8	8	0.43762207	0.105712891	0.32	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-18	3	3	0.766662598	8	8	0.43762207	0.329040527	0.09	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-19	3	3	0.866668701	8	8	0.43762207	0.429046631	0.12	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-20	3	3	0.123336792	8	8	0.43762207	-0.314285278	0.93	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-21	3	3	0.147994995	8	8	0.43762207	-0.289627075	0.90	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-22	3	3	1.069992065	8	8	0.43762207	0.632369995	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-01	3	3	1200	8	8	727.5	472.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-02	3	3	1300	8	8	727.5	572.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-03	3	3	1300	8	8	727.5	572.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-04	3	3	1266.666672	8	8	727.5	539.1666718	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-05	3	3	1233.333328	8	8	727.5	505.8333282	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-06	3	3	1200	8	8	727.5	472.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-07	3	3	1033.333328	8	8	727.5	305.8333282	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-09	3	3	1266.666672	8	8	727.5	539.1666718	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-10	3	3	1333.333328	8	8	727.5	605.8333282	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-11	3	3	956.6666565	8	8	727.5	229.1666565	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-12	3	3	1100	8	8	727.5	372.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-13	3	3	1400	8	8	727.5	672.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-14	3	3	993.3333282	8	8	727.5	265.8333282	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-15	3	3	1200	8	8	727.5	472.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-16	3	3	1566.666656	8	8	727.5	839.1666565	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-17	3	3	1200	8	8	727.5	472.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-18	3	3	1840	8	8	727.5	1112.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-19	3	3	1433.333328	8	8	727.5	705.8333282	<0.05	Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-01	3	3	0.233337402	8	8	0.762481689	-0.529144287	0.88	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-02	3	3	3.566665649	8	8	0.762481689	2.80418396	<0.05	Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-03	3	3	0.730010986	8	8	0.762481689	-0.032470703	0.51	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-04	3	3	3.433334351	8	8	0.762481689	2.670852661	<0.05	Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-05	3	3	0.576675415	8	8	0.762481689	-0.185806274	0.61	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-09	3	3	0.326675415	8	8	0.762481689	-0.435806274	0.84	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-11	3	3	1.223327637	8	8	0.762481689	0.460845947	0.15	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-12	3	3	3.200012207	8	8	0.762481689	2.437530518	<0.05	Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-13	3	3	24.66667175	8	8	0.762481689	23.90419006	<0.05	Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-16	3	3	0.670013428	8	8	0.762481689	-0.092468262	0.55	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-17	3	3	1.206680298	8	8	0.762481689	0.444198608	0.15	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-18	3	3	1.223327637	8	8	0.762481689	0.460845947	0.17	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-19	3	3	1.966674805	8	8	0.762481689	1.204193115	0.05	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-20	3	3	0.276672363	8	8	0.762481689	-0.485809326	0.86	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-21	3	3	0.283340454	8	8	0.762481689	-0.479141235	0.85	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-22	3	3	2.633331299	8	8	0.762481689	1.870849609	<0.05	Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-01	3	3	0.356658936	8	8	0.959991455	-0.60333252	1.00	Do Not Reject H0

Phase I Soil Background Comparison Permutation Tests

					Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-02	3	3	0.319992065	8	8	0.959991455	-0.63999939	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-03	3	3	0.416671753	8	8	0.959991455	-0.543319702	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-04	3	3	0.486679077	8	8	0.959991455	-0.473312378	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-05	3	3	0.28666687	8	8	0.959991455	-0.673324585	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-06	3	3	0.350006104	8	8	0.959991455	-0.609985352	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-07	3	3	0.386672974	8	8	0.959991455	-0.573318481	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-09	3	3	0.289993286	8	8	0.959991455	-0.669998169	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-10	3	3	0.276657104	8	8	0.959991455	-0.683334351	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-11	3	3	0.550003052	8	8	0.959991455	-0.409988403	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-12	3	3	0.429992676	8	8	0.959991455	-0.529998779	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-13	3	3	0.61000061	8	8	0.959991455	-0.349990845	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-14	3	3	0.386672974	8	8	0.959991455	-0.573318481	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-15	3	3	0.53666687	8	8	0.959991455	-0.423324585	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-16	3	3	0.383331299	8	8	0.959991455	-0.576660156	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-17	3	3	0.466659546	8	8	0.959991455	-0.493331909	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-18	3	3	0.559997559	8	8	0.959991455	-0.399993896	0.98	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-19	3	3	0.403335571	8	8	0.959991455	-0.556655884	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-01	3	0	0.099	8	8	0.272491455	-0.173491455	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-02	3	0	0.1	8	8	0.272491455	-0.172491455	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-03	3	1	0.096008301	8	8	0.272491455	-0.176483154	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-04	3	3	0.102661133	8	8	0.272491455	-0.169830322	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-05	3	0	0.099	8	8	0.272491455	-0.173491455	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-06	3	3	0.07699585	8	8	0.272491455	-0.195495605	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-07	3	3	0.099990845	8	8	0.272491455	-0.17250061	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-09	3	0	0.095	8	8	0.272491455	-0.177491455	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-10	3	1	0.059005737	8	8	0.272491455	-0.213485718	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-11	3	3	0.079666138	8	8	0.272491455	-0.192825317	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-12	3	3	0.070999146	8	8	0.272491455	-0.20149231	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-13	3	3	0.089660645	8	8	0.272491455	-0.182830811	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-14	3	3	0.076675415	8	8	0.272491455	-0.19581604	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-15	3	3	0.080337524	8	8	0.272491455	-0.192153931	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-16	3	3	0.058334351	8	8	0.272491455	-0.214157104	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-17	3	3	0.623336792	8	8	0.272491455	0.350845337	<0.05	Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-18	3	3	0.800003052	8	8	0.272491455	0.527511597	<0.05	Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-19	3	3	0.123336792	8	8	0.272491455	-0.149154663	1.00	Do Not Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-01	3	3	101.6666565	8	8	43.75	57.91665649	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-02	3	3	73.66667175	8	8	43.75	29.91667175	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-03	3	3	88.66665649	8	8	43.75	44.91665649	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-04	3	3	210	8	8	43.75	166.25	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-05	3	3	61.66667175	8	8	43.75	17.91667175	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-06	3	3	84.66667175	8	8	43.75	40.91667175	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-07	3	3	90.66667175	8	8	43.75	46.91667175	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-09	3	3	163.3333282	8	8	43.75	119.5833282	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-10	3	2	85.5	8	8	43.75	41.75	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-11	3	3	60.33332825	8	8	43.75	16.58332825	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-12	3	3	69.33334351	8	8	43.75	25.58334351	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-13	3	3	123.3333282	8	8	43.75	79.58332825	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-14	3	3	71.66665649	8	8	43.75	27.91665649	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-15	3	3	77.66665649	8	8	43.75	33.91665649	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-16	3	3	376.6666718	8	8	43.75	332.9166718	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-17	3	3	420	8	8	43.75	376.25	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-18	3	3	736.6666718	8	8	43.75	692.9166718	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-19	3	3	2300	8	8	43.75	2256.25	<0.05	Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-01	3	3	0.126663208	8	8	0.129241943	-0.002578735	0.52	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-02	3	3	0.130004883	8	8	0.129241943	0.000762939	0.50	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-03	3	3	0.133331299	8	8	0.129241943	0.004089355	0.45	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-04	3	3	0.183334351	8	8	0.129241943	0.054092407	0.06	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-05	3	3	0.10333252	8	8	0.129241943	-0.025909424	0.74	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-06	3	3	0.136657715	8	8	0.129241943	0.007415771	0.45	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-07	3	3	0.203338623	8	8	0.129241943	0.07409668	<0.05	Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-09	3	3	0.123336792	8	8	0.129241943	-0.005905151	0.62	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-10	3	3	0.149993896	8	8	0.129241943	0.020751953	0.29	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-11	3	3	0.210006714	8	8	0.129241943	0.080764771	<0.05	Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-12	3	3	0.14666748	8	8	0.129241943	0.017425537	0.30	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-13	3	3	0.166671753	8	8	0.129241943	0.03742981	0.17	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-14	3	3	0.120010376	8	8	0.129241943	-0.009231567	0.63	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-15	3	3	0.156661987	8	8	0.129241943	0.027420044	0.24	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-16	3	3	0.123336792	8	8	0.129241943	-0.005905151	0.57	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-17	3	3	0.123321533	8	8	0.129241943	-0.00592041	0.59	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-18	3	3	0.180007935	8	8	0.129241943	0.050765991	0.11	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-19	3	3	0.126663208	8	8	0.129241943	-0.002578735	0.61	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-01	3	3	22	8	8	32.375	-10.375	0.88	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-02	3	3	21.66667175	8	8	32.375	-10.70832825	0.89	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-03	3	3	24	8	8	32.375	-8.375	0.77	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-04	3	3	22	8	8	32.375	-10.375	0.86	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-05	3	3	19.66667175	8	8	32.375	-12.70832825	0.92	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-06	3	3	20.33334351	8	8	32.375	-12.04165649	0.86	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-07	3	3	20.33332825	8	8	32.375	-12.04167175	0.91	Do Not Reject H0

Phase I Soil Background Comparison Permutation Tests

					Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-09	3	3	25	8	8	32.375	-7.375	0.80	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-10	3	3	22.66665649	8	8	32.375	-9.708343506	0.85	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-11	3	3	23	8	8	32.375	-9.375	0.84	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-12	3	3	27	8	8	32.375	-5.375	0.69	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-13	3	3	30.33332825	8	8	32.375	-2.041671753	0.61	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-14	3	3	20	8	8	32.375	-12.375	0.90	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-15	3	3	25.33332825	8	8	32.375	-7.041671753	0.73	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-16	3	3	29.33332825	8	8	32.375	-3.041671753	0.68	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-17	3	3	19	8	8	32.375	-13.375	0.93	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-18	3	3	27.33332825	8	8	32.375	-5.041671753	0.71	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-19	3	3	47.33332825	8	8	32.375	14.95832825	0.08	Do Not Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-01	3	3	78.33332825	8	8	42.375	35.95832825	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-02	3	3	75.33332825	8	8	42.375	32.95832825	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-03	3	3	109	8	8	42.375	66.625	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-04	3	3	206.6666718	8	8	42.375	164.2916718	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-05	3	3	75.66667175	8	8	42.375	33.29167175	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-06	3	3	67.66667175	8	8	42.375	25.29167175	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-07	3	3	206.6666718	8	8	42.375	164.2916718	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-09	3	3	68.66665649	8	8	42.375	26.29165649	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-10	3	3	58	8	8	42.375	15.625	0.12	Do Not Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-11	3	3	99	8	8	42.375	56.625	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-12	3	3	96	8	8	42.375	53.625	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-13	3	3	153.3333435	8	8	42.375	110.9583435	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-14	3	3	75.33332825	8	8	42.375	32.95832825	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-15	3	3	163.3333282	8	8	42.375	120.9583282	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-16	3	3	69	8	8	42.375	26.625	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-17	3	3	7033.333328	8	8	42.375	6990.958328	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-18	3	3	1161	8	8	42.375	1118.625	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-19	3	3	106.6666565	8	8	42.375	64.29165649	<0.05	Reject H0
SB	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-17	3	3	0.098342896	8	8	0.013412476	0.08493042	<0.05	Reject H0
SB	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-18	3	3	0.088668823	8	8	0.013412476	0.075256348	<0.05	Reject H0
SB	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-19	3	3	0.000976563	8	8	0.013412476	-0.012435913	1.00	Do Not Reject H0
SB	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-20	3	3	0.004928589	8	8	0.013412476	-0.008483887	0.96	Do Not Reject H0
SB	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-21	3	3	0.005599976	8	8	0.013412476	-0.0078125	0.97	Do Not Reject H0
SB	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-17	3	3	0.13999939	8	8	0.012390137	0.127609253	<0.05	Reject H0
SB	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-18	3	3	0.105010986	8	8	0.012390137	0.09262085	<0.05	Reject H0
SB	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-19	3	3	0.00151062	8	8	0.012390137	-0.010879517	1.00	Do Not Reject H0
SB	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-20	3	3	0.007553101	8	8	0.012390137	-0.004837036	0.94	Do Not Reject H0
SB	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-21	3	3	0.00793457	8	8	0.012390137	-0.004455566	0.90	Do Not Reject H0
SB	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-17	3	3	0.070999146	8	8	0.038757324	0.032241821	0.06	Do Not Reject H0
SB	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-18	3	3	0.196655273	8	8	0.038757324	0.157897949	<0.05	Reject H0
SB	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-19	3	3	0.001586914	8	8	0.038757324	-0.03717041	1.00	Do Not Reject H0
SB	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-20	3	3	0.006027222	8	8	0.038757324	-0.032730103	0.99	Do Not Reject H0
SB	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-21	3	3	0.004837036	8	8	0.038757324	-0.033920288	0.99	Do Not Reject H0
SB	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-17	3	3	0.036010742	8	8	0.033493042	0.0025177	0.38	Do Not Reject H0
SB	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-18	3	3	0.056655884	8	8	0.033493042	0.023162842	0.10	Do Not Reject H0
SB	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-19	3	3	0.005630493	8	8	0.033493042	-0.027862549	1.00	Do Not Reject H0
SB	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-20	3	3	0.021331787	8	8	0.033493042	-0.012161255	0.84	Do Not Reject H0
SB	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-21	3	3	0.011260986	8	8	0.033493042	-0.022232056	0.97	Do Not Reject H0
SB	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-17	3	3	6033.333328	8	8	12162.5	-6129.166672	1.00	Do Not Reject H0
SB	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-18	3	3	5000	8	8	12162.5	-7162.5	1.00	Do Not Reject H0
SB	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-19	3	3	22000	8	8	12162.5	9837.5	<0.05	Reject H0
SB	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-17	3	3	0.15032959	8	8	0.059188843	0.091140747	<0.05	Reject H0
SB	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-18	3	3	0.169998169	8	8	0.059188843	0.110809326	<0.05	Reject H0
SB	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-19	3	3	0.005432129	8	8	0.059188843	-0.053756714	1.00	Do Not Reject H0
SB	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-20	3	3	0.026000977	8	8	0.059188843	-0.033187866	0.89	Do Not Reject H0
SB	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-21	3	3	0.015670776	8	8	0.059188843	-0.043518066	0.96	Do Not Reject H0
SB	Antimony	SB	7440-36-0	mg/kg	IINY-DU-17	3	3	4.566665649	8	8	0.986236572	3.580429077	<0.05	Reject H0
SB	Antimony	SB	7440-36-0	mg/kg	IINY-DU-18	3	3	9.833343506	8	8	0.986236572	8.847106934	<0.05	Reject H0
SB	Antimony	SB	7440-36-0	mg/kg	IINY-DU-19	3	3	0.113327026	8	8	0.986236572	-0.872909546	1.00	Do Not Reject H0
SB	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-17	3	3	23.33334351	8	8	5.325012207	18.0083313	<0.05	Reject H0
SB	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-18	3	3	17.33334351	8	8	5.325012207	12.0083313	<0.05	Reject H0
SB	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-19	3	3	2.766662598	8	8	5.325012207	-2.558349609	0.97	Do Not Reject H0
SB	Barium	BA	7440-39-3	mg/kg	IINY-DU-17	3	3	356.6666565	8	8	33.375	323.2916565	<0.05	Reject H0
SB	Barium	BA	7440-39-3	mg/kg	IINY-DU-18	3	3	303.3333435	8	8	33.375	269.9583435	<0.05	Reject H0
SB	Barium	BA	7440-39-3	mg/kg	IINY-DU-19	3	3	35.33334351	8	8	33.375	1.958343506	0.44	Do Not Reject H0
SB	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-17	3	3	0.456665039	8	8	0.307479858	0.149185181	0.20	Do Not Reject H0
SB	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-18	3	3	0.503341675	8	8	0.307479858	0.195861816	0.15	Do Not Reject H0
SB	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-19	3	3	0.022003174	8	8	0.307479858	-0.285476685	1.00	Do Not Reject H0
SB	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-20	3	3	0.072998047	8	8	0.307479858	-0.234481812	0.91	Do Not Reject H0
SB	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-21	3	3	0.066665649	8	8	0.307479858	-0.240814209	0.95	Do Not Reject H0
SB	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-17	3	3	0.289993286	8	8	0.329742432	-0.039749146	0.58	Do Not Reject H0
SB	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-18	3	3	0.356658936	8	8	0.329742432	0.026916504	0.43	Do Not Reject H0
SB	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-19	3	3	0.025009155	8	8	0.329742432	-0.304733276	1.00	Do Not Reject H0
SB	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-20	3	3	0.074661255	8	8	0.329742432	-0.255081177	0.97	Do Not Reject H0
SB	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-21	3	3	0.067657471	8	8	0.329742432	-0.262084961	0.95	Do Not Reject H0
SB	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-17	3	3	0.653335571	8	8	0.523986816	0.129348755	0.35	Do Not Reject H0
SB	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-18	3	3	0.836669922	8	8	0.523986816	0.312683105	0.17	Do Not Reject H0

Phase I Soil Background Comparison Permutation Tests

					Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SB	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-19	3	3	0.038330078	8	8	0.523986816	-0.485656738	1.00	Do Not Reject H0
SB	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-20	3	3	0.113327026	8	8	0.523986816	-0.41065979	0.97	Do Not Reject H0
SB	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-21	3	3	0.123336792	8	8	0.523986816	-0.400650024	0.97	Do Not Reject H0
SB	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-17	3	3	0.246673584	8	8	0.261871338	-0.015197754	0.54	Do Not Reject H0
SB	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-18	3	3	0.296661377	8	8	0.261871338	0.034790039	0.39	Do Not Reject H0
SB	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-19	3	3	0.022674561	8	8	0.261871338	-0.239196777	1.00	Do Not Reject H0
SB	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-20	3	3	0.045669556	8	8	0.261871338	-0.216201782	0.96	Do Not Reject H0
SB	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-21	3	3	0.040664673	8	8	0.261871338	-0.221206665	0.98	Do Not Reject H0
SB	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-17	3	3	0.15032959	8	8	0.191375732	-0.041046143	0.63	Do Not Reject H0
SB	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-18	3	3	0.164993286	8	8	0.191375732	-0.026382446	0.55	Do Not Reject H0
SB	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-19	3	3	0.011734009	8	8	0.191375732	-0.179641724	1.00	Do Not Reject H0
SB	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-20	3	3	0.033660889	8	8	0.191375732	-0.157714844	0.96	Do Not Reject H0
SB	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-21	3	3	0.038330078	8	8	0.191375732	-0.153045654	0.95	Do Not Reject H0
SB	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-17	3	3	1.333328247	8	8	0.43963623	0.893692017	<0.05	Reject H0
SB	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-18	3	3	0.653335571	8	8	0.43963623	0.213699341	0.13	Do Not Reject H0
SB	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-19	3	3	0.183334351	8	8	0.43963623	-0.25630188	0.91	Do Not Reject H0
SB	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-17	3	3	3.5	8	8	0.174987793	3.325012207	<0.05	Reject H0
SB	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-18	3	3	12.09999084	8	8	0.174987793	11.92500305	<0.05	Reject H0
SB	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-19	3	3	0.092330933	8	8	0.174987793	-0.08265686	1.00	Do Not Reject H0
SB	Calcium	CA	7440-70-2	mg/kg	IINY-DU-17	3	3	18333.33333	8	8	1222.5	17110.83333	<0.05	Reject H0
SB	Calcium	CA	7440-70-2	mg/kg	IINY-DU-18	3	3	32000	8	8	1222.5	30777.5	<0.05	Reject H0
SB	Calcium	CA	7440-70-2	mg/kg	IINY-DU-19	3	3	18000	8	8	1222.5	16777.5	<0.05	Reject H0
SB	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-17	3	3	12.66667175	8	8	14.6625061	-1.995834351	0.66	Do Not Reject H0
SB	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-18	3	3	31.33332825	8	8	14.6625061	16.67082214	<0.05	Reject H0
SB	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-19	3	3	7.766662598	8	8	14.6625061	-6.895843506	0.77	Do Not Reject H0
SB	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-17	3	3	0.759994507	8	8	0.424224854	0.335769653	0.09	Do Not Reject H0
SB	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-18	3	3	1.149993896	8	8	0.424224854	0.725769043	<0.05	Reject H0
SB	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-19	3	3	0.024658203	8	8	0.424224854	-0.39956665	1.00	Do Not Reject H0
SB	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-20	3	3	0.079330444	8	8	0.424224854	-0.344894409	0.97	Do Not Reject H0
SB	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-21	3	3	0.078674316	8	8	0.424224854	-0.345550537	0.97	Do Not Reject H0
SB	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-17	3	3	6.566665649	8	8	3.748733521	2.817932129	0.06	Do Not Reject H0
SB	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-18	3	3	6.333328247	8	8	3.748733521	2.584594727	0.08	Do Not Reject H0
SB	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-19	3	3	17	8	8	3.748733521	13.25126648	<0.05	Reject H0
SB	Copper	CU	7440-50-8	mg/kg	IINY-DU-17	3	3	146.6666718	8	8	14.92500305	131.7416687	<0.05	Reject H0
SB	Copper	CU	7440-50-8	mg/kg	IINY-DU-18	3	3	5400	8	8	14.92500305	5385.074997	<0.05	Reject H0
SB	Copper	CU	7440-50-8	mg/kg	IINY-DU-19	3	3	210	8	8	14.92500305	195.0749969	<0.05	Reject H0
SB	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-17	3	3	0.115997314	7	6	0.06703186	0.048965454	0.15	Do Not Reject H0
SB	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-18	3	3	0.121322632	7	6	0.06703186	0.054290771	0.13	Do Not Reject H0
SB	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-19	3	3	0.005569458	7	6	0.06703186	-0.061462402	0.98	Do Not Reject H0
SB	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-20	3	3	0.013671875	7	6	0.06703186	-0.053359985	0.93	Do Not Reject H0
SB	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-21	3	3	0.011993408	7	6	0.06703186	-0.055038452	0.97	Do Not Reject H0
SB	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-17	3	3	0.980010986	8	8	0.907501221	0.072509766	0.45	Do Not Reject H0
SB	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-18	3	3	1.016662598	8	8	0.907501221	0.109161377	0.37	Do Not Reject H0
SB	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-19	3	3	0.040664673	8	8	0.907501221	-0.866836548	1.00	Do Not Reject H0
SB	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-20	3	3	0.136672974	8	8	0.907501221	-0.770828247	0.98	Do Not Reject H0
SB	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-21	3	3	0.126663208	8	8	0.907501221	-0.780838013	1.00	Do Not Reject H0
SB	Fluorene	FL	86-73-7	mg/kg	IINY-DU-17	3	3	0.083343506	8	8	0.055587769	0.027755737	0.11	Do Not Reject H0
SB	Fluorene	FL	86-73-7	mg/kg	IINY-DU-18	3	3	0.150009155	8	8	0.055587769	0.094421387	<0.05	Reject H0
SB	Fluorene	FL	86-73-7	mg/kg	IINY-DU-19	3	3	0.002532959	8	8	0.055587769	-0.05305481	1.00	Do Not Reject H0
SB	Fluorene	FL	86-73-7	mg/kg	IINY-DU-20	3	3	0.008956909	8	8	0.055587769	-0.046630859	0.96	Do Not Reject H0
SB	Fluorene	FL	86-73-7	mg/kg	IINY-DU-21	3	3	0.005691528	8	8	0.055587769	-0.04989624	0.99	Do Not Reject H0
SB	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-17	3	3	4.684677124	8	8	4.054122925	0.630554199	0.35	Do Not Reject H0
SB	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-18	3	3	5.639663696	8	8	4.054122925	1.585540771	0.28	Do Not Reject H0
SB	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-19	3	3	0.253631592	8	8	4.054122925	-3.800491333	1.00	Do Not Reject H0
SB	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-20	3	3	0.759002686	8	8	4.054122925	-3.295120239	0.97	Do Not Reject H0
SB	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-21	3	3	0.728012085	8	8	4.054122925	-3.32611084	0.96	Do Not Reject H0
SB	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-17	3	3	0.208343506	8	8	0.287521362	-0.079177856	0.67	Do Not Reject H0
SB	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-18	3	3	0.256668091	8	8	0.287521362	-0.030853271	0.56	Do Not Reject H0
SB	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-19	3	3	0.023330688	8	8	0.287521362	-0.264190674	1.00	Do Not Reject H0
SB	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-20	3	3	0.048995972	8	8	0.287521362	-0.238525391	0.97	Do Not Reject H0
SB	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-21	3	3	0.047332764	8	8	0.287521362	-0.240188599	0.95	Do Not Reject H0
SB	Iron	FE	7439-89-6	mg/kg	IINY-DU-17	3	3	25666.66667	8	8	14200	11466.66667	<0.05	Reject H0
SB	Iron	FE	7439-89-6	mg/kg	IINY-DU-18	3	3	37333.33333	8	8	14200	23133.33333	<0.05	Reject H0
SB	Iron	FE	7439-89-6	mg/kg	IINY-DU-19	3	3	34666.66666	8	8	14200	20466.66666	<0.05	Reject H0
SB	Lead	PB	7439-92-1	mg/kg	IINY-DU-17	3	3	1573.333328	8	8	55	1518.333328	<0.05	Reject H0
SB	Lead	PB	7439-92-1	mg/kg	IINY-DU-18	3	3	2433.333344	8	8	55	2378.333344	<0.05	Reject H0
SB	Lead	PB	7439-92-1	mg/kg	IINY-DU-19	3	3	12.33334351	8	8	55	-42.66665649	1.00	Do Not Reject H0
SB	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-17	3	3	1.63899231	8	8	0.668014526	0.970977783	<0.05	Reject H0
SB	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-18	3	3	2.300323486	8	8	0.668014526	1.63230896	<0.05	Reject H0
SB	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-19	3	3	0.0377	8	8	0.668014526	-0.630310059	1.00	Do Not Reject H0
SB	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-20	3	3	0.151992798	8	8	0.668014526	-0.516021729	0.94	Do Not Reject H0
SB	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-21	3	3	0.115493774	8	8	0.668014526	-0.552520752	1.00	Do Not Reject H0
SB	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-17	3	3	8233.333328	8	8	1712.5	6520.833328	<0.05	Reject H0
SB	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-18	3	3	17333.33333	8	8	1712.5	15620.83333	<0.05	Reject H0
SB	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-19	3	3	7266.666656	8	8	1712.5	5554.166656	<0.05	Reject H0
SB	Manganese	MN	7439-96-5	mg/kg	IINY-DU-17	3	3	170	8	8	211.5	-41.5	0.74	Do Not Reject H0
SB	Manganese	MN	7439-96-5	mg/kg	IINY-DU-18	3	3	480	8	8	211.5	268.5	<0.05	Reject H0
SB	Manganese	MN	7439-96-5	mg/kg	IINY-DU-19	3	3	276.6666718	8	8	211.5	65.16667175	0.15	Do Not Reject H0

Phase I Soil Background Comparison Permutation Tests

					Site Data				Background Data			Permutation Test (H0: Site <= Background)[1]		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	N	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SB	Mercury	HG	7439-97-6	mg/kg	IINY-DU-17	3	3	0.82333374	8	8	0.227493286	0.595840454	<0.05	Reject H0
SB	Mercury	HG	7439-97-6	mg/kg	IINY-DU-18	3	3	1.173339844	8	8	0.227493286	0.945846558	<0.05	Reject H0
SB	Mercury	HG	7439-97-6	mg/kg	IINY-DU-19	3	3	0.206665039	8	8	0.227493286	-0.020828247	0.63	Do Not Reject H0
SB	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-17	3	3	0.240005493	8	8	0.017593384	0.222412109	<0.05	Reject H0
SB	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-18	3	3	0.559997559	8	8	0.017593384	0.542404175	<0.05	Reject H0
SB	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-19	3	2	0.001998901	8	8	0.017593384	-0.015594482	1.00	Do Not Reject H0
SB	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-20	3	3	0.007507324	8	8	0.017593384	-0.01008606	0.96	Do Not Reject H0
SB	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-21	3	3	0.007827759	8	8	0.017593384	-0.009765625	0.94	Do Not Reject H0
SB	Nickel	NI	7440-02-0	mg/kg	IINY-DU-17	3	3	19.66667175	8	8	13.02500916	6.641662598	0.23	Do Not Reject H0
SB	Nickel	NI	7440-02-0	mg/kg	IINY-DU-18	3	3	65	8	8	13.02500916	51.97499084	<0.05	Reject H0
SB	Nickel	NI	7440-02-0	mg/kg	IINY-DU-19	3	3	14	8	8	13.02500916	0.974990845	0.40	Do Not Reject H0
SB	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-17	3	3	0.820007324	8	8	0.43762207	0.382385254	0.09	Do Not Reject H0
SB	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-18	3	3	0.973327637	8	8	0.43762207	0.535705566	<0.05	Reject H0
SB	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-19	3	3	0.018035889	8	8	0.43762207	-0.419586182	1.00	Do Not Reject H0
SB	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-20	3	3	0.069656372	8	8	0.43762207	-0.367965698	0.99	Do Not Reject H0
SB	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-21	3	3	0.056655884	8	8	0.43762207	-0.380966187	1.00	Do Not Reject H0
SB	Potassium	K	2023695	mg/kg	IINY-DU-17	3	3	573.3333435	8	8	727.5	-154.1666565	1.00	Do Not Reject H0
SB	Potassium	K	2023695	mg/kg	IINY-DU-18	3	3	723.3333282	8	8	727.5	-4.166671753	0.47	Do Not Reject H0
SB	Potassium	K	2023695	mg/kg	IINY-DU-19	3	3	1133.333328	8	8	727.5	405.8333282	<0.05	Reject H0
SB	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-17	3	3	0.82333374	8	8	0.762481689	0.060852051	0.44	Do Not Reject H0
SB	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-18	3	3	0.936676025	8	8	0.762481689	0.174194336	0.31	Do Not Reject H0
SB	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-19	3	3	0.039672852	8	8	0.762481689	-0.722808838	1.00	Do Not Reject H0
SB	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-20	3	3	0.13999939	8	8	0.762481689	-0.6224823	0.96	Do Not Reject H0
SB	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-21	3	3	0.126663208	8	8	0.762481689	-0.635818481	0.99	Do Not Reject H0
SB	Selenium	SE	7782-49-2	mg/kg	IINY-DU-17	3	3	1.333343506	8	8	0.959991455	0.373352051	<0.05	Reject H0
SB	Selenium	SE	7782-49-2	mg/kg	IINY-DU-18	3	3	0.866668701	8	8	0.959991455	-0.093322754	0.80	Do Not Reject H0
SB	Selenium	SE	7782-49-2	mg/kg	IINY-DU-19	3	3	0.229995728	8	8	0.959991455	-0.729995728	1.00	Do Not Reject H0
SB	Silver	AG	7440-22-4	mg/kg	IINY-DU-17	3	3	0.263336182	8	8	0.272491455	-0.009155273	0.56	Do Not Reject H0
SB	Silver	AG	7440-22-4	mg/kg	IINY-DU-18	3	3	1.476669312	8	8	0.272491455	1.204177856	<0.05	Reject H0
SB	Silver	AG	7440-22-4	mg/kg	IINY-DU-19	3	3	0.102325439	8	8	0.272491455	-0.170166016	1.00	Do Not Reject H0
SB	Sodium	NA	7440-23-5	mg/kg	IINY-DU-17	3	3	500	8	8	43.75	456.25	<0.05	Reject H0
SB	Sodium	NA	7440-23-5	mg/kg	IINY-DU-18	3	3	426.6666718	8	8	43.75	382.9166718	<0.05	Reject H0
SB	Sodium	NA	7440-23-5	mg/kg	IINY-DU-19	3	3	2733.333328	8	8	43.75	2689.583328	<0.05	Reject H0
SB	Thallium	TL	7440-28-0	mg/kg	IINY-DU-17	3	3	0.706680298	8	8	0.129241943	0.577438354	<0.05	Reject H0
SB	Thallium	TL	7440-28-0	mg/kg	IINY-DU-18	3	3	0.309997559	8	8	0.129241943	0.180755615	<0.05	Reject H0
SB	Thallium	TL	7440-28-0	mg/kg	IINY-DU-19	3	3	0.07232666	8	8	0.129241943	-0.056915283	0.93	Do Not Reject H0
SB	Vanadium	V	7440-62-2	mg/kg	IINY-DU-17	3	3	22.33334351	8	8	32.375	-10.04165649	0.84	Do Not Reject H0
SB	Vanadium	V	7440-62-2	mg/kg	IINY-DU-18	3	3	17.66667175	8	8	32.375	-14.70832825	0.94	Do Not Reject H0
SB	Vanadium	V	7440-62-2	mg/kg	IINY-DU-19	3	3	55.33332825	8	8	32.375	22.95832825	<0.05	Reject H0
SB	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-17	3	3	2133.333328	8	8	42.375	2090.958328	<0.05	Reject H0
SB	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-18	3	3	4566.666672	8	8	42.375	4524.291672	<0.05	Reject H0
SB	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-19	3	3	61	8	8	42.375	18.625	<0.05	Reject H0

1. For each test, 10,000 permutation resamples were used to yield a stable p-value. When the value shown in "Right Tailed Prob" is less than 0.05, the H0 is rejected. If the resulting value in the Conclusion column is Do Not Reject H0, then the H0 is true and site concentrations are less than or equal to background. If the result is Reject H0, then site concentrations are greater than background.

			Site Data				Background Data				Permutation Test (H0: Site <= Background)				
Analyte Name	Analyte Code	CAS	Units	Decision Unit	Number of Samples Collected	Number of Analyte Detections	Mean [1]	Decision Unit	Number of Samples Collected	Number of Analyte Detections	Mean[1]	Site Mean - Background Mean [2]	Right-Tailed Probability[3]	Adjusted Right-Tailed Probability[3]	Conclusion[4]
Aluminum	AL	7429-90-5	mg/kg	IHRS	3	3	6,300	CHHRS	8	8	13,500	-7,200	1.0000	1.0000	Do Not Reject H0
Antimony	SB	7440-36-0	mg/kg	IHRS	3	3	103	CHHRS	8	8	0.48	103	0.0020*	0.0060*	Reject H0
Arsenic	AS	7440-38-2	mg/kg	IHRS	3	3	33.7	CHHRS	8	8	5.94	27.7	0.0040*	0.0060*	Reject H0
Barium	BA	7440-39-3	mg/kg	IHRS	3	3	450	CHHRS	8	8	85.6	364	0.0120*	0.0120*	Reject H0
Beryllium	BE	7440-41-7	mg/kg	IHRS	3	3	0.863	CHHRS	8	8	0.889	-0.0254	0.5210	0.5210	Do Not Reject H0
Cadmium	CD	7440-43-9	mg/kg	IHRS	3	3	9.27	CHHRS	8	8	0.711	8.56	0.0080*	0.0140*	Reject H0
Chromium	CR	7440-47-3	mg/kg	IHRS	3	3	133	CHHRS	8	8	32.9	100	0.0080*	0.0080*	Reject H0
Cobalt	CO	7440-48-4	mg/kg	IHRS	3	3	13.3	CHHRS	8	8	10.5	2.8	0.2495	0.2495	Do Not Reject H0
Copper	CU	7440-50-8	mg/kg	IHRS	3	3	6,230	CHHRS	8	8	35.8	6200	0.0120*	0.0120*	Reject H0
Iron	FE	7439-89-6	mg/kg	IHRS	3	3	157,000	CHHRS	8	8	23,800	133,000	0.0080*	0.0120*	Reject H0
Lead	PB	7439-92-1	mg/kg	IHRS	3	3	9,900	CHHRS	8	8	49.1	9,850	0.0080*	0.0120*	Reject H0
Manganese	MN	7439-96-5	mg/kg	IHRS	3	3	1,200	CHHRS	8	8	1,020	182	0.2894	0.2894	Do Not Reject H0
Mercury	HG	7439-97-6	mg/kg	IHRS	6	6	0.072	CHHRS	16	16	0.19	-0.118	0.9960	0.9960	Do Not Reject H0
Nickel	NI	7440-02-0	mg/kg	IHRS	3	3	85.3	CHHRS	8	8	22.9	62.4	0.0060*	0.0120*	Reject H0
Selenium	SE	7782-49-2	mg/kg	IHRS	3	0	<0.63	CHHRS	8	8	0.436	[-0.436, 0.194]	0.0379*	0.1138	Do Not Reject H0
Silver	AG	7440-22-4	mg/kg	IHRS	3	3	1.47	CHHRS	8	8	0.253	1.21	0.0060*	0.0180*	Reject H0
Thallium	TL	7440-28-0	mg/kg	IHRS	3	3	0.0667	CHHRS	8	8	0.149	-0.0822	1.0000	1.0000	Do Not Reject H0
Vanadium	V	7440-62-2	mg/kg	IHRS	3	3	33	CHHRS	8	8	21.8	11.2	0.0100*	0.0150*	Reject H0
Zinc	ZN	7440-66-6	mg/kg	IHRS	3	3	3,730	CHHRS	8	8	109	3,620	0.0040*	0.0080*	Reject H0
Aluminum	AL	7429-90-5	mg/kg	RRDS	3	3	18,000	CHMS	8	8	15,400	2620	0.0659	0.0659	Do Not Reject H0
Antimony	SB	7440-36-0	mg/kg	RRDS	3	3	0.743	CHMS	8	8	0.94	-0.197	0.9820	0.9820	Do Not Reject H0
Arsenic	AS	7440-38-2	mg/kg	RRDS	3	3	9.57	CHMS	8	8	5.69	3.88	0.0040*	0.0060*	Reject H0
Barium	BA	7440-39-3	mg/kg	RRDS	3	3	107	CHMS	8	8	62.4	44.3	0.0060*	0.0120*	Reject H0
Beryllium	BE	7440-41-7	mg/kg	RRDS	3	3	0.927	CHMS	8	8	1.12	-0.191	0.7764	0.7764	Do Not Reject H0
Cadmium	CD	7440-43-9	mg/kg	RRDS	3	3	0.937	CHMS	8	8	0.726	0.21	0.0120*	0.0140*	Reject H0
Chromium	CR	7440-47-3	mg/kg	RRDS	3	3	41	CHMS	8	8	24.4	16.6	0.0080*	0.0080*	Reject H0
Cobalt	CO	7440-48-4	mg/kg	RRDS	3	3	14.7	CHMS	8	8	8.22	6.44	0.0060*	0.0090*	Reject H0
Copper	CU	7440-50-8	mg/kg	RRDS	3	3	54	CHMS	8	8	26.2	27.8	0.0060*	0.0120*	Reject H0
Iron	FE	7439-89-6	mg/kg	RRDS	3	3	35,700	CHMS	8	8	17,400	18,300	0.0140*	0.0140*	Reject H0
Lead	PB	7439-92-1	mg/kg	RRDS	3	3	61	CHMS	8	8	53.2	7.75	0.0439*	0.0439*	Reject H0
Manganese	MN	7439-96-5	mg/kg	RRDS	3	3	2,700	CHMS	8	8	488	2,210	0.0080*	0.0120*	Reject H0
Mercury	HG	7439-97-6	mg/kg	RRDS	6	6	0.187	CHMS	16	16	0.25	-0.0633	0.9940	0.9940	Do Not Reject H0
Nickel	NI	7440-02-0	mg/kg	RRDS	3	3	34	CHMS	8	8	21.4	12.6	0.0080*	0.0120*	Reject H0
Selenium	SE	7782-49-2	mg/kg	RRDS	3	3	0.763	CHMS	8	8	0.781	-0.0179	0.6287	0.6287	Do Not Reject H0
Silver	AG	7440-22-4	mg/kg	RRDS	3	3	0.317	CHMS	8	8	0.316	0.000443	0.4291	0.4291	Do Not Reject H0
Thallium	TL	7440-28-0	mg/kg	RRDS	3	3	0.19	CHMS	8	8	0.175	0.015	0.2735	0.2735	Do Not Reject H0
Vanadium	V	7440-62-2	mg/kg	RRDS	3	3	29.7	CHMS	8	8	24.2	5.42	0.0699	0.0699	Do Not Reject H0
Zinc	ZN	7440-66-6	mg/kg	RRDS	3	3	193	CHMS	8	8	116	77.8	0.0080*	0.0080*	Reject H0
Aluminum	AL	7429-90-5	mg/kg	TWS	3	3	15700	CHMS	8	8	15,400	292	0.5090	0.5090	Do Not Reject H0
Antimony	SB	7440-36-0	mg/kg	TWS	3	3	0.84	CHMS	8	8	0.94	-0.1	0.7904	0.7904	Do Not Reject H0
Arsenic	AS	7440-38-2	mg/kg	TWS	3	3	8.57	CHMS	8	8	5.69	2.88	0.0080*	0.0080*	Reject H0
Barium	BA	7440-39-3	mg/kg	TWS	3	3	94	CHMS	8	8	62.4	31.6	0.0120*	0.0120*	Reject H0
Beryllium	BE	7440-41-7	mg/kg	TWS	3	3	0.927	CHMS	8	8	1.12	-0.191	0.7904	0.7904	Do Not Reject H0
Cadmium	CD	7440-43-9	mg/kg	TWS	3	3	1.41	CHMS	8	8	0.726	0.687	0.0140*	0.0140*	Reject H0
Chromium	CR	7440-47-3	mg/kg	TWS	3	3	42.3	CHMS	8	8	24.4	18	0.0060*	0.0080*	Reject H0
Cobalt	CO	7440-48-4	mg/kg	TWS	3	3	13.3	CHMS	8	8	8.22	5.11	0.0040*	0.0090*	Reject H0
Copper	CU	7440-50-8	mg/kg	TWS	3	3	62	CHMS	8	8	26.2	35.8	0.0100*	0.0120*	Reject H0
Iron	FE	7439-89-6	mg/kg	TWS	3	3	31,300	CHMS	8	8	17,400	14,000	0.0060*	0.0120*	Reject H0
Lead	PB	7439-92-1	mg/kg	TWS	3	3	80.3	CHMS	8	8	53.2	27.1	0.0080*	0.0120*	Reject H0
Manganese	MN	7439-96-5	mg/kg	TWS	3	3	1,100	CHMS	8	8	488	612	0.0060*	0.0120*	Reject H0
Mercury	HG	7439-97-6	mg/kg	TWS	6	6	0.193	CHMS	16	16	0.25	-0.0567	0.9940	0.9940	Do Not Reject H0
Nickel	NI	7440-02-0	mg/kg	TWS	3	3	33	CHMS	8	8	21.4	11.6	0.0140*	0.0140*	Reject H0
Selenium	SE	7782-49-2	mg/kg	TWS	3	3	0.66	CHMS	8	8	0.781	-0.121	0.9481	0.9481	Do Not Reject H0
Silver	AG	7440-22-4	mg/kg	TWS	3	3	0.323	CHMS	8	8	0.316	0.00711	0.3892	0.3892	Do Not Reject H0
Thallium	TL	7440-28-0	mg/kg	TWS	3	3	0.18	CHMS	8	8	0.175	0.005	0.4830	0.4830	Do Not Reject H0
Vanadium	V	7440-62-2	mg/kg	TWS	3	3	34.3	CHMS	8	8	24.2	10.1	0.0060*	0.0150*	Reject H0
Zinc	ZN	7440-66-6	mg/kg	TWS	3	3	527	CHMS	8	8	116	411	0.0080*	0.0080*	Reject H0

1. Kaplan-Meier estimator used for data sets with non-detect results.

2. Difference between site and background means reported as an interval if either site or background mean is a non-detect.

3. Right-tailed probability of permutation test of difference between site and background means. Adjusted p-values computed with Benjamini-Hochberg procedure for controlling false discovery rate (FDR). Asterisks indicate significance level (<0.05, <0.01, <0.001).

4. If the resulting value in the Conclusion column is Do Not Reject H0, then the H0 is true and site concentrations are less than or equal to background. If the result is Reject H0, then site concentrations are greater than background.

NOTES:

			Site Data				Background Data				Permutation Test (H0: Site <= Background)				
Analyte Name	Analyte Code	CAS	Units	Decision Unit	Number of Samples Collected	Number of Analyte Detections	Mean [1]	Decision Unit	Number of Samples Collected	Number of Analyte Detections	Mean[1]	Site Mean - Background Mean [2]	Right-Tailed Probability[3]	Adjusted Right-Tailed Probability[3]	Conclusion[4]

CAS = Chemical Abstracts Service

mg/kg = milligrams per kilogram

DUMP = AOC #16 – Area D (former Dumping Area)

IHRS = Iona Hudson River Shoreline (along eastern boundary of AOC #16 – Area D)

RRDS = Riprap Filled Drainage Swale (Iona Marsh shoreline at outlet of riprap filled drainage swale)

TWS = Tidal Wetland Swale (Iona Marsh shoreline at outlet of tidal wetland swale)

CHHRS = Con Hook Hudson River Shoreline

CHMS = Con Hook Marsh Shoreline

Phase II Surface Water Background Comparison Permutation Tests

				Site Data				Background Data				Permutation Test (H0: Site <= Background)			
Analyte Name	Analyte Code	CAS	Units	Decision Unit	Number of Samples Collected	Number of Analyte Detections	Mean [1]	Decision Unit	Number of Samples Collected	Number of Analyte Detections	Mean [1]	Site Mean - Background Mean [2]	Right-Tailed Probability [3]	Adjusted Right-Tailed Probability [3]	Conclusion [4]
Aluminum	AL	7429-90-5	ug/L	DUMP	20	10	23.3	CHHRS	20	20	20.5	2.8	0.0499*	0.2495	Do Not Reject H0
Antimony	SB	7440-36-0	ug/L	DUMP	20	2	1.04	CHHRS	20	0	<1	[0.035, 1.04]	0.2196	0.2196	Do Not Reject H0
Arsenic	AS	7440-38-2	ug/L	DUMP	20	10	0.401	CHHRS	20	16	0.376	0.0248	0.1477	0.1477	Do Not Reject H0
Barium	BA	7440-39-3	ug/L	DUMP	20	20	12.7	CHHRS	20	20	12.4	0.35	0.1836	0.1836	Do Not Reject H0
Beryllium	BE	7440-41-7	ug/L	DUMP	20	2	0.0996	CHHRS	20	0	<0.3	[-0.2, 0.0996]	0.7425	0.7425	Do Not Reject H0
Cadmium	CD	7440-43-9	ug/L	DUMP	20	0	<0.75	CHHRS	20	0	<0.75	[-0.75, 0.75]	1.0000	1.0000	Do Not Reject H0
Calcium	CA	7440-70-2	ug/L	DUMP	20	20	17,400	CHHRS	20	20	22,200	-4800	1.0000	1.0000	Do Not Reject H0
Chromium	CR	7440-47-3	ug/L	DUMP	20	1	0.5	CHHRS	20	0	<1.8	[-1.3, 0.5]	1.0000	1.0000	Do Not Reject H0
Cobalt	CO	7440-48-4	ug/L	DUMP	20	4	0.145	CHHRS	20	1	0.093	0.052	0.0978	.0978	Do Not Reject H0
Copper	CU	7440-50-8	ug/L	DUMP	20	20	2.66	CHHRS	20	20	1.36	1.3	0.0020*	0.0025*	Reject H0
Iron	FE	7439-89-6	ug/L	DUMP	20	0	<96.7	CHHRS	20	19	65.6	[-65.6, 31.1]	0.0120*	0.0599	Do Not Reject H0
Lead	PB	7439-92-1	ug/L	DUMP	20	10	0.406	CHHRS	20	1	0.61	-0.204	0.9441	0.9441	Do Not Reject H0
Magnesium	MG	7439-95-4	ug/L	DUMP	20	20	5,790	CHHRS	20	20	3,820	1970	0.0020*	0.0050*	Reject H0
Manganese	MN	7439-96-5	ug/L	DUMP	20	20	6.73	CHHRS	20	20	12.7	-5.93	0.9242	0.9242	Do Not Reject H0
Mercury	HG	7439-97-6	ug/L	DUMP	40	0	<0.08	CHHRS	40	0	<0.08	[-0.08, 0.08]	1.0000	1.0000	Do Not Reject H0
Nickel	NI	7440-02-0	ug/L	DUMP	20	16	0.428	CHHRS	20	5	0.373	0.0551	0.1178	0.1178	Do Not Reject H0
Potassium	K	2023695	ug/L	DUMP	20	20	2,240	CHHRS	20	20	1,220	1020	0.0020*	0.0050*	Reject H0
Selenium	SE	7782-49-2	ug/L	DUMP	20	1	0.37	CHHRS	20	0	<1	[-0.63, 0.37]	1.0000	1.0000	Do Not Reject H0
Silver	AG	7440-22-4	ug/L	DUMP	20	0	<0.1	CHHRS	20	0	<0.1	[-0.1, 0.1]	1.0000	1.0000	Do Not Reject H0
Sodium	NA	7440-23-5	ug/L	DUMP	20	20	25,100	CHHRS	20	20	15,700	9400	0.0020*	0.0050*	Reject H0
Thallium	TL	7440-28-0	ug/L	DUMP	20	1	0.17	CHHRS	20	0	<0.2	[-0.03, 0.17]	1.0000	1.0000	Do Not Reject H0
Vanadium	V	7440-62-2	ug/L	DUMP	20	0	<3	CHHRS	20	0	<3	[-3, 3]	1.0000	1.0000	Do Not Reject H0
Zinc	ZN	7440-66-6	ug/L	DUMP	20	19	11.5	CHHRS	20	2	7.35	4.17	0.2635	0.2635	Do Not Reject H0
Aluminum	AL	7429-90-5	ug/L	DUMP	20	10	23.3	CHMS	20	18	58.9	-35.6	0.9900	0.9900	Do Not Reject H0
Antimony	SB	7440-36-0	ug/L	DUMP	20	2	1.04	CHMS	20	0	<1	[0.035, 1.04]	0.2315	0.2315	Do Not Reject H0
Arsenic	AS	7440-38-2	ug/L	DUMP	20	10	0.401	CHMS	20	19	0.711	-0.31	1.0000	1.0000	Do Not Reject H0
Barium	BA	7440-39-3	ug/L	DUMP	20	20	12.7	CHMS	20	20	13.1	-0.385	0.6627	0.6627	Do Not Reject H0
Beryllium	BE	7440-41-7	ug/L	DUMP	20	2	0.0996	CHMS	20	0	<0.3	[-0.2, 0.0996]	.7186	.7186	Do Not Reject H0
Cadmium	CD	7440-43-9	ug/L	DUMP	20	0	<0.75	CHMS	20	0	<0.75	[-0.75, 0.75]	1.0000	1.0000	Do Not Reject H0
Calcium	CA	7440-70-2	ug/L	DUMP	20	20	17,400	CHMS	20	20	20,300	-2920	0.9820	0.9820	Do Not Reject H0
Chromium	CR	7440-47-3	ug/L	DUMP	20	1	0.5	CHMS	20	12	0.555	-0.055	0.9860	0.9860	Do Not Reject H0
Cobalt	CO	7440-48-4	ug/L	DUMP	20	4	0.145	CHMS	20	12	0.132	0.0133	0.1776	0.1776	Do Not Reject H0
Copper	CU	7440-50-8	ug/L	DUMP	20	20	2.66	CHMS	20	20	0.896	1.76	0.0020*	0.0025*	Reject H0
Iron	FE	7439-89-6	ug/L	DUMP	20	0	<96.7	CHMS	20	12	170	[-170, -72.8]	0.9122	0.9122	Do Not Reject H0
Lead	PB	7439-92-1	ug/L	DUMP	20	10	0.406	CHMS	20	5	0.286	0.12	0.0459*	0.2295	Do Not Reject H0
Magnesium	MG	7439-95-4	ug/L	DUMP	20	20	5,790	CHMS	20	20	6,980	-1180	0.8942	0.8942	Do Not Reject H0
Manganese	MN	7439-96-5	ug/L	DUMP	20	20	6.73	CHMS	20	20	144	-137	1.0000	1.0000	Do Not Reject H0
Mercury	HG	7439-97-6	ug/L	DUMP	40	0	<0.08	CHMS	40	0	<0.08	[-0.08, 0.08]	1.0000	1.0000	Do Not Reject H0
Nickel	NI	7440-02-0	ug/L	DUMP	20	16	0.428	CHMS	20	17	0.436	-0.00833	0.6427	0.6427	Do Not Reject H0
Potassium	K	2023695	ug/L	DUMP	20	20	2,240	CHMS	20	20	2,060	185	0.1856	0.1856	Do Not Reject H0
Selenium	SE	7782-49-2	ug/L	DUMP	20	1	0.37	CHMS	20	0	<1	[-0.63, 0.37]	1.0000	1.0000	Do Not Reject H0
Silver	AG	7440-22-4	ug/L	DUMP	20	0	<0.1	CHMS	20	0	<0.1	[-0.1, 0.1]	1.0000	1.0000	Do Not Reject H0
Sodium	NA	7440-23-5	ug/L	DUMP	20	20	25,100	CHMS	20	20	52,200	-27200	1.0000	1.0000	Do Not Reject H0
Thallium	TL	7440-28-0	ug/L	DUMP	20	1	0.17	CHMS	20	0	<0.2	[-0.03, 0.17]	1.0000	1.0000	Do Not Reject H0
Vanadium	V	7440-62-2	ug/L	DUMP	20	0	<3	CHMS	20	0	<3	[-3, 3]	1.0000	1.0000	Do Not Reject H0
Zinc	ZN	7440-66-6	ug/L	DUMP	20	19	11.5	CHMS	20	10	3.08	8.44	0.0020*	0.0100*	Reject H0
Aluminum	AL	7429-90-5	ug/L	IHRS	20	6	21.8	CHHRS	20	20	20.5	1.33	0.1677	0.1677	Do Not Reject H0
Antimony	SB	7440-36-0	ug/L	IHRS	20	5	0.622	CHHRS	20	0	<1	[-0.378, 0.622]	0.9681	0.9681	Do Not Reject H0
Arsenic	AS	7440-38-2	ug/L	IHRS	20	20	0.491	CHHRS	20	16	0.376	0.115	0.0020*	0.0100*	Reject H0
Barium	BA	7440-39-3	ug/L	IHRS	20	20	16.4	CHHRS	20	20	12.4	4	0.0020*	0.0100*	Reject H0
Beryllium	BE	7440-41-7	ug/L	IHRS	20	0	<0.3	CHHRS	20	0	<0.3	[-0.3, 0.3]	1.0000	1.0000	Do Not Reject H0
Cadmium	CD	7440-43-9	ug/L	IHRS	20	0	<0.75	CHHRS	20	0	<0.75	[-0.75, 0.75]	1.0000	1.0000	Do Not Reject H0
Calcium	CA	7440-70-2	ug/L	IHRS	20	20	22,200	CHHRS	20	20	22,200	50	0.4711	0.4711	Do Not Reject H0
Chromium	CR	7440-47-3	ug/L	IHRS	20	1	0.56	CHHRS	20	0	<1.8	[-1.24, 0.56]	1.0000	1.0000	Do Not Reject H0
Cobalt	CO	7440-48-4	ug/L	IHRS	20	0	<0.35	CHHRS	20	1	0.093	[-0.093, 0.257]	0.5309	0.5309	Do Not Reject H0
Copper	CU	7440-50-8	ug/L	IHRS	20	20	5.93	CHHRS	20	20	1.36	4.57	0.0020*	0.0025*	Reject H0
Iron	FE	7439-89-6	ug/L	IHRS	20	1	37.8	CHHRS	20	19	65.6	-27.8	0.9800	0.9800	Do Not Reject H0
Lead	PB	7439-92-1	ug/L	IHRS	20	8	0.31	CHHRS	20	1	0.61	-0.3	1.0000	1.0000	Do Not Reject H0
Magnesium	MG	7439-95-4	ug/L	IHRS	20	20	4,450	CHHRS	20	20	3,820	630	0.0020*	0.0050*	Reject H0
Manganese	MN	7439-96-5	ug/L	IHRS	20	20	9.32	CHHRS	20	20	12.7	-3.34	0.7625	0.7625	Do Not Reject H0
Mercury	HG	7439-97-6	ug/L	IHRS	40	0	<0.08	CHHRS	40	0	<0.08	[-0.08, 0.08]	1.0000	1.0000	Do Not Reject H0
Nickel	NI	7440-02-0	ug/L	IHRS	20	18	0.432	CHHRS	20	5	0.373	0.0592	0.0998	0.0998	Do Not Reject H0
Potassium	K	2023695	ug/L	IHRS	20	20	1,730	CHHRS	20	20	1,220	510	0.0020*	0.0050*	Reject H0
Selenium	SE	7782-49-2	ug/L	IHRS	20	0	<1	CHHRS	20	0	<1	[-1, 1]	1.0000	1.0000	Do Not Reject H0
Silver	AG	7440-22-4	ug/L	IHRS	20	2	0.0667	CHHRS	20	0	<0.1	[-0.0333, 0.0667]	0.7545	0.7545	Do Not Reject H0
Sodium	NA	7440-23-5	ug/L	IHRS	20	20	20,400	CHHRS	20	20	15,700	4700	0.0020*	0.0050*	Reject H0
Thallium	TL	7440-28-0	ug/L	IHRS	20	0	<0.2	CHHRS	20	0	<0.2	[-0.2, 0.2]	1.0000	1.0000	Do Not Reject H0
Vanadium	V	7440-62-2	ug/L	IHRS	20	0	<3	CHHRS	20	0	<3	[-3, 3]	1.0000	1.0000	Do Not Reject H0
Zinc	ZN	7440-66-6	ug/L	IHRS	20	17	7.29	CHHRS	20	2	7.35	-0.06	0.4990	0.4990	Do Not Reject H0
Aluminum	AL	7429-90-5	ug/L	RRDS	10	8	20.9	CHMS	20	18	58.9	-38	1.0000	1.0000	Do Not Reject H0
Antimony	SB	7440-36-0	ug/L	RRDS	10	1	0.72	CHMS	20	0	<1	[-0.28, 0.72]	1.0000	1.0000	Do Not Reject H0
Arsenic	AS	7440-38-2	ug/L	RRDS	10	10	0.559	CHMS	20	19	0.711	-0.152	0.7705	0.7705	Do Not Reject H0
Barium	BA	7440-39-3	ug/L	RRDS	10	10	14.1	CHMS	20	20	13.1	1.02	0.2136	0.2136	Do Not Reject H0
Beryllium	BE	7440-41-7	ug/L	RRDS	10	0	<0.3	CHMS	20	0	<0.3	[-0.3, 0.3]	1.0000	1.0000	Do Not Reject H0
Cadmium	CD	7440-43-9	ug/L	RRDS	10	0	<0.75	CHMS	20	0	<0.75	[-0.75, 0.75]	1.0000	1.0000	Do Not Reject H0
Calcium	CA	7440-70-2	ug/L	RRDS	10	10	21,600	CHMS	20	20	20,300	1280	0.2675	0.2675	Do Not Reject H0
Chromium	CR	7440-47-3	ug/L	RRDS	10	0	<1.8	CHMS	20	12	0.555	[-0.555, 1.25]	0.0040*	0.0100*	Reject H0
Cobalt	CO	7440-48-4	ug/L	RRDS	10	2	0.0955	CHMS	20	12	0.132	-0.0362	1.0000	1.0000	Do Not Reject H0

Phase II Surface Water Background Comparison Permutation Tests

				Site Data				Background Data				Permutation Test (H0: Site <= Background)			
Analyte Name	Analyte Code	CAS	Units	Decision Unit	Number of Samples Collected	Number of Analyte Detections	Mean [1]	Decision Unit	Number of Samples Collected	Number of Analyte Detections	Mean [1]	Site Mean - Background Mean [2]	Right-Tailed Probability [3]	Adjusted Right-Tailed Probability [3]	Conclusion [4]
Copper	CU	7440-50-8	ug/L	RRDS	10	10	1.28	CHMS	20	20	0.896	0.384	0.0020*	0.0025*	Reject H0
Iron	FE	7439-89-6	ug/L	RRDS	10	0	<100	CHMS	20	12	170	[-170, -69.5]	1.0000	1.0000	Do Not Reject H0
Lead	PB	7439-92-1	ug/L	RRDS	10	0	<0.7	CHMS	20	5	0.286	[-0.286, 0.414]	0.1118	0.1118	Do Not Reject H0
Magnesium	MG	7439-95-4	ug/L	RRDS	10	10	4,290	CHMS	20	20	6980	-2680	0.9780	0.9780	Do Not Reject H0
Manganese	MN	7439-96-5	ug/L	RRDS	10	10	30.7	CHMS	20	20	144	-113	0.9920	0.9920	Do Not Reject H0
Mercury	HG	7439-97-6	ug/L	RRDS	20	0	<0.08	CHMS	40	0	<0.08	[-0.08, 0.08]	1.0000	1.0000	Do Not Reject H0
Nickel	NI	7440-02-0	ug/L	RRDS	10	10	0.444	CHMS	20	17	0.436	0.00754	0.3992	0.3992	Do Not Reject H0
Potassium	K	2023695	ug/L	RRDS	10	10	1,580	CHMS	20	20	2,060	-475	0.9441	0.9441	Do Not Reject H0
Selenium	SE	7782-49-2	ug/L	RRDS	10	0	<1	CHMS	20	0	<1	[-1, 1]	1.0000	1.0000	Do Not Reject H0
Silver	AG	7440-22-4	ug/L	RRDS	10	0	<0.1	CHMS	20	0	<0.1	[-0.1, 0.1]	1.0000	1.0000	Do Not Reject H0
Sodium	NA	7440-23-5	ug/L	RRDS	10	10	20,200	CHMS	20	20	52,200	-32000	0.9900	0.9900	Do Not Reject H0
Thallium	TL	7440-28-0	ug/L	RRDS	10	0	<0.2	CHMS	20	0	<0.2	[-0.2, 0.2]	1.0000	1.0000	Do Not Reject H0
Vanadium	V	7440-62-2	ug/L	RRDS	10	1	1.2	CHMS	20	0	<3	[-1.8, 1.2]	1.0000	1.0000	Do Not Reject H0
Zinc	ZN	7440-66-6	ug/L	RRDS	10	0	<8	CHMS	20	10	3.08	[-3.08, 4.92]	0.0060*	0.0150*	Reject H0
Aluminum	AL	7429-90-5	ug/L	TWS	10	4	24.2	CHMS	20	18	58.9	-34.6	0.9381	.9381	Do Not Reject H0
Antimony	SB	7440-36-0	ug/L	TWS	10	7	0.558	CHMS	20	0	<1	[-0.442, 0.558]	1.0000	1.0000	Do Not Reject H0
Arsenic	AS	7440-38-2	ug/L	TWS	10	10	0.97	CHMS	20	19	0.711	0.259	0.0878	.0878	Do Not Reject H0
Barium	BA	7440-39-3	ug/L	TWS	10	10	13.7	CHMS	20	20	13.1	0.615	0.2814	.2814	Do Not Reject H0
Beryllium	BE	7440-41-7	ug/L	TWS	10	3	0.15	CHMS	20	0	<0.3	[-0.15, 0.15]	1.0000	1.0000	Do Not Reject H0
Cadmium	CD	7440-43-9	ug/L	TWS	10	0	<0.75	CHMS	20	0	<0.75	[-0.75, 0.75]	1.0000	1.0000	Do Not Reject H0
Calcium	CA	7440-70-2	ug/L	TWS	10	10	22,500	CHMS	20	20	20,300	2180	0.1337	.1337	Do Not Reject H0
Chromium	CR	7440-47-3	ug/L	TWS	10	2	0.635	CHMS	20	12	0.555	0.08	0.0040*	.0100*	Reject H0
Cobalt	CO	7440-48-4	ug/L	TWS	10	4	0.111	CHMS	20	12	0.132	-0.0207	0.9681	.9681	Do Not Reject H0
Copper	CU	7440-50-8	ug/L	TWS	10	10	1.25	CHMS	20	20	0.896	0.354	0.0040*	.0040*	Reject H0
Iron	FE	7439-89-6	ug/L	TWS	10	0	<100	CHMS	20	12	170	[-170, -69.5]	1.0000	1.0000	Do Not Reject H0
Lead	PB	7439-92-1	ug/L	TWS	10	0	<0.7	CHMS	20	5	0.286	[-0.286, 0.414]	0.1517	0.1517	Do Not Reject H0
Magnesium	MG	7439-95-4	ug/L	TWS	10	10	6,640	CHMS	20	20	6,980	-335	0.6168	0.6168	Do Not Reject H0
Manganese	MN	7439-96-5	ug/L	TWS	10	10	58.1	CHMS	20	20	144	-85.6	0.9381	0.9381	Do Not Reject H0
Mercury	HG	7439-97-6	ug/L	TWS	20	0	<0.08	CHMS	40	0	<0.08	[-0.08, 0.08]	1.0000	1.0000	Do Not Reject H0
Nickel	NI	7440-02-0	ug/L	TWS	10	10	0.444	CHMS	20	17	0.436	0.00752	0.4311	0.4311	Do Not Reject H0
Potassium	K	2023695	ug/L	TWS	10	10	2,550	CHMS	20	20	2,060	495	0.0539	0.0539	Do Not Reject H0
Selenium	SE	7782-49-2	ug/L	TWS	10	0	<1	CHMS	20	0	<1	[-1, 1]	1.0000	1.0000	Do Not Reject H0
Silver	AG	7440-22-4	ug/L	TWS	10	0	<0.1	CHMS	20	0	<0.1	[-0.1, 0.1]	1.0000	1.0000	Do Not Reject H0
Sodium	NA	7440-23-5	ug/L	TWS	10	10	39,600	CHMS	20	20	52,200	-12600	0.8543	0.8543	Do Not Reject H0
Thallium	TL	7440-28-0	ug/L	TWS	10	1	0.11	CHMS	20	0	<0.2	[-0.09, 0.11]	1.0000	1.0000	Do Not Reject H0
Vanadium	V	7440-62-2	ug/L	TWS	10	0	<3	CHMS	20	0	<3	[-3, 3]	1.0000	1.0000	Do Not Reject H0
Zinc	ZN	7440-66-6	ug/L	TWS	10	1	3.9	CHMS	20	10	3.08	0.82	0.0639	0.0639	Do Not Reject H0

1. Kaplan-Meier estimator used for data sets with non-detect results.

2. Difference between site and background means reported as an interval if either site or background mean is a non-detect.

3. Right-tailed probability of permutation test of difference between site and background means. Adjusted p-values computed with Benjamini-Hochberg procedure for controlling false discovery rate (FDR). Asterisks indicate significance level (<0.05, <0.01, <0.001).

4. If the resulting value in the Conclusion column is Do Not Reject H0, then the H0 is true and site concentrations are less than or equal to background. If the result is Reject H0, then site concentrations are greater than background.

NOTES:

µg/L = micrograms per liter

CAS = Chemical Abstracts Service

DUMP = AOC #16 – Area D (former Dumping Area)

IHRS = Iona Hudson River Shoreline (along eastern boundary of AOC #16 – Area D)

RRDS = Riprap Filled Drainage Swale (Iona Marsh shoreline at outlet of riprap filled drainage swale)

TWS = Tidal Wetland Swale (Iona Marsh shoreline at outlet of tidal wetland swale)

CHHRS = Con Hook Hudson River Shoreline

CHMS = Con Hook Marsh Shoreline

ATTACHMENT 3

EXPOSURE AREA 95UCL CALCULATIONS

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Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
1	DU 1	10000.00	11	12	8.9			3	0.07	10.6	1.6	11.2	1.1	0.9	13.3	14.6
2	DU 2	10000.00	14	13	14			3	0.07	13.7	0.6	4.1	0.3	0.3	14.6	15.1
3	DU 3	10000.00	15	13	12			3	0.07	13.3	1.5	10.8	0.8	0.9	15.9	17.2
4	DU 4	10000.00	23	30	41			3	0.07	31.3	9.1	64.2	2.0	5.2	46.6	54.2
5	DU 5	10000.00	11	11	12			3	0.07	11.3	0.6	4.1	0.4	0.3	12.3	12.8
6	DU 6	10000.00	10	11	8			3	0.07	9.7	1.5	10.8	1.1	0.9	12.2	13.5
7	DU 7	10000.00	18	17	17			3	0.07	17.3	0.6	4.1	0.2	0.3	18.3	18.8
9	DU 9	10000.00	7	7.3	6.9			3	0.07	7.1	0.2	1.5	0.2	0.1	7.4	7.6
10	DU 10	10000.00	7.5	7.2	6.5			3	0.07	7.1	0.5	3.6	0.5	0.3	7.9	8.4
11	DU 11	10000.00	37	43	39			3	0.07	39.7	3.1	21.6	0.5	1.8	44.8	47.4
12	DU 12	10000.00	13	14	14			3	0.07	13.7	0.6	4.1	0.3	0.3	14.6	15.1
13	DU 13	10000.00	9.7	11	11			3	0.07	10.6	0.8	5.3	0.5	0.4	11.8	12.5
14	DU 14	10000.00	16	18	17			3	0.07	17.0	1.0	7.1	0.4	0.6	18.7	19.5
15	DU 15	10000.00	7	6.5	7.1			3	0.07	6.9	0.3	2.3	0.3	0.2	7.4	7.7
16	DU 16	10000.00	7.1	6.8	7.2			3	0.07	7.0	0.2	1.5	0.2	0.1	7.4	7.6
Combined DUs Weighted by Area		**150000.00**	--	--	--	--	--	**45**	**1.00**	**14.4**	**0.6**	**0.0**	**Medium**	**0.4**	**15.5**	**16.0**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**16.0**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
1	DU 1	10000.00	21	22	21			3	0.07	21.3	0.6	4.1	0.2	0.3	22.3	22.8
2	DU 2	10000.00	27	26	28			3	0.07	27.0	1.0	7.1	0.3	0.6	28.7	29.5
3	DU 3	10000.00	28	25	27			3	0.07	26.7	1.5	10.8	0.4	0.9	29.2	30.5
4	DU 4	10000.00	49	61	58			3	0.07	56.0	6.2	44.2	0.8	3.6	66.5	71.7
5	DU 5	10000.00	25	25	24			3	0.07	24.7	0.6	4.1	0.2	0.3	25.6	26.1
6	DU 6	10000.00	38	42	30			3	0.07	36.7	6.1	43.2	1.2	3.5	47.0	52.0
7	DU 7	10000.00	43	60	44			3	0.07	49.0	9.5	67.5	1.4	5.5	65.1	73.0
9	DU 9	10000.00	30	28	27			3	0.07	28.3	1.5	10.8	0.4	0.9	30.9	32.2
10	DU 10	10000.00	23	23	23			3	0.07	23.0	0.0	0.0	0.0	0.0	23.0	23.0
11	DU 11	10000.00	30	37	33			3	0.07	33.3	3.5	24.8	0.7	2.0	39.3	42.2
12	DU 12	10000.00	51	48	47			3	0.07	48.7	2.1	14.7	0.3	1.2	52.2	53.9
13	DU 13	10000.00	220	600	260			3	0.07	360.0	208.8	1476.5	4.1	120.6	712.0	885.5
14	DU 14	10000.00	23	26	25			3	0.07	24.7	1.5	10.8	0.4	0.9	27.2	28.5
15	DU 15	10000.00	30	31	33			3	0.07	31.3	1.5	10.8	0.3	0.9	33.9	35.2
16	DU 16	10000.00	38	33	39			3	0.07	36.7	3.2	22.7	0.6	1.9	42.1	44.8
Combined DUs Weighted by Area		**150000.00**	--	--	--	--	--	**45**	**1.00**	**55.2**	**0.9**	**0.0**	**High**	**0.5**	**56.2**	**57.4**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**57.4**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
1	DU 1	10000.00	7	6.8	7.5			3	0.07	7.1	0.4	2.5	0.4	0.2	7.7	8.0
2	DU 2	10000.00	7.6	7.4	7.7			3	0.07	7.6	0.2	1.1	0.1	0.1	7.8	8.0
3	DU 3	10000.00	8	7.3	7.6			3	0.07	7.6	0.4	2.5	0.3	0.2	8.2	8.5
4	DU 4	10000.00	6.8	7.8	7.3			3	0.07	7.3	0.5	3.5	0.5	0.3	8.1	8.6
5	DU 5	10000.00	7.9	7.8	7.7			3	0.07	7.8	0.1	0.7	0.1	0.1	8.0	8.1
6	DU 6	10000.00	7.9	7.5	6.3			3	0.07	7.2	0.8	5.9	0.8	0.5	8.6	9.3
7	DU 7	10000.00	6.2	5.6	6.5			3	0.07	6.1	0.5	3.2	0.5	0.3	6.9	7.3
9	DU 9	10000.00	7.6	7.4	7.3			3	0.07	7.4	0.2	1.1	0.1	0.1	7.7	7.8
10	DU 10	10000.00	7.9	8	7.5			3	0.07	7.8	0.3	1.9	0.2	0.2	8.2	8.5
11	DU 11	10000.00	6.7	7	6.7			3	0.07	6.8	0.2	1.2	0.2	0.1	7.1	7.2
12	DU 12	10000.00	7.6	7.9	7.5			3	0.07	7.7	0.2	1.5	0.2	0.1	8.0	8.2
13	DU 13	10000.00	8.6	82	8.5			3	0.07	33.0	42.4	299.9	9.1	24.5	104.5	139.8
14	DU 14	10000.00	6.8	6.9	7.3			3	0.07	7.0	0.3	1.9	0.3	0.2	7.4	7.7
15	DU 15	10000.00	6.8	6.7	6.8			3	0.07	6.8	0.1	0.4	0.1	0.0	6.9	6.9
16	DU 16	10000.00	8.5	8	8.4			3	0.07	8.3	0.3	1.9	0.2	0.2	8.7	9.0
Combined DUs Weighted by Area		**150000.00**	--	--	--	--	--	**45**	**1.00**	**9.0**	**0.1**	**0.0**	**High**	**0.0**	**9.1**	**9.2**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**9.2**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
1	DU 1	10000.00	16000	16000	15000			3	0.07	15666.7	577.4	4082.5	0.3	333.3	16640.0	17119.6
2	DU 2	10000.00	19000	18000	19000			3	0.07	18666.7	577.4	4082.5	0.2	333.3	19640.0	20119.6
3	DU 3	10000.00	19000	18000	19000			3	0.07	18666.7	577.4	4082.5	0.2	333.3	19640.0	20119.6
4	DU 4	10000.00	19000	20000	19000			3	0.07	19333.3	577.4	4082.5	0.2	333.3	20306.7	20786.3
5	DU 5	10000.00	20000	20000	19000			3	0.07	19666.7	577.4	4082.5	0.2	333.3	20640.0	21119.6
6	DU 6	10000.00	16000	19000	17000			3	0.07	17333.3	1527.5	10801.2	0.6	881.9	19908.5	21177.5
7	DU 7	10000.00	19000	18000	19000			3	0.07	18666.7	577.4	4082.5	0.2	333.3	19640.0	20119.6
9	DU 9	10000.00	16000	16000	17000			3	0.07	16333.3	577.4	4082.5	0.2	333.3	17306.7	17786.3
10	DU 10	10000.00	18000	18000	16000			3	0.07	17333.3	1154.7	8165.0	0.5	666.7	19280.0	20239.3
11	DU 11	10000.00	17000	19000	19000			3	0.07	18333.3	1154.7	8165.0	0.4	666.7	20280.0	21239.3
12	DU 12	10000.00	17000	17000	17000			3	0.07	17000.0	0.0	0.0	0.0	0.0	17000.0	17000.0
13	DU 13	10000.00	18000	18000	19000			3	0.07	18333.3	577.4	4082.5	0.2	333.3	19306.7	19786.3
14	DU 14	10000.00	16000	17000	16000			3	0.07	16333.3	577.4	4082.5	0.2	333.3	17306.7	17786.3
15	DU 15	10000.00	19000	18000	18000			3	0.07	18333.3	577.4	4082.5	0.2	333.3	19306.7	19786.3
16	DU 16	10000.00	22000	20000	21000			3	0.07	21000.0	1000.0	7071.1	0.3	577.4	22685.9	23516.6
Combined DUs Weighted by Area		**150000.00**	--	--	--	--	--	**45**	**1.00**	**18066.7**	**138.8**	**2.9**	**Low**	**80.1**	**18222.4**	**18415.9**

Degrees of freedom by Welch-Satterthwaite approximation	

Student's-t or Chebychev 95% UCL may be appropriate.	**Recommended UCL**	
	Student's t 95% UCL	**18222.4**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
1	DU 1	10000.00	470	470	480			3	0.07	473.3	5.8	40.8	0.1	3.3	483.1	487.9
2	DU 2	10000.00	620	660	640			3	0.07	640.0	20.0	141.4	0.2	11.5	673.7	690.3
3	DU 3	10000.00	670	580	630			3	0.07	626.7	45.1	318.9	0.5	26.0	702.7	740.1
4	DU 4	10000.00	430	480	510			3	0.07	473.3	40.4	285.8	0.6	23.3	541.5	575.0
5	DU 5	10000.00	800	690	700			3	0.07	730.0	60.8	430.1	0.6	35.1	832.5	883.1
6	DU 6	10000.00	870	680	520			3	0.07	690.0	175.2	1239.0	1.8	101.2	985.4	1130.9
7	DU 7	10000.00	480	460	630			3	0.07	523.3	92.9	657.0	1.3	53.6	680.0	757.2
9	DU 9	10000.00	510	500	470			3	0.07	493.3	20.8	147.2	0.3	12.0	528.4	545.7
10	DU 10	10000.00	570	550	520			3	0.07	546.7	25.2	178.0	0.3	14.5	589.1	610.0
11	DU 11	10000.00	600	600	600			3	0.07	600.0	0.0	0.0	0.0	0.0	600.0	600.0
12	DU 12	10000.00	940	820	790			3	0.07	850.0	79.4	561.2	0.7	45.8	983.8	1049.7
13	DU 13	10000.00	1000	830	1100			3	0.07	976.7	136.5	965.2	1.0	78.8	1206.8	1320.2
14	DU 14	10000.00	670	720	700			3	0.07	696.7	25.2	178.0	0.3	14.5	739.1	760.0
15	DU 15	10000.00	410	480	430			3	0.07	440.0	36.1	255.0	0.6	20.8	500.8	530.7
16	DU 16	10000.00	450	430	440			3	0.07	440.0	10.0	70.7	0.2	5.8	456.9	465.2
Combined DUs Weighted by Area		**150000.00**	--	--	--	--	--	**45**	**1.00**	**613.3**	**14.5**	**0.3**	**Medium**	**8.4**	**631.1**	**649.8**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**649.8**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
1	DU 1	10000.00	0.14	0.12	0.12			3	0.07	0.1	0.0	0.1	0.6	0.0	0.1	0.2
2	DU 2	10000.00	0.13	0.13	0.13			3	0.07	0.1	0.0	0.0	0.0	0.0	0.1	0.1
3	DU 3	10000.00	0.13	0.14	0.13			3	0.07	0.1	0.0	0.0	0.3	0.0	0.1	0.1
4	DU 4	10000.00	0.16	0.19	0.2			3	0.07	0.2	0.0	0.1	0.8	0.0	0.2	0.2
5	DU 5	10000.00	0.11	0.1	0.1			3	0.07	0.1	0.0	0.0	0.4	0.0	0.1	0.1
6	DU 6	10000.00	0.14	0.15	0.12			3	0.07	0.1	0.0	0.1	0.8	0.0	0.2	0.2
7	DU 7	10000.00	0.21	0.19	0.21			3	0.07	0.2	0.0	0.1	0.4	0.0	0.2	0.2
9	DU 9	10000.00	0.11	0.12	0.14			3	0.07	0.1	0.0	0.1	0.9	0.0	0.1	0.2
10	DU 10	10000.00	0.15	0.15	0.15			3	0.07	0.2	0.0	0.0	0.0	0.0	0.2	0.2
11	DU 11	10000.00	0.19	0.22	0.22			3	0.07	0.2	0.0	0.1	0.6	0.0	0.2	0.3
12	DU 12	10000.00	0.15	0.14	0.15			3	0.07	0.1	0.0	0.0	0.3	0.0	0.2	0.2
13	DU 13	10000.00	0.16	0.16	0.18			3	0.07	0.2	0.0	0.1	0.5	0.0	0.2	0.2
14	DU 14	10000.00	0.11	0.13	0.12			3	0.07	0.1	0.0	0.1	0.6	0.0	0.1	0.1
15	DU 15	10000.00	0.16	0.15	0.16			3	0.07	0.2	0.0	0.0	0.3	0.0	0.2	0.2
16	DU 16	10000.00	0.13	0.12	0.12			3	0.07	0.1	0.0	0.0	0.3	0.0	0.1	0.1
Combined DUs Weighted by Area		**150000.00**	--	--	--	--	--	**45**	**1.00**	**0.1**	**0.0**	**0.0**	**Low**	**0.0**	**0.15**	**0.15**

Degrees of freedom by Welch-Satterthwaite approximation	

Student's-t or Chebychev 95% UCL may be appropriate.	**Recommended UCL**	
	Student's t 95% UCL	**0.15**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
1	DU 1	10000.00	0.15	0.13	0.11			3	0.08	0.1	0.0	0.1	1.1	0.0	0.2	0.2
2	DU 2	10000.00	3.3	1.5	1.4			3	0.08	2.1	1.1	7.6	3.7	0.6	3.9	4.8
3	DU 3	10000.00	0.59	0.35	0.23			3	0.08	0.4	0.2	1.3	3.3	0.1	0.7	0.9
4	DU 4	10000.00	1.2	1.3	0.89			3	0.08	1.1	0.2	1.5	1.3	0.1	1.5	1.7
5	DU 5	10000.00	0.4	0.25	0.3			3	0.08	0.3	0.1	0.5	1.7	0.0	0.4	0.5
9	DU 9	10000.00	0.19	0.13	0.15			3	0.08	0.2	0.0	0.2	1.4	0.0	0.2	0.2
11	DU 11	10000.00	0.67	0.97	0.52			3	0.08	0.7	0.2	1.6	2.3	0.1	1.1	1.3
12	DU 12	10000.00	2.2	1.5	2.1			3	0.08	1.9	0.4	2.7	1.4	0.2	2.6	2.9
13	DU 13	10000.00	16	17	9.4			3	0.08	14.1	4.1	29.2	2.1	2.4	21.1	24.5
16	DU 16	10000.00	0.5	0.44	0.21			3	0.08	0.4	0.2	1.1	2.8	0.1	0.6	0.8
20	DU 20	3600.00	0.14	0.15	0.15			3	0.03	0.1	0.0	0.0	0.3	0.0	0.2	0.2
20B	DU 20B	3600.00	0.074	0.074	0.071			3	0.03	0.1	0.0	0.0	0.2	0.0	0.1	0.1
21	DU 21	3600.00	0.26	0.088	0.098			3	0.03	0.1	0.1	0.7	4.6	0.1	0.3	0.4
21B	DU21B	3600.00	0.073	0.061	0.066			3	0.03	0.1	0.0	0.0	0.6	0.0	0.1	0.1
22	DU 22	3600.00	2	1.3	1.2			3	0.03	1.5	0.4	3.1	2.1	0.3	2.2	2.6
Combined DUs Weighted by Area		**118000.00**	--	--	--	--	--	**45**	**1.00**	**1.9**	**0.1**	**0.0**	**High**	**0.1**	**2.0**	**2.1**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**2.1**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
1	DU 1	10000.00	0.17	0.15	0.13			3	0.08	0.2	0.0	0.1	0.9	0.0	0.2	0.2
2	DU 2	10000.00	2.7	1.3	1.2			3	0.08	1.7	0.8	5.9	3.4	0.5	3.1	3.8
3	DU 3	10000.00	0.61	0.35	0.25			3	0.08	0.4	0.2	1.3	3.3	0.1	0.7	0.9
4	DU 4	10000.00	1.1	1.1	1.1			3	0.08	1.1	0.0	0.0	0.0	0.0	1.1	1.1
5	DU 5	10000.00	0.35	0.23	0.26			3	0.08	0.3	0.1	0.4	1.6	0.0	0.4	0.4
9	DU 9	10000.00	0.21	0.15	0.17			3	0.08	0.2	0.0	0.2	1.2	0.0	0.2	0.3
11	DU 11	10000.00	0.87	1.2	0.75			3	0.08	0.9	0.2	1.6	1.8	0.1	1.3	1.5
12	DU 12	10000.00	1.8	1.2	1.8			3	0.08	1.6	0.3	2.4	1.5	0.2	2.2	2.5
13	DU 13	10000.00	12	13	7.1			3	0.08	10.7	3.2	22.3	2.1	1.8	16.0	18.6
16	DU 16	10000.00	0.47	0.43	0.24			3	0.08	0.4	0.1	0.9	2.3	0.1	0.6	0.7
20	DU 20	3600.00	0.16	0.17	0.15			3	0.03	0.2	0.0	0.1	0.4	0.0	0.2	0.2
20B	DU 20B	3600.00	0.074	0.071	0.079			3	0.03	0.1	0.0	0.0	0.4	0.0	0.1	0.1
21	DU 21	3600.00	0.22	0.089	0.1			3	0.03	0.1	0.1	0.5	3.8	0.0	0.3	0.3
21B	DU21B	3600.00	0.073	0.061	0.069			3	0.03	0.1	0.0	0.0	0.6	0.0	0.1	0.1
22	DU 22	3600.00	1.9	1.3	1.1			3	0.03	1.4	0.4	2.9	2.1	0.2	2.1	2.5
Combined DUs Weighted by Area		**118000.00**	--	--	--	--	--	**45**	**1.00**	**1.5**	**0.1**	**0.0**	**High**	**0.0**	**1.7**	**1.7**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.

Recommended UCL	
Chebyshev 95% UCL	1.7

The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
1	DU 1	10000.00	0.27	0.23	0.2			3	0.08	0.2	0.0	0.2	1.1	0.0	0.3	0.3
2	DU 2	10000.00	3.9	1.8	1.7			3	0.08	2.5	1.2	8.8	3.6	0.7	4.6	5.6
3	DU 3	10000.00	0.93	0.48	0.37			3	0.08	0.6	0.3	2.1	3.5	0.2	1.1	1.3
4	DU 4	10000.00	2.9	2.7	2.1			3	0.08	2.6	0.4	2.9	1.1	0.2	3.3	3.6
5	DU 5	10000.00	0.48	0.34	0.41			3	0.08	0.4	0.1	0.5	1.2	0.0	0.5	0.6
9	DU 9	10000.00	0.35	0.23	0.26			3	0.08	0.3	0.1	0.4	1.6	0.0	0.4	0.4
11	DU 11	10000.00	1.2	1.6	1.1			3	0.08	1.3	0.3	1.9	1.4	0.2	1.7	2.0
12	DU 12	10000.00	2.8	1.6	2.6			3	0.08	2.3	0.6	4.5	1.9	0.4	3.4	4.0
13	DU 13	10000.00	17	17	9.7			3	0.08	14.6	4.2	29.8	2.0	2.4	21.7	25.2
16	DU 16	10000.00	0.71	0.65	0.33			3	0.08	0.6	0.2	1.4	2.6	0.1	0.9	1.1
20	DU 20	3600.00	0.25	0.28	0.23			3	0.03	0.3	0.0	0.2	0.7	0.0	0.3	0.3
20B	DU 20B	3600.00	0.11	0.11	0.12			3	0.03	0.1	0.0	0.0	0.4	0.0	0.1	0.1
21	DU 21	3600.00	0.35	0.15	0.18			3	0.03	0.2	0.1	0.8	3.4	0.1	0.4	0.5
21B	DU21B	3600.00	0.13	0.11	0.13			3	0.03	0.1	0.0	0.1	0.7	0.0	0.1	0.2
22	DU 22	3600.00	3.1	1.9	1.8			3	0.03	2.3	0.7	5.1	2.3	0.4	3.5	4.1
Combined DUs Weighted by Area		**118000.00**	--	--	--	--	--	**45**	**1.00**	**2.2**	**0.1**	**0.0**	**High**	**0.1**	**2.4**	**2.5**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**2.5**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
1	DU 1	10000.00	0.035	0.03	0.026			3	0.08	0.0	0.0	0.0	1.1	0.0	0.0	0.0
2	DU 2	10000.00	0.45	0.26	0.24			3	0.08	0.3	0.1	0.8	2.6	0.1	0.5	0.6
3	DU 3	10000.00	0.11	0.064	0.055			3	0.08	0.1	0.0	0.2	2.7	0.0	0.1	0.2
4	DU 4	10000.00	0.28	0.3	0.26			3	0.08	0.3	0.0	0.1	0.5	0.0	0.3	0.3
5	DU 5	10000.00	0.069	0.043	0.05			3	0.08	0.1	0.0	0.1	1.8	0.0	0.1	0.1
9	DU 9	10000.00	0.038	0.027	0.028			3	0.08	0.0	0.0	0.0	1.4	0.0	0.0	0.0
11	DU 11	10000.00	0.18	0.23	0.16			3	0.08	0.2	0.0	0.3	1.3	0.0	0.3	0.3
12	DU 12	10000.00	0.38	0.2	0.37			3	0.08	0.3	0.1	0.7	2.3	0.1	0.5	0.6
13	DU 13	10000.00	2.3	2.4	1.2			3	0.08	2.0	0.7	4.7	2.4	0.4	3.1	3.6
16	DU 16	10000.00	0.1	0.085	0.042			3	0.08	0.1	0.0	0.2	2.8	0.0	0.1	0.2
20	DU 20	3600.00	0.03	0.028	0.028			3	0.03	0.0	0.0	0.0	0.3	0.0	0.0	0.0
20B	DU 20B	3600.00	0.013	0.013	0.015			3	0.03	0.0	0.0	0.0	0.6	0.0	0.0	0.0
21	DU 21	3600.00	0.038	0.016	0.019			3	0.03	0.0	0.0	0.1	3.5	0.0	0.0	0.1
21B	DU21B	3600.00	0.013	0.011	0.012			3	0.03	0.0	0.0	0.0	0.6	0.0	0.0	0.0
22	DU 22	3600.00	0.38	0.23	0.2			3	0.03	0.3	0.1	0.7	2.5	0.1	0.4	0.5
Combined DUs Weighted by Area		**118000.00**	--	--	--	--	--	**45**	**1.00**	**0.3**	**0.0**	**0.0**	**High**	**0.0**	**0.3**	**0.3**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**0.3**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
1	DU 1	10000.00	0.15	0.14	0.12			3	0.08	0.1	0.0	0.1	0.8	0.0	0.2	0.2
2	DU 2	10000.00	1.8	0.83	0.81			3	0.08	1.1	0.6	4.0	3.5	0.3	2.1	2.6
3	DU 3	10000.00	0.46	0.27	0.19			3	0.08	0.3	0.1	1.0	3.2	0.1	0.5	0.7
4	DU 4	10000.00	1	1.1	1			3	0.08	1.0	0.1	0.4	0.4	0.0	1.1	1.2
5	DU 5	10000.00	0.25	0.17	0.21			3	0.08	0.2	0.0	0.3	1.3	0.0	0.3	0.3
9	DU 9	10000.00	0.18	0.12	0.14			3	0.08	0.1	0.0	0.2	1.5	0.0	0.2	0.2
11	DU 11	10000.00	0.78	1.1	0.74			3	0.08	0.9	0.2	1.4	1.6	0.1	1.2	1.4
12	DU 12	10000.00	1.5	0.76	1.4			3	0.08	1.2	0.4	2.8	2.3	0.2	1.9	2.2
13	DU 13	10000.00	7.9	9.2	4.9			3	0.08	7.3	2.2	15.6	2.1	1.3	11.1	12.9
16	DU 16	10000.00	0.38	0.35	0.19			3	0.08	0.3	0.1	0.7	2.4	0.1	0.5	0.6
20	DU 20	3600.00	0.13	0.15	0.12			3	0.03	0.1	0.0	0.1	0.8	0.0	0.2	0.2
20B	DU 20B	3600.00	0.049	0.045	0.053			3	0.03	0.0	0.0	0.0	0.6	0.0	0.1	0.1
21	DU 21	3600.00	0.15	0.07	0.074			3	0.03	0.1	0.0	0.3	3.3	0.0	0.2	0.2
21B	DU21B	3600.00	0.053	0.042	0.047			3	0.03	0.0	0.0	0.0	0.8	0.0	0.1	0.1
22	DU 22	3600.00	1.2	0.92	0.73			3	0.03	1.0	0.2	1.7	1.8	0.1	1.3	1.5
Combined DUs Weighted by Area		**118000.00**	--	--	--	--	--	**45**	**1.00**	**1.1**	**0.1**	**0.0**	**High**	**0.0**	**1.2**	**1.2**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**1.2**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
17A	DU 17A	10000.00	5400	5300	7000			3	0.17	5900.0	953.9	6745.4	1.1	550.8	7508.2	8300.7
17B	DU 17B	10000.00	6100	5900	6100			3	0.17	6033.3	115.5	816.5	0.1	66.7	6228.0	6323.9
18A	DU 18A	10000.00	11000	11000	6500			3	0.17	9500.0	2598.1	18371.2	1.9	1500.0	13880.0	16038.3
18B	DU 18B	10000.00	4300	4800	5900			3	0.17	5000.0	818.5	5787.9	1.2	472.6	6379.9	7059.9
19A	DU 19A	10000.00	16000	25000	20000			3	0.17	20333.3	4509.2	31885.2	1.6	2603.4	27935.3	31681.4
19B	DU 19B	10000.00	25000	20000	21000			3	0.17	22000.0	2645.8	18708.3	0.9	1527.5	26460.4	28658.3
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**11461.1**	**995.5**	**33.2**	**Medium**	**574.8**	**12686.4**	**13966.4**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**13966.4**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
17A	DU 17A	10000.00	9.9	7.3	6.5			3	0.17	7.9	1.8	12.6	1.6	1.0	10.9	12.4
17B	DU 17B	10000.00	4.8	4.5	4.4			3	0.17	4.6	0.2	1.5	0.3	0.1	4.9	5.1
18A	DU 18A	10000.00	6.5	6.2	6.9			3	0.17	6.5	0.4	2.5	0.4	0.2	7.1	7.4
18B	DU 18B	10000.00	11	13	5.5			3	0.17	9.8	3.9	27.5	2.8	2.2	16.4	19.6
19A	DU 19A	10000.00	0.5	0.28	0.5			3	0.17	0.4	0.1	0.9	2.1	0.1	0.6	0.7
19B	DU 19B	10000.00	0.12	0.11	0.11			3	0.17	0.1	0.0	0.0	0.4	0.0	0.1	0.1
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**4.9**	**0.7**	**0.0**	**Medium**	**0.4**	**6.1**	**6.7**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**6.7**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
17A	DU 17A	10000.00	8.2	2.7	8.8			3	0.17	6.6	3.4	23.8	3.6	1.9	12.2	15.0
17B	DU 17B	10000.00	22	25	23			3	0.17	23.3	1.5	10.8	0.5	0.9	25.9	27.2
18A	DU 18A	10000.00	7.8	15	15			3	0.17	12.6	4.2	29.4	2.3	2.4	19.6	23.1
18B	DU 18B	10000.00	17	19	16			3	0.17	17.3	1.5	10.8	0.6	0.9	19.9	21.2
19A	DU 19A	10000.00	9.6	6.8	12			3	0.17	9.5	2.6	18.4	1.9	1.5	13.9	16.0
19B	DU 19B	10000.00	2.8	2.9	2.6			3	0.17	2.8	0.2	1.1	0.4	0.1	3.0	3.2
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**12.0**	**1.1**	**0.0**	**High**	**0.6**	**13.2**	**14.7**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**14.7**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
17A	DU 17A	10000.00	5	20	16			3	0.17	13.7	7.8	54.9	4.0	4.5	26.8	33.2
17B	DU 17B	10000.00	3.9	3.4	3.2			3	0.17	3.5	0.4	2.5	0.7	0.2	4.1	4.4
18A	DU 18A	10000.00	5.2	4.2	4.5			3	0.17	4.6	0.5	3.6	0.8	0.3	5.5	5.9
18B	DU 18B	10000.00	7.6	24	4.7			3	0.17	12.1	10.4	73.6	6.1	6.0	29.6	38.3
19A	DU 19A	10000.00	0.33	0.25	0.3			3	0.17	0.3	0.0	0.3	1.0	0.0	0.4	0.4
19B	DU 19B	10000.00	0.097	0.093	0.087			3	0.17	0.1	0.0	0.0	0.4	0.0	0.1	0.1
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**5.7**	**2.2**	**0.1**	**High**	**1.3**	**8.7**	**11.2**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**11.2**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
17A	DU 17A	10000.00	7.2	4.9	5.7			3	0.17	5.9	1.2	8.3	1.4	0.7	7.9	8.9
17B	DU 17B	10000.00	6.3	6.8	6.6			3	0.17	6.6	0.3	1.8	0.3	0.1	7.0	7.2
18A	DU 18A	10000.00	7.6	7	7.2			3	0.17	7.3	0.3	2.2	0.3	0.2	7.8	8.0
18B	DU 18B	10000.00	7.5	5	6.5			3	0.17	6.3	1.3	8.9	1.4	0.7	8.5	9.5
19A	DU 19A	10000.00	14	19	15			3	0.17	16.0	2.6	18.7	1.2	1.5	20.5	22.7
19B	DU 19B	10000.00	18	16	17			3	0.17	17.0	1.0	7.1	0.4	0.6	18.7	19.5
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**9.9**	**0.6**	**0.0**	**Low**	**0.3**	**10.5**	**11.2**

Degrees of freedom by Welch-Satterthwaite approximation	

Student's-t or Chebychev 95% UCL may be appropriate.	**Recommended UCL**	
	Student's t 95% UCL	**10.5**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
17A	DU 17A	10000.00	210	83	280			3	0.17	191.0	99.9	706.2	3.7	57.7	359.4	442.3
17B	DU 17B	10000.00	180	130	130			3	0.17	146.7	28.9	204.1	1.4	16.7	195.3	219.3
18A	DU 18A	10000.00	40	1700	1000			3	0.17	913.3	833.4	5892.9	6.5	481.2	2318.3	3010.6
18B	DU 18B	10000.00	5500	5600	5100			3	0.17	5400.0	264.6	1870.8	0.3	152.8	5846.0	6065.8
19A	DU 19A	10000.00	130	180	140			3	0.17	150.0	26.5	187.1	1.2	15.3	194.6	216.6
19B	DU 19B	10000.00	210	210	210			3	0.17	210.0	0.0	0.0	0.0	0.0	210.0	210.0
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**1168.5**	**146.8**	**4.9**	**High**	**84.8**	**1416.0**	**1538.0**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**1538.0**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
17A	DU 17A	10000.00	16000	14000	19000			3	0.17	16333.3	2516.6	17795.1	1.1	1453.0	20576.0	22666.7
17B	DU 17B	10000.00	26000	26000	25000			3	0.17	25666.7	577.4	4082.5	0.2	333.3	26640.0	27119.6
18A	DU 18A	10000.00	35000	35000	27000			3	0.17	32333.3	4618.8	32659.9	1.0	2666.7	40120.0	43957.1
18B	DU 18B	10000.00	43000	36000	33000			3	0.17	37333.3	5131.6	36285.9	1.0	2962.7	45984.5	50247.6
19A	DU 19A	10000.00	23000	36000	29000			3	0.17	29333.3	6506.4	46007.2	1.6	3756.5	40302.2	45707.4
19B	DU 19B	10000.00	36000	33000	35000			3	0.17	34666.7	1527.5	10801.2	0.3	881.9	37241.9	38510.9
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**29277.8**	**1658.3**	**55.3**	**Medium**	**957.4**	**31138.2**	**33451.1**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**33451.1**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
17A	DU 17A	10000.00	2900	1500	1200			3	0.17	1866.7	907.4	6416.1	3.4	523.9	3396.4	4150.2
17B	DU 17B	10000.00	2700	1200	820			3	0.17	1573.3	994.0	7029.0	4.5	573.9	3249.2	4075.0
18A	DU 18A	10000.00	1500	1400	1400			3	0.17	1433.3	57.7	408.2	0.3	33.3	1530.7	1578.6
18B	DU 18B	10000.00	2900	2000	2400			3	0.17	2433.3	450.9	3188.5	1.3	260.3	3193.5	3568.1
19A	DU 19A	10000.00	61	38	67			3	0.17	55.3	15.3	108.2	2.0	8.8	81.1	93.9
19B	DU 19B	10000.00	14	12	11			3	0.17	12.3	1.5	10.8	0.9	0.9	14.9	16.2
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**1229.1**	**236.8**	**7.9**	**High**	**136.7**	**1520.5**	**1824.9**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**1824.9**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
17A	DU 17A	10000.00	400	380	440			3	0.17	406.7	30.6	216.0	0.5	17.6	458.2	483.6
17B	DU 17B	10000.00	170	170	170			3	0.17	170.0	0.0	0.0	0.0	0.0	170.0	170.0
18A	DU 18A	10000.00	540	550	450			3	0.17	513.3	55.1	389.4	0.8	31.8	606.2	651.9
18B	DU 18B	10000.00	480	450	510			3	0.17	480.0	30.0	212.1	0.4	17.3	530.6	555.5
19A	DU 19A	10000.00	410	410	470			3	0.17	430.0	34.6	244.9	0.6	20.0	488.4	517.2
19B	DU 19B	10000.00	270	280	280			3	0.17	276.7	5.8	40.8	0.1	3.3	286.4	291.2
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**379.4**	**13.0**	**0.4**	**Low**	**7.5**	**394.0**	**412.2**

Degrees of freedom by Welch-Satterthwaite approximation	

Student's-t or Chebychev 95% UCL may be appropriate.	**Recommended UCL**	
	Student's t 95% UCL	**394.0**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
17A	DU 17A	10000.00	0.98	0.61	0.77			3	0.17	0.8	0.2	1.3	1.7	0.1	1.1	1.3
17B	DU 17B	10000.00	0.9	0.8	0.77			3	0.17	0.8	0.1	0.5	0.6	0.0	0.9	1.0
18A	DU 18A	10000.00	4.3	2.3	1.5			3	0.17	2.7	1.4	10.2	3.8	0.8	5.1	6.3
18B	DU 18B	10000.00	0.71	2.1	0.71			3	0.17	1.2	0.8	5.7	4.8	0.5	2.5	3.2
19A	DU 19A	10000.00	0.46	0.11	0.43			3	0.17	0.3	0.2	1.4	4.1	0.1	0.7	0.8
19B	DU 19B	10000.00	0.12	0.23	0.27			3	0.17	0.2	0.1	0.5	2.7	0.0	0.3	0.4
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**1.0**	**0.3**	**0.0**	**High**	**0.2**	**1.4**	**1.7**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**1.7**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
17A	DU 17A	10000.00	0.12	0.1	0.15			3	0.17	0.1	0.0	0.2	1.4	0.0	0.2	0.2
17B	DU 17B	10000.00	0.6	0.72	0.8			3	0.17	0.7	0.1	0.7	1.0	0.1	0.9	1.0
18A	DU 18A	10000.00	0.13	0.21	0.2			3	0.17	0.2	0.0	0.3	1.7	0.0	0.3	0.3
18B	DU 18B	10000.00	0.35	0.31	0.27			3	0.17	0.3	0.0	0.3	0.9	0.0	0.4	0.4
19A	DU 19A	10000.00	0.12	0.12	0.14			3	0.17	0.1	0.0	0.1	0.6	0.0	0.1	0.2
19B	DU 19B	10000.00	0.07	0.076	0.071			3	0.17	0.1	0.0	0.0	0.3	0.0	0.1	0.1
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**0.3**	**0.0**	**0.0**	**Medium**	**0.0**	**0.3**	**0.3**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**0.30**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
17A	DU 17A	10000.00	17	18	22			3	0.17	19.0	2.6	18.7	1.0	1.5	23.5	25.7
17B	DU 17B	10000.00	24	22	21			3	0.17	22.3	1.5	10.8	0.5	0.9	24.9	26.2
18A	DU 18A	10000.00	29	24	29			3	0.17	27.3	2.9	20.4	0.7	1.7	32.2	34.6
18B	DU 18B	10000.00	17	18	18			3	0.17	17.7	0.6	4.1	0.2	0.3	18.6	19.1
19A	DU 19A	10000.00	46	52	44			3	0.17	47.3	4.2	29.4	0.6	2.4	54.4	57.8
19B	DU 19B	10000.00	59	55	52			3	0.17	55.3	3.5	24.8	0.4	2.0	61.3	64.2
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**31.5**	**1.2**	**0.0**	**Low**	**0.7**	**32.8**	**34.4**

Degrees of freedom by Welch-Satterthwaite approximation	

Student's-t or Chebychev 95% UCL may be appropriate.	**Recommended UCL**	
	Student's t 95% UCL	**32.8**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
17A	DU 17A	10000.00	8200	7200	5700			3	0.17	7033.3	1258.3	8897.6	1.3	726.5	9154.7	10200.0
17B	DU 17B	10000.00	1900	2900	1600			3	0.17	2133.3	680.7	4813.2	2.3	393.0	3280.9	3846.4
18A	DU 18A	10000.00	83	1800	1600			3	0.17	1161.0	938.9	6639.1	5.7	542.1	2743.9	3523.9
18B	DU 18B	10000.00	5600	5000	3100			3	0.17	4566.7	1305.1	9228.6	2.0	753.5	6766.9	7851.1
19A	DU 19A	10000.00	120	90	110			3	0.17	106.7	15.3	108.0	1.0	8.8	132.4	145.1
19B	DU 19B	10000.00	60	61	62			3	0.17	61.0	1.0	7.1	0.1	0.6	62.7	63.5
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**2510.3**	**358.7**	**12.0**	**High**	**207.1**	**2912.8**	**3413.0**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**3413.0**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
17A	DU 17A	10000.00	0.58	0.48	0.89			3	0.17	0.7	0.2	1.5	2.3	0.1	1.0	1.2
17B	DU 17B	10000.00	0.7	0.2	0.47			3	0.17	0.5	0.3	1.8	3.9	0.1	0.9	1.1
18A	DU 18A	10000.00	0.49	0.63	1			3	0.17	0.7	0.3	1.9	2.6	0.2	1.2	1.4
18B	DU 18B	10000.00	0.28	0.44	0.79			3	0.17	0.5	0.3	1.8	3.7	0.2	0.9	1.2
19A	DU 19A	10000.00	2.5	1.1	1.1			3	0.17	1.6	0.8	5.7	3.6	0.5	2.9	3.6
19B	DU 19B	10000.00	0.024	0.029	0.013			3	0.17	0.0	0.0	0.1	2.6	0.0	0.0	0.0
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**0.7**	**0.2**	**0.0**	**High**	**0.1**	**0.9**	**1.0**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**1.0**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
17A	DU 17A	10000.00	0.5	0.41	0.75			3	0.17	0.6	0.2	1.2	2.3	0.1	0.9	1.0
17B	DU 17B	10000.00	0.45	0.11	0.31			3	0.17	0.3	0.2	1.2	4.2	0.1	0.6	0.7
18A	DU 18A	10000.00	0.44	0.58	0.92			3	0.17	0.6	0.2	1.7	2.7	0.1	1.1	1.3
18B	DU 18B	10000.00	0.15	0.28	0.64			3	0.17	0.4	0.3	1.8	5.0	0.1	0.8	1.0
19A	DU 19A	10000.00	1.9	0.9	0.98			3	0.17	1.3	0.6	3.9	3.1	0.3	2.2	2.7
19B	DU 19B	10000.00	0.029	0.031	0.015			3	0.17	0.0	0.0	0.1	2.5	0.0	0.0	0.0
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**0.5**	**0.1**	**0.0**	**High**	**0.1**	**0.7**	**0.8**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**0.82**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
17A	DU 17A	10000.00	0.88	0.71	1.3			3	0.17	1.0	0.3	2.1	2.2	0.2	1.5	1.7
17B	DU 17B	10000.00	0.97	0.32	0.67			3	0.17	0.7	0.3	2.3	3.5	0.2	1.2	1.5
18A	DU 18A	10000.00	0.86	1.1	1.6			3	0.17	1.2	0.4	2.7	2.2	0.2	1.8	2.1
18B	DU 18B	10000.00	0.44	0.77	1.3			3	0.17	0.8	0.4	3.1	3.7	0.3	1.6	1.9
19A	DU 19A	10000.00	3.4	1.6	1.8			3	0.17	2.3	1.0	7.0	3.1	0.6	3.9	4.7
19B	DU 19B	10000.00	0.045	0.047	0.023			3	0.17	0.0	0.0	0.1	2.5	0.0	0.1	0.1
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**1.0**	**0.2**	**0.0**	**High**	**0.1**	**1.2**	**1.5**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**1.5**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
17A	DU 17A	10000.00	0.12	0.093	0.15			3	0.17	0.1	0.0	0.2	1.7	0.0	0.2	0.2
17B	DU 17B	10000.00	0.15	0.068	0.13			3	0.17	0.1	0.0	0.3	2.6	0.0	0.2	0.2
18A	DU 18A	10000.00	0.11	0.16	0.19			3	0.17	0.2	0.0	0.3	1.9	0.0	0.2	0.3
18B	DU 18B	10000.00	0.064	0.1	0.2			3	0.17	0.1	0.1	0.5	4.1	0.0	0.2	0.3
19A	DU 19A	10000.00	0.41	0.26	0.27			3	0.17	0.3	0.1	0.6	1.9	0.0	0.5	0.5
19B	DU 19B	10000.00	0.0061	0.0067	0.0039			3	0.17	0.0	0.0	0.0	1.9	0.0	0.0	0.0
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**0.1**	**0.0**	**0.0**	**High**	**0.0**	**0.2**	**0.2**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**0.19**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
17A	DU 17A	10000.00	0.38	0.3	0.52			3	0.17	0.4	0.1	0.8	2.0	0.1	0.6	0.7
17B	DU 17B	10000.00	0.29	0.085	0.25			3	0.17	0.2	0.1	0.8	3.7	0.1	0.4	0.5
18A	DU 18A	10000.00	0.31	0.45	0.71			3	0.17	0.5	0.2	1.4	2.9	0.1	0.8	1.0
18B	DU 18B	10000.00	0.1	0.22	0.45			3	0.17	0.3	0.2	1.3	4.9	0.1	0.6	0.7
19A	DU 19A	10000.00	1.5	0.77	0.82			3	0.17	1.0	0.4	2.9	2.8	0.2	1.7	2.1
19B	DU 19B	10000.00	0.027	0.029	0.014			3	0.17	0.0	0.0	0.1	2.5	0.0	0.0	0.0
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**0.4**	**0.1**	**0.0**	**High**	**0.0**	**0.5**	**0.6**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**0.62**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebychev
17A	DU 17A	10000.00	0.044	0.041	0.048			3	0.20	0.0	0.0	0.0	0.6	0.0	0.1	0.1
17B	DU 17B	10000.00	0.0068	0.0063	0.0031			3	0.20	0.0	0.0	0.0	2.6	0.0	0.0	0.0
18A	DU 18A	10000.00	0.16	0.074	0.25			3	0.20	0.2	0.1	0.6	3.9	0.1	0.3	0.4
19A	DU 19A	10000.00	0.011	0.0071	0.0022			3	0.20	0.0	0.0	0.0	4.6	0.0	0.0	0.0
19B	DU 19B	10000.00	0.05	0.049	0.054			3	0.20	0.1	0.0	0.0	0.4	0.0	0.1	0.1
Combined DUs Weighted by Area		**50000.00**	--	--	--	--	--	**15**	**1.00**	**0.1**	**0.0**	**0.0**	**High**	**0.0**	**0.1**	**0.10**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**0.10**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard errror
UCL Upper confidence limit

ATTACHMENT 4

CONSTRUCTION PARTICULATE EMISSION FACTOR

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Site-specific
Construction Worker Inputs

Variable	Construction Worker Soil - Other Default Value	Form-input Value
$A_{c\text{-}doz}$ (areal extent of dozing) acres	.	0.5
A_{excav} (area of excavation site) m^2	.	2023
$A_{c\text{-}grade}$ (areal extent of grading) acres	.	0.5
A (PEF Dispersion Constant)	2.4538	2.4538
A_{surf} (areal extent of site) m^2	2023.43	2023.43
A_{till} (areal extent of tilling) acres	.	0.5
$B_{l\text{-}doz}$ (dozing blade length) m	.	3.7
$B_{l\text{-}grade}$ (grading blade length) m	.	3.7
B (PEF Dispersion Constant)	17.5660	17.5660
C (PEF Dispersion Constant)	189.0426	189.0426
d_{excav} (average depth of excavation site) m	.	0.3
F_D Unitless Dispersion Correction Factor	0.185837208	0.185837208
F(x) (function dependant on U_m/U_t derived using Cowherd et al. (1985))	0.194	0.194
$M_{m\text{-}doz}$ (Gravimetric soil moisture content) %	7.9	7.9
$M_{m\text{-}excav}$ (Gravimetric soil moisture content) %	12	12
M_{wind} (dust emitted by wind erosion) g	51288.84717	51288.84717
$N_{A\text{-}doz}$ (number of times site was dozed)	.	2
$N_{A\text{-}dump}$ (number of times soil is dumped)	2	2
$N_{A\text{-}grade}$ (number of times site was graded)	.	2
$N_{A\text{-}till}$ (number of times soil is tilled)	2	2
Q/C_{sa} (inverse of the ratio of the geometric mean air concentration to the emission flux at the center of a square source) g/m ^{2}-s per kg/m ^{3}	14.31407	14.31407
p_{soil} (density) g/cm ^{3} - chemical-specific	1.68	1.68
s_{doz} (soil silt content) %	6.9	6.9
AF_{cw} (skin adherence factor - construction worker) mg/cm ^{2}	0.3	0.3
AT_{cw} (averaging time - construction worker) days	365	365
BW_{cw} (body weight - construction worker) kg	80	80
ED_{cw} (exposure duration - construction worker) yr	1	1
EF_{cw} (exposure frequency - construction worker) day/yr	250	250
ET_{cw} (exposure time - construction worker) hr/day	8	8
THQ (target hazard quotient) unitless	0.1	0.1
IRS_{cw} (soil ingestion rate - construction worker) mg/day	330	330

Site-specific
Construction Worker Inputs

Variable	Construction Worker Soil - Other Default Value	Form-input Value
LT (lifetime) yr	70	70
SA_{cw} (surface area - construction worker) cm^2/day	3527	3527
TR (target cancer risk) unitless	1.0E-06	1.0E-06
S_{doz} (dozing speed) kph	11.4	11.4
S_{grade} (grading speed) kph	11.4	11.4
s_{silt} (soil silt content) %	18	18
t_c (overall duration of construction) hours	8400	8400
T_c (overall duration of construction) s	30240000	30240000
T (time over which traffic occurs) s	7200000	7200000
T_t (overall duration of traffic) s	7200000	7200000
U_m (mean annual wind speed) m/s	4.69	4.69
U_t (equivalent threshold value) m/s	11.32	11.32
V (fraction of vegetative cover)	0	0

Site-specific

Construction Worker Regional Screening Levels (RSL) for Soil - Other Construction Activities

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; * = where: nc SL < 100X ca SL; ** = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF_o (mg/kg-day)$^{-1}$	SF_o Ref	IUR (ug/m^3)$^{-1}$	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m^3)	RfC Ref	GIABS	ABS	RBA
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	1.50E+00	I	4.30E-03	I	3.00E-04	I /Chronic	1.50E-05	C /Chronic	1	0.03	0.6

Soil Saturation Concentration (mg/kg)	S (mg/L)	K_{oc}\ (cm^3/g)	K_d\ (cm^3/g)	HLC (atm-m^3/mole)	Henry's Law Constant Used in Calcs (unitless)	H` and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Chemical Type	D_{ia}\ (cm^2/s)	D_{iw}\ (cm^2/s)
-	-	-	2.90E+01	-	-		888.15	PHYSPROP	1673	CRC89	INORGANIC	-	-

D_A\ (cm^2/s)	Particulate Emission Factor (m^3/kg)	Volatilization Factor (m^3/kg)	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)	Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL THQ=0.1 (mg/kg)	Dermal SL THQ=0.1 (mg/kg)	Inhalation SL THQ=0.1 (mg/kg)	Noncarcinogenic SL THI=0.1 (mg/kg)	Screening Level (mg/kg)
-	2.06E+07	-	2.75E+01	1.72E+02	1.47E+03	2.33E+01	1.70E+01	1.06E+02	1.30E+02	1.31E+01	1.31E+01 nc

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ATTACHMENT 5

LEAD MODEL OUTPUTS

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Calculations of Blood Lead Concentrations (PbBs) and Risk in Nonresidential Areas

U.S. EPA Technical Review Workgroup for Lead

Version date 06/14/2017

DU7

Edit Red Cells

Variable	Description of Variable	Units	Park Personnel GSDi and PbBo from Analysis of NHANES 2009-2014	Park Personnel GSDi and PbBo from Analysis of NHANES 2009-2014	Adult Recreator GSDi and PbBo from Analysis of NHANES 2009-2014	Adolescent Recreator GSDi and PbBo from Analysis of NHANES 2009-2014
PbS	Soil lead concentration	µg/g or ppm	1087	1087	1087	1087
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	µg/dL per µg/day	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	1.8	1.8	1.8
PbB_0	Baseline PbB	µg/dL	0.6	0.6	0.6	1.1
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.100	0.050	0.050
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--
$AF_{S,D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S,D}$	Exposure frequency (same for soil and dust)	days/yr	160	219	31	31
$AT_{S,D}$	Averaging time (same for soil and dust)	days/yr	365	365	182	182
PbB_{adult}	PbB of adult worker, geometric mean	µg/dL	1.7	3.7	1.0	1.5
$PbB_{fetal,\ 0.95}$	95th percentile PbB among fetuses of adult workers	µg/dL	4.1	8.8	2.5	3.7
PbB_t	Target PbB level of concern (e.g., 2-8 ug/dL)	µg/dL	**5.0**	**5.0**	**5.0**	**5.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB exceeds target PbB, assuming lognormal distribution**	**%**	**2.4%**	**24.9%**	**0.22%**	**1.5%**

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Calculations of Blood Lead Concentrations (PbBs) and Risk in Nonresidential Areas

U.S. EPA Technical Review Workgroup for Lead

Version date 06/14/2017

DU17 - subsurface soil

Edit Red Cells

Variable	Description of Variable	Units	Park Personnel GSDi and PbBo from Analysis of NHANES 2009-2014	Construction worker GSDi and PbBo from Analysis of NHANES 2009-2014	Adult Recreator GSDi and PbBo from Analysis of NHANES 2009-2014	Adolescent Recreator GSDi and PbBo from Analysis of NHANES 2009-2014
PbS	Soil lead concentration	µg/g or ppm	1573	1573	1573	1573
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	µg/dL per µg/day	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	1.8	1.8	1.8
PbB_0	Baseline PbB	µg/dL	0.6	0.6	0.6	1.1
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.100	0.050	0.050
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--
$AF_{S,D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S,D}$	Exposure frequency (same for soil and dust)	days/yr	160	219	31	31
$AT_{S,D}$	Averaging time (same for soil and dust)	days/yr	365	365	182	182
PbB_{adult}	PbB of adult worker, geometric mean	µg/dL	2.3	5.1	1.2	1.7
$PbB_{fetal,\ 0.95}$	95th percentile PbB among fetuses of adult workers	µg/dL	5.3	12.1	2.9	4.1
PbB_t	Target PbB level of concern (e.g., 2-8 ug/dL)	µg/dL	**5.0**	**5.0**	**5.0**	**5.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB exceeds target PbB, assuming lognormal distribution**	**%**	**6.3%**	**44.6%**	**0.54%**	**2.4%**

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Calculations of Blood Lead Concentrations (PbBs) and Risk in Nonresidential Areas

U.S. EPA Technical Review Workgroup for Lead

Version date 06/14/2017

DU17 - surface soil

Edit Red Cells

Variable	Description of Variable	Units	Park Personnel GSDi and PbBo from Analysis of NHANES 2009-2014	Construction worker GSDi and PbBo from Analysis of NHANES 2009-2014	Adult Recreator GSDi and PbBo from Analysis of NHANES 2009-2014	Adolescent Recreator GSDi and PbBo from Analysis of NHANES 2009-2014
PbS	Soil lead concentration	µg/g or ppm	1867	1867	1867	1867
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	µg/dL per µg/day	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	1.8	1.8	1.8
PbB_0	Baseline PbB	µg/dL	0.6	0.6	0.6	1.1
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.100	0.050	0.050
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--
$AF_{S,D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S,D}$	Exposure frequency (same for soil and dust)	days/yr	160	219	31	31
$AT_{S,D}$	Averaging time (same for soil and dust)	days/yr	365	365	182	182
PbB_{adult}	PbB of adult worker, geometric mean	µg/dL	2.6	6.0	1.4	1.9
$PbB_{fetal,\ 0.95}$	95th percentile PbB among fetuses of adult workers	µg/dL	6.1	14.1	3.2	4.4
PbB_t	Target PbB level of concern (e.g., 2-8 ug/dL)	µg/dL	**5.0**	**5.0**	**5.0**	**5.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB exceeds target PbB, assuming lognormal distribution**	**%**	**9.4%**	**54.9%**	**0.84%**	**3.2%**

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Calculations of Blood Lead Concentrations (PbBs) and Risk in Nonresidential Areas

U.S. EPA Technical Review Workgroup for Lead

Version date 06/14/2017

DU18 - subsurface soil

Edit Red Cells

Variable	Description of Variable	Units	Park Personnel GSDi and PbBo from Analysis of NHANES 2009-2014	Construction worker GSDi and PbBo from Analysis of NHANES 2009-2014	Adult Recreator GSDi and PbBo from Analysis of NHANES 2009-2014	Adolescent Recreator GSDi and PbBo from Analysis of NHANES 2009-2014
PbS	Soil lead concentration	µg/g or ppm	2433	2433	2433	2433
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	µg/dL per µg/day	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	1.8	1.8	1.8
PbB_0	Baseline PbB	µg/dL	0.6	0.6	0.6	1.1
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.100	0.050	0.050
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--
$AF_{S,D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S,D}$	Exposure frequency (same for soil and dust)	days/yr	160	219	31	31
$AT_{S,D}$	Averaging time (same for soil and dust)	days/yr	365	365	182	182
PbB_{adult}	PbB of adult worker, geometric mean	µg/dL	3.2	7.6	1.6	2.1
$PbB_{fetal,\ 0.95}$	95th percentile PbB among fetuses of adult workers	µg/dL	7.5	18.0	3.8	5.0
PbB_t	Target PbB level of concern (e.g., 2-8 ug/dL)	µg/dL	**5.0**	**5.0**	**5.0**	**5.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB exceeds target PbB, assuming lognormal distribution**	**%**	**16.9%**	**70.4%**	**1.7%**	**4.9%**

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Calculations of Blood Lead Concentrations (PbBs) and Risk in Nonresidential Areas

U.S. EPA Technical Review Workgroup for Lead

Version date 06/14/2017

DU18 - surface soil

Edit Red Cells

Variable	Description of Variable	Units	Park Personnel GSDi and PbBo from Analysis of NHANES 2009-2014	Construction worker GSDi and PbBo from Analysis of NHANES 2009-2014	Adult Recreator GSDi and PbBo from Analysis of NHANES 2009-2014	Adolescent Recreator GSDi and PbBo from Analysis of NHANES 2009-2014
PbS	Soil lead concentration	µg/g or ppm	1433	1433	1433	1433
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	µg/dL per µg/day	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	1.8	1.8	1.8
PbB_0	Baseline PbB	µg/dL	0.6	0.6	0.6	1.1
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.100	0.050	0.050
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--
$AF_{S,D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S,D}$	Exposure frequency (same for soil and dust)	days/yr	160	219	31	31
$AT_{S,D}$	Averaging time (same for soil and dust)	days/yr	365	365	182	182
PbB_{adult}	PbB of adult worker, geometric mean	µg/dL	2.1	4.7	1.2	1.7
$PbB_{fetal,\ 0.95}$	95th percentile PbB among fetuses of adult workers	µg/dL	5.0	11.2	2.8	4.0
PbB_t	Target PbB level of concern (e.g., 2-8 ug/dL)	µg/dL	**5.0**	**5.0**	**5.0**	**5.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB exceeds target PbB, assuming lognormal distribution**	**%**	**5.0%**	**39.2%**	**0.43%**	**2.1%**

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Calculations of Blood Lead Concentrations (PbBs) and Risk in Nonresidential Areas
U.S. EPA Technical Review Workgroup for Lead

Version date 06/14/2017

IHRS - sediment

Edit Red Cells

Variable	Description of Variable	Units	Park Personnel GSDi and PbBo from Analysis of NHANES 2009-2014	Adult Recreator GSDi and PbBo from Analysis of NHANES 2009-2014	Adolescent Recreator GSDi and PbBo from Analysis of NHANES 2009-2014
PbS	Soil lead concentration	µg/g or ppm	9900	9900	9900
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	µg/dL per µg/day	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	1.8	1.8
PbB_0	Baseline PbB	µg/dL	0.6	0.6	1.1
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	0.050
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--
$AF_{S,D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12
$EF_{S,D}$	Exposure frequency (same for soil and dust)	days/yr	160	31	31
$AT_{S,D}$	Averaging time (same for soil and dust)	days/yr	365	182	182
PbB_{adult}	PbB of adult worker, geometric mean	µg/dL	11.0	4.6	5.1
$PbB_{fetal,\ 0.95}$	95th percentile PbB among fetuses of adult workers	µg/dL	26.1	11.0	12.2
PbB_t	Target PbB level of concern (e.g., 2-8 ug/dL)	µg/dL	**5.0**	**5.0**	**5.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB exceeds target PbB, assuming lognormal distribution**	**%**	**87.8%**	**38.1%**	**44.8%**

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Appendix H

Ecological Risk Assessment

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Ecological Risk Assessment
for
Iona Island Naval Ammunition Depot
Formerly Used Defense Site
Stony Point, Rockland County, New York

Prepared for

United States Army Corps of Engineers
Baltimore District

Prepared by

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June 2024
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LIST OF ACRONYMS AND ABBREVIATIONS

µg/L	Microgram(s) per liter
µmol/g_{oc}	Micromole(s) per grams organic carbon
95UCL	95 Percent upper confidence limit
AE	Assessment endpoint
Alion	Alion Science and Technology Corporation
AOC	Area of concern
ATSDR	Agency for Toxic Substances and Disease Registry
AUF	Area use factor
AVS	Acid volatile sulfide
BAF	Bioaccumulation factor
BCF	Bioconcentration factor
BERA	Baseline ecological risk assessment
bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CCME	Canadian Council of Ministries of the Environment
CEC	Cation exchange capacity
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CHMS	Con Hook Marsh Shoreline
CHHRS	Con Hook Hudson River Shoreline
COPEC	Constituent of potential ecological concern
CSM	Conceptual site model
CV	Coefficient of variation
DO	Dissolved oxygen
DoD	Department of Defense
DU	Decision unit
EA	EA Engineering, P.C. and Its Affiliate EA Science and Technology
EcoSSL	Ecological soil screening level
EPA	U.S. Environmental Protection Agency
EPC	Exposure point concentration
ERA	Ecological risk assessment
ESV	Ecological sediment screening value
FDR	false discovery rate
f_{oc}	Fraction of organic carbon
ft	Feet (foot)
FUDS	Formerly Used Defense Site
FEW	Familywise error rate

GSA	General Services Administration
HI	Hazard index
HMW	High molecular weight
HQ	Hazard quotient
HTRW	Hazardous, toxic, and radioactive waste
IHRS	Iona Island Hudson River Shoreline
in.	Inch(es)
ISM	Incremental sampling methodology
ITRC	Interstate Technology and Regulatory Council
kg/kg bw-d	Kilogram(s) soil per kilogram(s) body weight per day
LMW	Low molecular weight
LOAEL	Lowest observed adverse effects levels
LOD	Limit of detection
LOQ	Limit of quantitation
meq/100g	Milli-equivalents per 100 grams
mg/kg	Milligram(s) per kilogram
mg/kg bw-d	Milligram(s) soil per kilogram(s) body weight per day
NOAA	National Oceanic and Atmospheric Association
NOAEL	No observed adverse effect level
NRWQC	National Recommended Water Quality Criteria
NYDEC	New York State Department of Environmental Conservation
ORP	Oxidation reduction potential
OSWER	Office of Solid Waste and Emergency Response
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated biphenyl
PIPC	Palisades Interstate Park Commission
QAPP	Quality assurance project plan
QC	Quality control
RI	Remedial investigation
RRDS	Riprap drainage swale
RSD	Relative standard deviation
RSLERA	Refined screening-level ecological risk assessment
RSV	Refinement screening value

SEM	Simultaneously extracted metals
SLERA	Screening-level ecological risk assessment
SVOC	Semivolatile organic compound
TAL	Target Analyte List
TOC	Total organic carbon
TRV	Toxicity reference value
TWS	Tidal wetland swale
UFP	Uniform federal policy
USACE	U.S. Army Corps of Engineers
USACHPPM	U.S. Army Center for Health Promotion and Preventative Medicine
USAGC	U.S. Army Geospatial Services Administration
USFWS	U.S. Fish and Wildlife Service

1. INTRODUCTION

The Hazardous, Toxic, and Radioactive Waste (HTRW) Remedial Investigation (RI) was conducted at the Iona Island Naval Ammunition Depot Formerly Used Defense Site (FUDS, [FUDS Project No. C02NY074402]) to characterize the nature and extent of hazardous substances in environmental media at the FUDS that are attributable to historical Department of Defense (DoD) operations and to evaluate potential risk to human health and ecological receptors. The HTRW RI is the first comprehensive investigation of the Iona Island Naval Ammunition Depot FUDS.

A brief historical context of the background follows. This site was actively used from 1900 to 1947, with significant activity for assembling naval ammunition and explosives for World War II. This included ammunition related activities such as assembling, maintaining, inspecting, and testing; storing bulk explosives; issuing ammunition to fleets among other activities (U.S. Army Geospatial Services Administration [USAGC] 2018). The former Iona Island Naval Ammunition Depot was excessed by the U.S. Navy in 1957 and transferred to the General Services Administration (GSA), which conveyed the FUDS to the Palisades Interstate Park Commission (PIPC) in 1965. Most of the buildings and structures were demolished and removed by 1973 (USAGC 2018). For more information on site history and description, please see Section 2.1.1 (Environmental Setting and Constituents at the Site).

Previously at this site, two investigations were conducted in 1997 and 2007, which reported detections of metals and polycyclic aromatic hydrocarbons (PAHs) in multiple media (Greeley-Polhemus Group, Inc. 1997; Alion Science and Technology Corporation [Alion] 2008). These investigations were not comprehensive enough to establish the nature and extent of contamination and therefore the HTRW RI was proposed. A two-phased approach was employed to facilitate data collection, evaluation, and discussion. Phase I field activities were conducted in March and April 2020 and consisted of soil sampling using incremental sampling methodology (ISM). Phase II field activities were conducted in April 2022 and consisted of shoreline surface water and sediment sampling as well as additional soil sampling to provide information to complete this ecological risk assessment (ERA).

This ERA was prepared on behalf of the U.S. Army Corps of Engineers (USACE) by EA Engineering, PC. and Its Affiliate EA Science and Technology (EA) to evaluate the potential for adverse effects to ecological receptors exposed to site-related constituents of potential ecological concern (COPECs). The overall objective of the ERA was to quantitatively and qualitatively evaluate exposure and risks to ecological receptors and to provide risk managers with information necessary to achieve management goals and evaluate remedial decisions, if necessary.

1.1 GENERAL APPROACH

The ERA followed the procedures and methodologies set forth by the U.S. Environmental Protection Agency (EPA) and USACE. Specific EPA guidance documents included the following:

- *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments – Interim Final.* EPA 540-R-97-006, Office of Solid Waste and Emergency Response (OSWER) 9285.7-25, PB97-963211. June 1997.

- *The Role of Screening-Level Risk Assessments and Refining Contaminants of Concern in Baseline Ecological Risk Assessments Eco Update.* OSWER. Publication 9345.0-14. EPA 540/F-01/014. June 2001.

- *Wildlife Exposure Factors Handbook.* Volumes 1 and 2. EPA/600/R-93/187. December 1993.

- *Guidelines for Ecological Risk Assessment.* EPA/630/R95/002F. April 1998.

- *Guidance for Developing Ecological Soil Screening Levels (EcoSSLs).* OSWER Directive 9285.7-55. Revised February 2007, including separate contaminant EcoSSL documents.

- *Framework for Metals Risk Assessment*. EPA 120/R-07/001. March 2007.

Additionally, the applicable USACE guidance documents included the following:

- *Risk Assessment Handbook Volume II: Environmental Evaluation of the USACE Engineering Manual 200-1-4*. EM 200-1-4. 31 December 2010.

- *Environmental Quality, Standard Scopes of Work for Environmental Risk Assessment.* USACE Engineer Pamphlet EP 200-1-15. 30 June 2016.

- *A Guide to Screening-Level Ecological Risk Assessment TriService Environmental Risk Assessment Working Group.* Technical Paper. TG-090801. September 2008.

1.1.1 EPA's 8-Step Ecological Risk Assessment Process

This ERA followed EPA's *Ecological Risk Assessment Guidance for Superfund* (EPA 1997), which includes an 8-Step ERA process (**Figure 1-1**). Steps 1 and 2 of the process include a screening-level ecological risk assessment (SLERA). In Step 1, COPECs are identified in environmental media (e.g., soil) through a conservative screening process. In this process, screening benchmarks are used for comparison to site-specific analytical results and are based on conservative assumptions. In Step 2, risk estimates are refined using informed assumptions (such as area use and life history-traits for modeled receptors) for exposure and toxicity of the previously identified COPECs. If the results of the SLERA indicate potential adverse ecological effects, a scientific-management decision point allows the process to continue to a baseline ecological risk assessment (BERA), if warranted. The BERA consists of Step 3 (Problem Formulation) through Step 8 (Risk Management) and would use additional site-specific information (e.g., analytical tissue data, toxicity testing, habitat evaluations, community analysis, population metrics) to characterize risk to ecological receptors.

1.1.2 U.S. Army Corps of Engineers Flowcharts

USACE New England District has drafted ERA flowcharts (**Attachment A**) to provide a breakdown of the ERA process for project managers, team members, and communication purposes. The process is 3-steps, consisting of: (1) a preliminary screening level, consistent with step 1 of EPA's process introduced above 2) a refined screening level, consistent with step 2 of EPA's process and 3), a baseline assessment, consistent with steps 3 through 8 of EPA's process, to evaluate ecological risks, as outlined below:

- ***Step 1—Screening-Level Risk Assessment*** (**Attachment A, Flowchart/Figure 1**): The SLERA consists of preliminary screening steps. The preliminary screen evaluates constituent concentrations against generic, conservative screening values.

- ***Step 2—Refined Screening-Level Risk Assessment*** (**Attachment A, Flowchart/ Figure 2**): If potential risk exists after the preliminary evaluation, a refined screen is conducted to incorporate more readily available site-specific information such as adjustments to the exposure point concentrations (EPCs), toxicity information/effects of the identified COPECs, exposure scenarios to ecological receptors, and other input parameters that make the evaluation more site-specific. Only receptors/pathways that show potential risk in the SLERA or for which insufficient information is available to address risk are carried through to the refined screening-level ecological risk assessment (RSLERA).

- ***Step 3—Baseline Ecological Risk Assessment*** (**Attachment A, Flowchart/Figure 3**)***:*** If results of the RSLERA indicate potential risk, additional data may be collected to refine the potential risks in the BERA for specific COPEC(s), environmental media, and receptor(s). Such data could include analyses of porewater samples, toxicity testing, tissue constituent concentrations, population studies, and/or benthic community metrics to understand actual site-specific risk. Only those receptors remaining at the completion of the RSLERA are carried forward for further evaluation in the BERA.

1.2 REPORT ORGANIZATION

This ERA is organized into the following sections:

- **Section 1, Introduction** – presents the purpose and objectives of the ERA and guidance documents that were followed as part of the process.

- **Section 2, Screening-Level Problem Formulation** – presents a description of the site, the ecological conceptual site model (CSM), ecological receptors and pathways for analysis, and the assessment and measurement endpoints (Step 1).

- **Section 3, Ecological Risk Assessment Dataset** – presents the data collected as part of the Phase I and Phase II investigations and the EPCs used in the ERA.

- **Section 4, Screening-Level Ecological Risk Assessment**– presents the results of Step 1 of EPA's 8-step process/Flowchart 1, which includes a screen of constituent concentrations and concludes with a list of COPECs for further evaluation in the RSLERA.

- **Section 5, Refined Screening-Level Ecological Risk Assessment Methodology** – describes the process for conducting the RSLERA, which includes combining elements of ecological exposure and effects to refine risk estimates for each COPEC, corresponding to Step 2 of EPA's process and Flowchart 2.

- **Section 6, Uncertainty Assessment** – presents the inherent uncertainties that are associated with evaluating risk.

- **Section 7, Refined Screening Level Ecological Risk Assessment Results and Risk Characterization** – presents and interprets the RSLERA results considering multiple measurement endpoints, lines of evidence, and uncertainties.

- **Section 8, Refined Screening Level Ecological Risk Assessment Conclusions** – presents the conclusions of the RSLERA.

- **Section 9, References**

2. SCREENING-LEVEL PROBLEM FORMULATION

The problem formulation is part of the initial screening assessment (Step 1). As part of this step, the ecological CSM is developed. For this initial step, site-specific information for determining the nature and extent of contamination and for characterizing ecological receptors at the site is limited to analytical chemistry data evaluated from environmental media. The problem formulation presents the ecological CSM, a description of the site, ecological receptors and pathways for analysis, and the assessment and measurement endpoints.

2.1 ECOLOGICAL CONCEPTUAL SITE MODEL

During the screening-level problem formulation, an ecological CSM is developed to address the five key issues presented in the EPA Ecological Risk Assessment Guidance for Superfund (EPA 1997):

- The environmental setting and constituents known or suspected to exist at the site (Section 2.1.1)
- Fate and transport pathways that might exist at the site (Section 2.1.2)
- Exposure potential and ecotoxicity associated with constituent, site ecology, and categories of receptors that could be affected (Sections 2.1.3 and 2.1.4)
- Identification of complete exposure pathways (Section 2.1.5)
- Selection of ecological receptors and endpoints to evaluate (Section 2.1.6)

The following sections describe these five key issues presented by EPA (1997) that contribute to the development of the CSM, which is presented in Section 2.1.7.

2.1.1 Environmental Setting and Constituents at the Site

The Iona Island Naval Ammunition Depot FUDS property is an approximately 124.2-acre site located on Iona Island and Round Island along the west side of the Hudson River, in the Town of Stony Point, Rockland County, New York, as presented in **Figure 2-1.** A busy freight rail line is located immediately east of Iona Island along the point of access.

Iona Island is located in Bear Mountain State Park on the east side of U.S. 202/Route 9W, 6 miles south/downstream of West Point Military Academy, one mile south/downstream of the Bear Mountain Bridge, and 41.2 miles north/upstream from the mouth of the Hudson River. Round Island, the southeastern part of Iona Island, was once cut off by marshes and was attached to Iona Island with fill in the early 20th century (New York State Department of Environmental Conservation and U.S. Department of Commerce 1992).

Iona Island is connected to the mainland by a narrow two-lane road off U.S. 202/Route 9W near Doodletown. The island is accessed by crossing active River Subdivision (CSX Transportation) railroad tracks and entering through an unmanned gate.

The Iona Island Naval Ammunition Depot was used by the U.S. Navy between 1900 and 1947, with the major effort consisting of assembling naval ammunition for World War II. Although no ammunition was manufactured there, various types of explosives were assembled on site. Activities included preparing, assembling, maintaining, inspecting, and testing ammunition; storing bulk explosives, ammunition, and ordnance material; and issuing ammunition to the fleet, shore establishments, armed merchantmen, transport, and district forces (USAGC 2018).

After World War II, use of the island as an ammunition depot became obsolete because of lack of expansion room to accommodate new types of ammunition. In 1947, the U.S. Navy deactivated the Iona Island Naval Ammunition Depot and made the property available for restricted lease. The FUDS was re-designated as an Annex to the U.S. Naval Ammunition Depot, Earle, New Jersey. In 1957, the Annex was declared excess. In 1955 and 1960, GSA utilized the Iona Island Naval Ammunition Depot FUDS through a permit for stockpile materials such as rubber and copper. In 1960, GSA received official jurisdiction of the property. Other agencies under GSA control utilized the property for record storage during the 1960s, including the following: Maritime Administration, Atomic Energy Commission, Civil Service Commission, Army Corps of Engineers, and U.S. Navy's Bureau of Ships. The Maritime Administration also conducted trans-shipments of heavy freight at the main wharf on an occasional basis. On 30 March 1965, Iona Island was deemed evacuated after the last load of stockpiled materials left the property. In 1965, PIPC acquired both Iona and Round Islands (USACE 1998).

The majority of buildings and structures, including building foundations, were demolished and removed by PIPC between November 1965 and December 1973 (USAGC 2018). Fill material may have been used during re-grading following demolition and excavation/removal of foundations, and surface and subsurface soil was significantly reworked/mixed across much of the former operations area. The FUDS has remained undeveloped since its transfer from DoD ownership to PIPC in 1965. PIPC developed demolition plans for the remaining buildings and for construction of a recreational park; however, the plans to develop the island into a recreational park were not executed. The only construction that occurred on the island was that of the parking lot located directly west of Iona Island and outside of the FUDS boundary.

Historical constituents from on-site operations include metals and semivolatile organic compounds (SVOCs) such as PAHs, explosives, and polychlorinated biphenyls (PCBs). More detailed descriptions about the site's history, uses, and constituents can be found in the main text of the RI Report, to which this appendix is attached.

2.1.2 Fate and Transport Pathways

The potential primary release mechanisms for site-related constituents from operational use include accidental spills, direct releases to the ground from testing activities, and improper disposal including dumping. These primary release mechanisms may have resulted in contamination of soil

at and/or beneath former buildings/structures and the surroundings. The Iona Island Naval Ammunition Depot was deactivated in 1947, and the majority of buildings and structures, including building foundations, were demolished and removed. Soil has been significantly reworked during demolition, excavation, and regrading following the demolition of former structures.

Constituents released through deposition may have remained in surface soil by adsorbing to soil particles. When released to the environment, constituents such as some metals and SVOCs including PAHs tend to sorb to soil, sediment, and other organic materials. Some toxic forms of metals (e.g., methyl mercury) accumulate in animal tissue, while others (e.g., arsenic) accumulate in plants. Natural processes such as adsorption, ion exchange, complexation, and precipitation can cause metals to become immobilized and, therefore, not be bioavailable.

Constituents in surface soil may have been transported to a range of exposure media (including air, subsurface soil, groundwater, surface water, and sediment). Secondary release mechanisms from surface soil to other media include the following:

- Infiltration and leaching to underlying subsurface soil and shallow groundwater
- Overland runoff and erosion into surface water and sediment
- Surface and subsurface soil removal/reworking

Reworking of surface and subsurface soil during demolition is a major mechanism by which constituents that bind to soil particles, such as metals and PAHs, can be widely dispersed across the site. For example, site demolition and regrading potentially released and mixed lead-based paint particles into the soil. While metals may generally sorb/bond to soils, very fine paint chips/particles would result in a more sporadic hit-or-miss distribution of contamination.

Due to the non-volatile properties of the site constituents and time elapsed since potential releases, active physical processes such as diffusion and volatilization would not be considered significant contributors to constituent migration. Vapors and particulates in ambient air could be potential exposure media. However, due to the vegetative cover present throughout the site, time since release, and non-volatile properties of the constituents, this transport pathway is unlikely to contribute to significant exposure pathways under current or future land use conditions. In addition, inhalation pathways are considered not significant for ecological receptors in comparison to ingestion pathways (EPA 2007a).

The types of constituents previously detected or potentially present at the site would be bound to soil particles but could migrate via advective transport (bulk movement) of soil particles or desorption (leaching) with the flow of surface water or groundwater toward the adjacent marshes and the Hudson River shoreline. Desorption would be dependent on the solubility of the individual constituent and the properties of the soil. For example, explosives with high solubility such as 2,4-dinitrotoluene could have leached into subsurface soil and groundwater being transported to the shoreline and deposited in the sediments along the island.

Tertiary release mechanisms from contaminated secondary media may include the following:

- Discharge from groundwater to sediment and surface water
- Infiltration from subsurface soil and shallow groundwater to deeper bedrock groundwater
- Uptake of constituents from abiotic media (e.g., soil, sediment, and surface water) into prey tissue that is consumed by wildlife.

2.1.3 Constituent Descriptions

As discussed above, constituents from on-site operations include primarily metals and organic compounds such as SVOCs (primarily PAHs), PCBs, and explosives. Each of the constituent groups are discussed in the sections below.

2.1.3.1 Metals

Metals are naturally occurring constituents in the environment and vary in concentrations across geographic regions. Since metals are naturally occurring, many organisms have evolved mechanisms to regulate accumulations, especially accumulations of essential metals. Some metals (e.g., copper, selenium, and zinc) are nutritionally essential elements at low levels but toxic at higher levels, and others (e.g., lead, arsenic, and mercury) have no known biological functions. For metals to become available for uptake into organisms and cause adverse effects, the metals must be freely dissolved. For example, aluminum toxicity is dependent on soil pH and is considered potentially toxic when the soil has a pH less than 5.5 (EPA 2003). Certain metal compounds bioaccumulate in tissues (e.g., methyl mercury), and this bioaccumulation may be correlated to toxicity depending on the exposure concentrations (EPA 2007b).

Metals are neither created nor destroyed by biological or chemical processes, rather these processes can transform metals from one species to another (valence states) and can convert them between inorganic and organic forms (e.g. methylation). The form of the metal (chemical species, compound, matrix, and particle size) influences the bioaccessibility, bioavailability, and toxicological effects of the metal(s). The form of the metal is influenced by environmental properties such as pH, grain size, moisture content, redox potential, total organic carbon (TOC) content, cation exchange capacity (CEC), and acid volatile sulfide (AVS) (EPA 2007b).

Toxicity in wildlife from metal exposures in field settings is rarely documented (EPA 2007b). Most metals express multiorgan toxicity, resulting in a decrease in overall vigor, as opposed to well-defined mechanisms of action documented from organic constituents such as pesticides (EPA 2007b). In raptors collected from the field, lead toxicity resulting in neurological impacts and emaciation has been documented (Franson and Russel 2014). However, correlation between field exposures and other confounding factors make evaluation of constituent-specific toxicity challenging. Therefore, toxicological data used to assess the risk of metals to wildlife are derived from laboratory species such as rats, mice, or domestic livestock (e.g., cattle and chickens) exposed to soluble metal salts that are typically more toxic than naturally occurring metals. Furthermore, toxicological studies tend to focus on one metal rather than the mixture of metals that often occur in the environment. Some metals have similar modes of action and are typically assumed to have

additive effects, whereas others may be antagonistic (EPA 2007b). As such, there is some uncertainty with the evaluation of potential risks from exposure to metal mixtures.

2.1.3.2 Organic Compounds

Some organic compounds of potential toxicological concern (e.g., PCBs) are anthropogenic and do not occur naturally. PCBs are a group of synthetic organic constituents that exist as oily liquids or solids. PCBs enter the environment as mixtures containing a variety of individual congeners and are often referred to by their trade name, Aroclor. For example, the name Aroclor 1254 means that the mixture of individual PCB congeners contains approximately 54 percent chlorine by weight, as indicated by the second two digits in the name. PCBs were used widely as coolants and lubricants in transformers, capacitors, and other electrical equipment. The manufacture of PCBs stopped in the United States in 1977 because there was evidence that PCBs accumulate in the environment and may cause harmful effects (Agency for Toxic Substances and Disease Registry [ATSDR] 2000).

There are more than 100 different PAHs that generally occur as complex mixtures (e.g., as part of combustion products such as soot), not as single compounds (ATSDR 1995). A targeted list of 18 PAHs are typically analyzed in environmental media for the following reasons: (1) information on these PAHs is available, (2) they are suspected to be more toxic and exhibit harmful effects that are representative of PAHs as a whole, 3) they are detected more frequently in environmental media relative to other PAHs and 4) these are PAHs identified as priority pollutants at Superfund Sites (ATSDR 1995).

Explosives are compounds or mixtures that decompose or re-arrange with extreme rapidity when heat or shock is applied, resulting in releases of gas and heat (Juhasz and Naidu 2007). Military use of explosives may have resulted in contamination on military installations, such as Iona. Explosives and residues that may contain production impurities or decomposition by-products may enter the environment following explosives manufacture, assembly, packing, and detonation (Juhasz and Naidu 2007).

One of the most important factors affecting fate of organic compounds in environmental media is their affinity for binding to fine grained soils/sediment and organic matter. PCBs, particularly the higher chlorinated congeners, adsorb strongly to sediment and soil, where they tend to persist with half-lives of months to years. This decreases the mobility of these compounds, preventing them from dissolving in groundwater. However, while the hydrophobicity of these compounds may decrease solubility, it also increases the potential for uptake into the tissues of biota and the potential for bioaccumulation. Alternatively, some constituents such as high molecular weight (HMW) PAHs (e.g., benzo[a]pyrene) do not bioaccumulate significantly because they are large molecules and cannot transport easily into tissue cells (ATSDR 1995, 2000).

Specific chemical properties of explosives (e.g., solubility in water and rate of degradation) can vary with the compound. Many explosives are characterized by moderate to high mobility in soil. These explosives are unlikely to adsorb strongly to soils, and therefore can lead to contamination of groundwater. The most common explosives have low Log Kow values (<2), which may be used

as a surrogate metric of bioaccumulation potential (See RI Table 7-2). Chemicals with Log Kow values >5 are potentially bioaccumulative, while Log Kow <5 are less likely to bioaccumulate into animal tissue (Government of Canada 1995). However, a limited number of studies investigating the bioaccumulation of various explosives have demonstrated bioaccumulation from soil by earthworms and plants and from surface water by fish (Juhasz and Naidu 2007).

Harmful effects following exposure to organic compounds may occur in wildlife and aquatic receptors. PCB exposure has been shown to induce a suite of deleterious effects including immunological, neurological, reproductive, and developmental toxicity, as well as disruption of thyroid function in various animal models (Arena et al. 2003; Boas et al. 2012; Fernie et al. 2001; Monosson 2000). Consequently, data from animal studies suggests that PCBs are endocrine disrupting chemicals (Djordjevic et al. 2020). Similarly, PAH exposure has been shown to impact the reproduction and development of terrestrial and aquatic wildlife (Cousin and Cachot 2014; Fernie et al. 2018; Zychowski et al. 2017), as well as having genotoxic and immunological effects (Matson et al. 2009; Reynaud and Deschaud 2006). For the nitroaromatic explosive compounds, effects on growth, reproduction, and the hematological system have been recorded for invertebrates, fish, and reptiles, though fewer studies have been conducted in mammalian species compared to the PCBs and PAHs (reviewed in Lotufo 2012).

The following sections discuss the site ecology and habitats that have the potential to be impacted by organic and inorganic constituents.

2.1.4 Site Ecology

Iona Island is part of the much larger Hudson River National Estuarine Research Reserve and Significant Coastal Fish and Wildlife Habitat Area, managed under New York's Coastal Management Program (Alion 2008). The Iona Island Marsh became a registered National Natural Landmark in 1974, and the island is considered a bald eagle sanctuary (Levine 2011). Habitats surrounding Iona Island include brackish intertidal mudflats, brackish tidal marsh, and freshwater tidal marsh. Terrestrial habitats on the island consist of deciduous forested uplands. Specific habitats are described in more detail in the following paragraphs.

An intertidal marsh encompasses approximately 225 acres between Iona Island and the western shore of the Hudson River and is one of the largest, undeveloped tidal wetlands along the river (Yozzo et al. 2005). The marsh is separated from the FUDS by a non-climbable steel fence on top of a rubble wall and the CSX railroad. The National Wetlands Inventory (U.S. Fish and Wildlife Service [USFWS] 2018a) classifies the marsh as an estuarine and marine wetland (E2EM1N6 – estuarine, intertidal, emergent, persistent, regularly flooded, oligohaline 0.5–5 parts per thousand salinity) (**Figure 2-2**).

The southern end of Iona Island has two wetland areas. The marshes that separate Iona Island and Round Island from the mainland were partially filled in the early 20th century, with a U.S. Navy dumping area located along the Hudson River side of the islands and an area of fill on the western shoreline placed by Palisades Interstate Park Commission (PIPC) following U.S. Navy transfer of the FUDS in 1965. A portion of the marshes remains tidally flooded and currently comprises the

"Former Dump Area". There is also a small (0.35-acre) freshwater emergent wetland on the western side of the island. Field observations indicate this area is dominated by persistent emergent vegetation such as *Phragmites australis* and cattails. The Hudson River is classified as estuarine and marine deep water (estuarine, subtidal, unconsolidated bottom, subtidal, oligohaline 0.5-5 parts per thousand salinity) (USFWS 2018a).

Vegetation within Iona Island Marsh is dominated by narrow leaf cattail (*Typha* spp.) with common reed (*Phragmites australis*) and swamp rose mallow (*Hibiscus moscheutos*). Crack willow (*Salix fragilis*) is present at the mouth of Doodletown Brook within the tidal swamp. In 2017, PIPC restored approximately 50 percent of the marsh from invasive species (including *Phragmites australis*) to native vegetation (pers. comm. Mr. Matthew Shook, Bluestone Environmental Group, Inc. 2018). Iona Island Marsh is especially important for marsh-nesting birds. Probable or confirmed breeding species include more than one species of heron, least bittern (*Ixobrychus exilis*), Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), wood duck (*Aix sponsa*), Virginia rail (*Rallus limicola*), belted kingfisher (*Ceryle alcyon*), marsh wren (*Cistothorus palustris*), and red-winged blackbird (*Agelaius phoeniceus*) (Yozzo et al. 2005, Levine 2011).

The upland terrestrial areas of the island consist of deciduous, rocky woodland communities including oaks (*Quercus* spp.), ashes (*Fraxinus* spp.), birches (*Betula* spp.), willows (*Salix* spp.), red maple (*Acer rubrum*), and elms (*Ulmus* spp.). Compaction of soil and site disturbance have resulted in a significant presence of invasive species (estimated at 60 percent of the vegetation on the island) including multiflora rose (*Rosa multiflora*), autumn olive (*Elaeagnus umbellate*), Norway maple (*Acer platanoides*), oriental bittersweet (*Celastrus orbiculatus*), and black swallow-wort (*Vincetoxicum nigrum*) (Yozzo et al. 2005). During the visual inspection of vegetation performed during the 2020 Shoreline Reconnaissance Survey (discussed below in Section 2.1.4.2), a high density of invasive species was observed including Japanese barberry (*Berberis thunbergii*), multiflora rose (*Rosa multiflora*), wineberry (*Rubus phoenicolasius*), and Japanese honeysuckle (*Lonicera japonica*).

The woodlands are maintained for their value as cover, perch sites, and buffer zones. Toward the center of the island, where historical buildings once stood, open grasslands and low-lying shrubs dominate the landscape. Resident wildlife species of Iona Island Marsh that could be present include muskrat (*Ondatra zibethicus*), white-tailed deer (*Odocoileus virginianus*), box turtle (*Terrapene carolina*), northern water snake (*Nerodia sipedon*), timber rattlesnake (*Crotalus horridus*), red fox (*Vulpes vulpes*), rat snake (*Pantherophis* spp.), and green frog (*Rana clamitans*) (Yozzo et al. 2005). Incidental observations of two mammals, three reptiles, and a number of birds were made during the 2020 Shoreline Reconnaissance Survey (discussed below in Section 2.1.4.2).

2.1.4.1 Threatened and Endangered Species

Under the Endangered Species Act of 1973 (ESA), threatened species are species that may become endangered if conditions surrounding the species begin, or continue, to deteriorate. Endangered species are species whose prospects for survival in an area are assumed to be in immediate danger because of a loss or change in habitat, over-exploitation, predation, competition, or disease. In

addition to threatened and endangered species, the state of New York also identifies species of special concern as any species that does not meet the criteria of an endangered or threatened species but is particularly vulnerable and could easily become an endangered, threatened, or extirpated species. Special concern species are established by policy, not by regulation, and are used for planning and informational purposes; they do not have the legal weight of endangered and threatened species. There are several protected species that may occur at the site and these species and their status are provided in the insect below. Additionally, there are 10 migratory birds of conservation concern known to use the Island as habitat.

Insert 2-1. Protected Animal Species at Iona Island[1]

Group	Species	Common Name	Status	Jurisdiction
Fish	*Acipenser brevirostrum*	Shortnose sturgeon	Endangered	Federal/State
Fish	*Acipenser oxyrhynchus*	Atlantic sturgeon	Endangered	Federal/State
Birds	*Haliaeetus leucocephalus*	Bald eagle	Threatened[1]	State
Birds	*Ixobrychus exilis*	Least bittern	Threatened	State
Birds	*Setophaga cerulea*	Cerulean warbler	Special Concern	State
Birds	*Vermivora chrysoptera*	Golden-winged warbler	Special Concern	State
Birds	*Pandion haliaetus*	Osprey	Special Concern	State
Birds	*Circus cyaneus*	Northern harrier	Threatened	State
Birds	*Podilymbus podiceps*	Pied-billed grebe	Threatened	State
Plants	*Isotria medeoloides*	Small whorled pogonia	Threatened/Endangered	Federal/State
Mammals	*Myotis sodalis*	Indiana bat	Endangered	Federal/State
Mammals	*Myotis septentrionalis*	Northern long-eared bat	Endangered[2]	Federal/State
Reptiles	*Clemmys muhlenbergii*	Bog turtle	Threatened/Endangered	Federal/State

Sources: USFWS ECOS-IPaC system Iona Island project request 10/8/2018 (USFWS 2018b), NYSDEC Environmental Resource Mapper (NYDEC 2019), and NOAA 2023a.

1) Bald eagles are also federally protected under the Bald and Golden Eagle Protection Act.
2) On 29 November 2022, USFWS published a ruling reclassifying northern long-eared bat from threatened to endangered under the federal Endangered Species Act. This rule is effective 30 January 2023. The change to endangered in New York will take place at the same time as the Federal listing.

Atlantic sturgeon (*Acipenser oxyrhynchus*) and shortnose sturgeon (*Acipenser brevirostrum*) are classified as Endangered by National Marine Fisheries Service and are protected in the State of New York (National Oceanic and Atmospheric Association [NOAA] Fisheries 2023a; NYSDEC 2019). These species of sturgeon live primarily in the ocean but migrate to coastal rivers for spawning. In New York, spawning and nursery grounds for juveniles are located in the Lower Hudson River, such as near Iona Island (Edinger et al. 2014). As adults, they will spend time at the fresh water/salt-water interface, which fluctuates near Iona Island. Sturgeon are known to shelter in deep holes (i.e., deep Hudson River channel), and in their adult and juvenile life stages foraging occurs in mucky substrate for crustaceans, worms, and mollusks (NOAA 2023b). Suitable foraging habitat would be expected in the estuaries surrounding Iona Island.

2.1.4.2 Shoreline Reconnaissance Survey Results

A Shoreline Reconnaissance Survey was conducted by EA as part of the Phase I investigation on 6–7 April 2020 to characterize the shoreline and document potential constituent migration and exposure pathways, ecological resources, and receptors. Field reconnaissance was conducted, and the results of the investigation are presented in **Attachment B**. As part of the field reconnaissance,

the type of material and environment along the shoreline was documented and photographed (**Attachment B**).

Sediments consisting of fine-grained particles and high organic matter (i.e., TOC) are more likely to present a "sink" for historical constituents and serve as a source of continuous exposure to organisms as opposed to coarser-grained particles (e.g., sand and gravel) with low TOC that are less likely to accumulate historical constituents. As such, seven sediment samples were collected and analyzed for physical parameters (TOC and grain size) to evaluate their potential for accumulating constituents. Samples were collected along the Hudson River shoreline as well as along the Iona Marsh and in accordance with Worksheet 11 of the Uniform Federal Policy (UFP)-Quality Assurance Project Plan (QAPP) (EA 2020)[1].

Results of the physical data in sediments can be found in the Phase I Data Summary Report (EA 2021) and indicate that the shoreline of the Hudson River contains pockets of sandy sediments with little organic matter (i.e., low TOC), whereas the shoreline on the marsh side of the island contains very soft, mucky sediments, with high organic matter, silty clays, and finer grained sediments. As such, it is anticipated that the marsh shoreline contains more of a depositional environment than the Hudson River shoreline and may be a "sink" for constituents.

Wildlife and vegetation observed on-site during the Shoreline Reconnaissance were documented to determine potential ecological receptors. In general, the observations made are consistent with what would be expected for the habitat areas described in Section 2.1.4 and include the following:

- Mammals:
  - White tailed deer (*Odocoileus virginianus*)
  - Grey squirrel (*Sciurus carolinensis*)

- Reptiles:
  - Northern water snake (*Nerodia sipedon*)
  - Black rat snake (*Panthrophis obsoletus*)
  - Painted turtle (*Chrysemys picta*)

- Birds:
  - Turkey vulture (*Cathartes aura*)
  - Osprey (*Pandion haliaethus*)
  - American crow (*Corvus brachyrhynchos*)
  - Red-winged blackbird (*Agelaius phoeniceus*)
  - Mourning dove (*Zenaida macroura*)
  - Northern cardinal (*Cardinalis cardinalis*)
  - Northern blue jay (*Cyanocitta cristata*)
  - Greater scaup (*Aythya marila*)

[1] EA Engineering, P.C. is affiliated with EA Engineering, Science, and Technology, Inc., PBC, who does business as EA Science and Technology in State of New York.

— Pileated woodpecker (*Dryocopus pileatus*)
— Ring-billed gull (*Larus delawarensis*)

In the wetland areas, phragmites *(Phragmites australis)* and cattail *(Typha spp.)* were the dominant aquatic vegetation. The upland habitat consists primarily of open grassland dominated by graminoid vegetation. The visual inspection found a high density of invasive species including Japanese barberry (*Berberis thunbergii*), multiflora rose (*Rosa multiflora*), wineberry (*Rubus phoenicolasius*), and Japanese honeysuckle (*Lonicera japonica*). Other species observed within the upland areas included maples (*Acer spp.*), *Forsythia spp*., devil's walkingstick (*Aralia spinosa*), and Eastern red cedar (*Juniperus virginiana*). Milkweed (*Asclepias syriaca*) was also identified.

2.1.5 Exposure Pathway Analysis

Exposure pathway analysis provides insight into the potential constituent exposure to wildlife receptors that may exist and/or visit the site. In general, an exposure pathway consists of the following components:

- Source and mechanism of constituent release to the environment (e.g., spill)
- Environmental transport medium (e.g., surface soil)
- Point-of-contact with the contaminated medium (exposure point)
- Exposure route at the exposure point (e.g., dermal contact with surface soil)

If all four components are present, the pathway is considered complete. Not all complete exposure pathways are quantitatively evaluated as pathways may be less significant than primary exposure pathways that account for nearly all exposure or, in some cases, the means to accurately evaluate exposure quantitatively are not available. Each pathway defines a unique mechanism by which potential receptors are directly or indirectly exposed to constituents. The following definitions are used to identify exposure pathways:

- ***Complete Exposure Pathway***—There is confirmed receptor and media interaction (i.e., a source, migration route, and receptor have been identified). Exposure is evaluated quantitatively.

- ***Complete Pathway, but not Significant***—There is confirmed receptor and media interaction. However, pathway is not significant and exposure is not evaluated quantitatively.

- ***Incomplete Exposure Pathway***—There is no receptor and media interaction. No evaluation is conducted.

Media of concern and ecological receptors are evaluated to identify potential exposure routes linking the two and to determine which pathways are complete. The sections below identify the major routes of exposure and their applicability to each of the identified receptor groups.

2.1.5.1 Groundwater

No groundwater was identified or sampled as part of the Phase I or II investigations. Exposure to groundwater is considered an incomplete pathway for terrestrial receptors because they are not exposed to groundwater directly. The Former Dump Area is low lying and the surface water sampled is subject to groundwater discharge and surface water inundation depending on tides. Aquatic receptors may be exposed to groundwater but only after it is transported to the Hudson River and becomes mixed with river water at which point this becomes surface water. Consequently, this exposure pathway was assessed by consideration of surface water exposure in aquatic receptors.

2.1.5.2 Terrestrial Exposure Pathways

Plants may absorb constituents from surface and subsurface soil via roots. They may also absorb constituents from air or airborne particles through the stomata in leaves, although the waxy surfaces of leaves may limit this exposure. Soil invertebrates may ingest constituents in soil and also may be exposed to constituents in soil through direct contact. Some plant roots may exist in deeper soil layers and invertebrates such as earthworms have the potential to burrow deeper into the soil. Therefore, exposure pathways linking plants and soil invertebrates to surface and subsurface soil are complete and relevant for assessment. As part of the base of the food web, plants and invertebrates also provide food/prey items for foraging by upper-trophic level wildlife (e.g., birds and mammals).

The major exposure route for wildlife (i.e., birds, mammals, and herptiles) is ingestion of constituents in contaminated media (EPA 2007a). The surface water ingestion pathway is a complete but not significant exposure pathway as constituents tend to bind to suspended sediments and settle out of the water column. Surface water ingestion is not likely to be a risk driving exposure route. Wildlife may ingest constituents by incidentally ingesting soil while grooming or foraging. Some constituents may bioaccumulate in animal tissues. Therefore, wildlife may also ingest constituents through the prey items that they consume as food. Ingestion of constituents in soil and/or food are considered complete exposure pathways for wildlife.

Wildlife may be exposed to constituents in air, surface water, or soil via direct contact during foraging. Birds and mammals have protective outer coverings (feathers and fur) that prevent or limit the dermal absorption of constituents from environmental media (EPA 2007a, U.S. Army Center for Health Promotion and Preventative Medicine [USACHPPM] 2004). EPA guidance identifies that, in most cases, dermal exposures are likely to be less significant than exposures through ingestion, and their evaluation involves considerable uncertainty (EPA 2007a, USACHPPM 2004). Therefore, the dermal exposure route is considered complete but not significant for birds and mammals and therefore is not quantitatively evaluated in the ERA. Since herptiles may be more sensitive to dermal exposure (Weir et al. 2010), the dermal exposure route is considered a complete exposure pathway for herptiles.

Some mammals burrow into the soil to create dens and burrows which serve, not only as a home for these species, but also benefit the environment by aerating the soil. As a result, these mammals

may be exposed to and incidentally ingest both surface and subsurface soil. Foxes have been observed on the island and likely burrow in dens, which were observed during a site visit in October 2018. As such, mammals are assumed to burrow and be exposed to both surface and subsurface soil.

Inhalation is a complete pathway for wildlife that may inhale constituents that have volatilized or that are adsorbed to airborne particulates. EPA guidance indicates that, in general, the inhalation pathway is complete but not significant compared to ingestion pathways (EPA 2007a) and therefore is not quantitatively evaluated in the ERA.

In summary, the following terrestrial exposure pathways are complete and quantitatively evaluated in the ERA:

- direct contact to constituents in soil for plants;
- ingestion and direct contact to constituents in soil for soil invertebrates and herptiles; and
- ingestion of constituents in soil and food for wildlife (birds, mammals, and herptiles).

2.1.5.3 Aquatic Exposure Pathways

Results of the Shoreline Reconnaissance indicate that much of the shoreline along the Hudson River consists of boulders and riprap and does not contain suitable sediments or benthic habitats to support infaunal organisms. Faunal amphipods were observed on the underside of rocks, so these organisms are likely exposed primarily to surface water rather than sediments. Sediments along the Hudson River are characterized by sands or cobbles with low TOC content. On the other side of the island within Iona Marsh, the sediments are characterized by fine-grained organic muck and exhibit higher TOC content.

Based on the results of the Shoreline Reconnaissance Survey, there is the potential for runoff from the partially filled area between Round and Iona Islands to travel to the marsh side of the island. This area floods frequently with high tides, which could transport constituents from soil out into Iona Marsh. Sediments in the marsh appear conducive for accumulation of constituents.

Sediments are ingested by benthic invertebrates, demersal (bottom-feeding) fish, pelagic fish (within the water column) and incidentally by wildlife (i.e., bird, mammals, and herptiles) that feed in the aquatic environment. These receptors are also directly exposed to the sediment. Pelagic fish exposure to sediment is complete but not significant compared to exposure captured by demersal fish exposure to sediment and this exposure pathway is not quantitatively evaluated.

EPA guidance indicates that dermal exposures from direct contact are likely to be less significant than exposures through ingestion for birds and mammals due to protective outer coverings (EPA 2007a, USACHPPM 2004). Therefore, the sediment dermal exposure route is considered complete but not significant for birds and mammals. Since herptiles may be more sensitive to dermal exposure (Weir et al. 2010), the dermal exposure route is considered a complete exposure pathway for herptiles.

Food web models are typically not conducted for benthic invertebrates as exposure parameters are not readily available in EPA's Wildlife Exposure Factors Handbook (1993) or for fish due to the lack of site fidelity (see Section 2.1.6.2 for more information). Sediment quality criteria are expected to be protective of benthic invertebrates and fish via all exposure routes.

Aquatic and wetland plants have root systems that are also directly exposed to sediment. Areas with dense *Phragmites* root mats will limit wildlife exposure to sediment. Desorption of constituents from sediment to the water column can occur, impacting water column invertebrates (i.e., zooplankton) and pelagic (predacious) fish.

Demersal and pelagic fish as well as aquatic-feeding wildlife (e.g., birds, mammals, and herptiles) may ingest constituents through the prey items that they consume as food. For instance, insectivorous birds and demersal fish consume benthic invertebrates; herbivorous birds and mammals consume wetland aquatic plants; pelagic fish, large piscivorous mammals (e.g., river otter), and birds (e.g., bald eagle and heron) consume fish; and herptiles may consume any of the aquatic biota items. Ingestion of constituents in sediment and aquatic biota are considered complete exposure pathways for aquatic wildlife and are evaluated quantitatively in the food web models.

Ingestion of aquatic biota is considered complete for fish, but this pathway is not evaluated quantitatively in the food web models due to fish being transient in nature. Moreover, modeling exposures and ultimate associations with toxicity for aquatic receptors is limited. For example, US EPA's Aquatox model is available but is limited to organic contaminants and is therefore not applicable for sites impacted by heavy metals such as Iona Island and the Hudson River. Additionally, another model available for quantifying exposure/toxicity to aquatic receptors is US EPA's Web-ICE; however, this is limited to acute exposure scenarios as outputs focus on acute endpoints (i.e. mortality), thus the application of such a model for legacy impacted sediments will not yield applicable information for an exposure characterization of persistent contaminants from sediments, such as the case for Iona Island sediment at the Hudson River littoral zone. Finally, in the context of contaminant exposures, food web models are unlikely the most representative exposure route as fish are predominantly exposed at the gill-water interface (Evans 1987). Ingestion of aquatic biota is considered a complete but not significant exposure pathway for demersal and pelagic fish. For more information on how exposure is evaluated for aquatic receptors by taxa see Section 2.1.6.2.

Ingestion and direct contact with surface water is a complete pathway for each of the aquatic receptors (aquatic plants [direct contact only], benthic invertebrates, zooplankton, demersal fish, pelagic fish, and wildlife [birds, mammals, and herptiles]). The surface water ingestion pathway is a complete but not significant exposure pathway for wildlife as constituents tend to bind to suspended sediments and settle out of the water column. Surface water ingestion is not likely to be a risk driving exposure route. Benthic invertebrate and aquatic plant exposure to surface water is complete but not significant compared to exposure to sediment. Surface water quality criteria are expected to be protective of benthic invertebrates, fish, and aquatic plants via all exposure routes.

As discussed above, EPA guidance indicates that dermal exposures from direct contact are likely to be less significant than exposures through ingestion for wildlife (birds and mammals) due to protective outer coverings (EPA 2007a, USACHPPM 2004). The direct contact exposure pathway for surface water was considered complete but not significant and was not quantitatively evaluated for birds and mammals. Since herptiles may be more sensitive to dermal exposure (Weir et al. 2010), the dermal exposure route is considered a complete exposure pathway for herptiles.

In summary, the following aquatic exposure pathways are considered complete and quantitatively evaluated in the ERA:

- direct contact to sediment for aquatic plants;
- ingestion and direct contact to sediment for benthic invertebrates;
- ingestion and direct contact to sediment and surface water for demersal fish and herptiles;
- ingestion and direct contact to surface water for zooplankton and pelagic fish;
- ingestion of constituents in sediment and food for aquatic wildlife (birds, mammals, and herptiles).

2.1.6 Ecological Receptors

Selection of representative ecological receptor species for evaluation is based primarily on the following (EPA 1997):

- The likelihood of a species to use the site and the area immediately surrounding it
- The potential for exposure to constituents based on the feeding habits and life history of the organisms/feeding guild represented by the receptor species
- Life history and exposure information for the selected receptor species
- Toxicity information for the representative receptor species
- The societal importance of the species (e.g., threatened and/or endangered species, species of special concern).

2.1.6.1 Terrestrial Receptors

Based on the ecological setting and media of concern discussed above, ecological receptors selected for evaluation include terrestrial organisms such as plants, soil invertebrates, mammals, birds, and herptiles, are discussed further below.

Terrestrial Plant Community

No protected terrestrial plant species have been observed or are known to inhabit Iona Island. However, the small whorled pogonia (*Isotria medeoloides*) is believed or known to occur in

Rockland County, New York, and is federally listed as threatened and listed as endangered by the state of New York. The plant species is an orchid and grows in open-canopy forests and woodlands (North American Orchid Conservation Center 2023). Thus, it is possible the small whorled pogonia could be at upland portions of the site, most likely on the slopes of Round Island beneath the forest canopy and along drainage features in shallow soils where it is not being outcompeted by shrubs or other herbaceous vegetation. Based on the general nature of available plant toxicity data, no specific plant species are selected for evaluation. Instead, the assessment evaluates the potential for adverse effects to terrestrial plant communities by comparing soil data to soil screening values protective of plants. Also, terrestrial plants are an important component of the food web as food for herbivorous wildlife.

Soil Invertebrate Community

The earthworm was selected as the representative receptor species for the soil invertebrate community. Earthworms are an ideal receptor because they are in constant contact with the soil and can accumulate some constituents; as such, they represent a conservative estimate of exposure. They will be evaluated by comparing soil data to soil screening values protective of earthworms. Also, soil invertebrates are an important component of the food web as prey for insectivorous wildlife.

Herbivorous Wildlife

The meadow vole (*Microtus pennsylvanicus*) was selected as a representative receptor species to evaluate the potential for adverse effects to small herbivorous mammals from the ingestion of constituents in plants. The meadow vole was selected as a representative receptor because it is likely to occur in the study area, has a relatively small foraging range (which increases the potential for exposure to localized areas of potential contamination), uses underground tunnels and burrows (University of Kentucky 2023), and has a diet consisting solely of plant material. Also, the meadow vole is an important component of the food web as a common prey species for upper-trophic level predatory birds and mammals. In addition to the ingestion of constituents in food items, the incidental ingestion of constituents in soil is also evaluated.

Insectivorous Wildlife

The American robin (*Turdus migratorius*) was selected as a representative receptor species to evaluate the potential for adverse effects to insectivorous birds. The American robin is an appropriate receptor because it is common in a wide range of habitat types, likely to be present at the site, feeds primarily on invertebrates, and has a life history similar to that of many other passerine birds, including the red-winged black bird which were noted by both citizen scientists and EA field staff in the reconnaissance survey. Also, sufficient data are available for this species to support quantitative evaluation of food web exposures for passerine birds. For this evaluation, American robins are conservatively assumed to predominantly ingest earthworms and other invertebrates as well as some incidental ingestion of soils to account for diets that align with the protected species noted below and the red-winged black bird.

The cerulean warbler (*Setophaga cerulea*) and the golden-winged warbler (*Vermivora chrysoptera*) are both considered species of special concern by the state of New York. The cerulean warbler prefers deciduous forest habitats (Cornell Lab of Ornithology 2023a) the golden-winged warbler prefers mosaic forest near wetlands (Cornell Lab of Ornithology 2023b), and since both habitat types exist on-site, both species may be present at the site. However, due to the lack of an available food web exposure model for these birds, both species will be represented by the American robin (Cornell Lab of Ornithology 2023c). The American robin is an appropriate surrogate receptor because both warblers and the robin eat a wide variety of insects, and all have similar nesting behaviors. However, the American robin has a more generalist life history, meaning it can utilize a wider range of resources and habitats, and is approximately twice the size of the warbler. Smaller birds are required to feed more frequently and have larger energy requirements relative to body size; thus, contaminant doses normalized to body weight (e.g., in the denominator) may be greater compared to larger species. As such, potential risks to the smaller warbler species may be underestimated using the larger American robin as a surrogate receptor. The uncertainty associated with using surrogate receptors to evaluate risk to protected species is discussed further in Section 6.4.

The northern short-tailed shrew (*Blarina brevicauda*) is identified as a representative receptor species for evaluation of the potential for adverse effects to insectivorous mammals. Shrews consume a diet consisting almost entirely of insects and, thus, have a high rate of incidental soil ingestion while foraging. Sufficient data are available for this species to support quantitative evaluation of food web exposures. In addition, given their life history, feeding habits, use of burrows and tunnels, and high ingestion rates, shrews are expected to be a precautionary representative of other partially or predominantly carnivorous mammals, including skunks, mice, coyotes, and fisher cats.

The Indiana bat (*Myotis sodalis*) and northern long-eared bat (*Myotis septentrionalis*) are both federal and state-listed endangered species. Both species spend winters hibernating in areas such as caves or mines that are not present at or near the site, however both species choose summer roost sites opportunistically, roosting under exfoliating bark or in tree cavities, and therefore both bats may be present on-site during the summer (USFWS 2023a, 2023b). However, due to the lack of an available food web exposure model for bats, both species will be represented by the northern short-tailed shrew. The northern short-tailed shrew is an appropriate surrogate receptor for the two bat species because all are mostly nocturnal mammals with a similar diet that is largely insectivorous and opportunistic, and all have high energy demands requiring individuals to eat very high volumes of insect matter relative to their body size. However, the shrew is significantly heavier than the bats and has some important life history differences, such as that shrews do not fly or hibernate (University of Virginia 2010). Therefore, potential risks to these bats may be underestimated or overestimated using the northern short-tailed shrew as a surrogate receptor. For example, the larger body size and associated food ingestion rate for shrews may underestimate dietary exposure doses for bats. Bats are known to hibernate in the winter in habitats that are not present at the site, meaning the habitat use assumption with shrews as a surrogate would likely lead to overestimation of risk. The uncertainty associated with using surrogate receptors to evaluate risk to protected species is discussed further in Section 6.4.

Predatory Wildlife

The red-tailed hawk (*Buteo jamaicensis*) was selected as the representative receptor for predatory birds because it is likely to be present at the site and feeds predominantly on small mammals (such as mice, shrews, voles, rabbits, and squirrels). Also, sufficient data are available for this species to support quantitative evaluation of food web exposures.

The northern harrier (*Circus cyaneus*) is a state-listed threatened species. They prefer open grassland, therefore it is possible they may be found on-site. Due to the lack of an available food web exposure model for this species, it will be represented by the red-tailed hawk. The red-tailed hawk is a suitable surrogate receptor for the northern harrier because the species are closely related, and both have highly similar diets and life histories (Cornell Lab of Ornithology 2023d). The species are of fairly similar size, however the red-tailed hawk is slightly larger on average and more of a generalist, so it is possible that risks to the northern harrier may be underestimated using the red-tailed hawk as a surrogate receptor due to differences in food intake and contaminant dose relative to body size (i.e., in the denominator). The uncertainty associated with using surrogate receptors to evaluate risks to protected species is discussed further in Section 6.4.

Red fox (*Vulpes vulpes*) was selected as the representative receptor for predatory mammals because it was observed at the site, feeds primarily on small mammals, burrows in dens, has a high potential for exposure due to bioaccumulation though the food web, and is a valuable component to ecosystem structure by regulating the abundance, reproduction, distribution, and recruitment of lower-trophic level prey. Also, sufficient data are available for this species to support quantitative evaluation of food web exposures.

Herptiles

Reptiles and amphibians could inhabit terrestrial areas and be exposed to soil and prey. However, due to the lack of toxicological information, exposure factors, and ecological screening values for these species, only a qualitative evaluation of potential risks is possible. Risks to reptiles and amphibians are assumed to be similar to other receptors such as birds based on studies comparing toxic thresholds between the two groups (Salice et al. 2009).

EPA guidance on risk assessment suggests that birds can be used as surrogates for reptiles (EPA 2004). It has been demonstrated that for reptile exposure specifically to lead, growth effects were seen at a similar exposure dose to the lead EcoSSL Toxicity reference value (TRV) for avian ground insectivores (Salice et al. 2009), indicating the risk due to lead could occur at similar thresholds for birds and reptiles. The dietary exposure (ingestion of prey as well as incidental ingestion of soil during foraging) to birds is expected to be greater than that for reptiles since reptiles have lower energetic demands (Weir et al. 2010). As long as birds are as, or more, sensitive than reptiles to a given constituent, using birds (and other receptors such as mammals) as surrogates for the evaluation of risk to herptiles should be a conservative evaluation. However, in some cases the evaluation may not be as conservative. For example, herptiles may be more sensitive to a given constituent than other receptors, and there is a possibility that dermal exposure may be a more important pathway for herptiles as compared to other receptors (Weir et al. 2010).

Although use of surrogate receptors for the evaluation of potential risk to herptiles is uncertain, given the lack of available information, risk characterization via food web models is not possible. The uncertainty in the evaluation of risks to herptiles is also discussed in Section 6.4.2.

Summary

In summary, terrestrial receptors for evaluation are based on feeding guilds and availability of quantitative wildlife exposure models. As described above there are some instances noted where protected species may be present at the site (i.e., Northern Harrier, Long-eared Bat and Indiana Bat). In such cases, potential exposures to these species are modeled using the best representative receptors with similar life history traits that are data rich for use in exposure modeling. The terrestrial receptors selected for evaluation include the following:

- Terrestrial plant community
- Soil invertebrate community, represented by earthworms (*Lumbricus terrestr*is)
- Populations of herbivorous mammals, represented by meadow vole (*Microtus pennsylvanicus*)
- Populations of insectivorous mammals, represented by short-tailed shrew (*Blarina brevicauda*)
- Populations of insectivorous birds, represented by American robin (*Turdus migratorius*)
- Populations of predatory (carnivorous) mammals, represented by red fox (*Vulpes vulpes*)
- Populations of predatory (carnivorous) birds, represented by red-tailed hawk (*Buteo jamaicensis*)
- Populations of herptiles (i.e., amphibians and reptiles)

2.1.6.2 Aquatic Receptors

Potential aquatic ecological receptors include aquatic plants, benthic invertebrates, zooplankton, demersal fish, pelagic fish, aquatic birds, mammals, and herptiles.

Aquatic Plant Community

Based on the general nature of available plant toxicity data, no specific aquatic plant species were selected for evaluation. Instead, the assessment evaluated the potential for adverse effects to aquatic plant communities. There are no screening values protective of aquatic plants; therefore, plant communities were evaluated by comparing constituent concentrations in sediment to sediment screening benchmarks. Despite the lack of specific screening levels, an evaluation was

still performed given the importance of aquatic plants in the food web for aquatic herbivorous wildlife.

Benthic Invertebrate Community

Based on the general nature of available benthic invertebrate toxicity data, no specific species were selected for evaluation. Instead, the assessment evaluated the potential for adverse effects to benthic invertebrate communities (i.e., benthos). Benthic invertebrate communities were evaluated by comparing constituent sediment concentrations to sediment screening benchmarks. Although benthic invertebrates may be exposed to surface water and porewater, exposure to sediment via direct contact is considered the primary exposure pathway and was evaluated quantitatively. Also, benthic invertebrates are an important component of the food web as food for demersal fish and aquatic insectivorous wildlife.

Zooplankton Community

Based on the general nature of available invertebrate toxicity data, no specific species were selected for evaluation. Instead, the assessment evaluated the potential for adverse effects to water column invertebrate communities. Zooplankton communities were evaluated by comparing constituent concentrations in surface water to relevant surface water quality criteria.

Fish Community

Fish are exposed to COPECs through gills and dietary exposure routes. Bioconcentration occurs via exposure from water (typically through passive diffusion at the gill), and bioaccumulation of a COPEC may occur from both dietary and water compartments (Barber et al. 1991). The fish that may inhabit the shoreline of Iona Island can include demersal and pelagic fish species that may also be anadromous (e.g., see Steimle et al. 2000). Thus, fish could be resident or transient at Iona Island shoreline. The endangered, demersal, and anadromous shortnose sturgeon (*Acipenser brevirostrum*) and Atlantic sturgeon (*Acipenser oxyrhynchus*) may be a transient fish as maturation of this fish occurs in the lower Hudson River (NYDEC 2023a).

Exposures to site related COPECs for fish that are transient in nature are expected to be limited to time spent near the site shoreline. Otherwise, fish ranges, especially those that are anadromous, will be within water further from the site, thus reducing continuous exposure scenarios. Importantly, while some exposure models exist (i.e., US EPA Bioaccumulation and Aquatic System Simulator [BASS] and Food and Gill Exchange of Toxic Substance [FGETS]), application of such models would be limited in the context of this ecological risk assessment. Exposure without a metric for comparison of hazard yields limited information relevant to potential risk scenarios. Outputs from these models could help understand potential exposures to fish; however, utility would be limited to exposure alone as there are no standards or criteria appropriate for comparison. Therefore, comparisons to USEPA chronic surface water quality criteria (derived by US EPA following established guidelines for the protection of aquatic organisms) and sediment screening benchmarks (threshold effect concentrations (TECs) that are below concentrations expected to cause harmful effects to aquatic organisms (MacDonald et al. 2003) will be conducted. These

comparisons are conservative as these assume continuous chronic exposures. Resident fish communities will also be compared to chronic screening benchmarks.

Herbivorous Wildlife

Populations of herbivorous birds were represented by the mallard duck (*Anas platyrhynchos*), which are common dabbling (surface-feeding) ducks of freshwater and saltwater wetlands. They feed by dabbling and tipping up in shallow water, often filtering through soft sediments for food. They primarily feed on seeds, leaves, buds, stems, roots, and tubers of aquatic plants (EPA 1993). Herbivorous birds were evaluated by calculating a daily dose of constituents from sediment and aquatic biota (aquatic plants). Exposure from ingestion of surface water was not included for aquatic receptors, as constituents tend to bind to suspended sediments that settle out of the water column, resulting in minimal risk from this pathway (see Section 2.1.5.3 above). The daily dose was compared to TRVs for birds.

Populations of herbivorous mammals were represented by muskrat (*Ondatra zibethicus*). These rodents spend most of their lives in or near bogs, marshes, lakes, or streams. They are primarily herbivorous and feed upon roots, shoots, bulbs, tubers, stems, and leaves of aquatic plants. They construct dens in riverbanks or along shores of waterways and have a small home range (EPA 1993). Herbivorous mammals were evaluated by calculating a daily dose of constituent from sediment and aquatic biota (aquatic plants). The daily dose was compared to TRVs for mammals.

Insectivorous Wildlife

Populations of insectivorous birds were represented by lesser scaup (*Aythya affinis*), which is a common diving duck that primarily consumes invertebrates from the water column and surfaces of aquatic plants and other substrates. Common prey includes snails, clams, water fleas, amphipods, midges, chironomids, and leeches. When seeds are abundant, they may also be consumed in large quantities (EPA 1993). Insectivorous birds were evaluated by calculating a daily dose of constituent from sediment and aquatic biota (benthic invertebrates). The daily dose was compared to TRVs for birds.

The pied-billed grebe (*Podilymbus podiceps*) is a state-listed threatened species. It prefers wetland habitats with both open water and aquatic vegetation cover available, and so may be present on-site. However, due to the lack of an available food web exposure model for the grebe, the species will be represented by the lesser scaup. The lesser scaup is a suitable surrogate receptor for the pied-billed grebe because both species have highly similar diets, habitat requirements, and life histories. However, the lesser scaup is significantly larger than the pied-billed grebe, and as such it is possible that risk to the grebe will be underestimated due to the differences in ingestion rates and contaminant doses relative to body size (i.e., in the denominator). The uncertainty associated with using surrogate receptors to evaluate risk to protected species is discussed further in Section 6.4.

Piscivorous Wildlife

COPECs that do accumulate in fish tissue and those that are expected to transfer to higher trophic levels are evaluated using food web models. Piscivorous birds and mammals are evaluated in those food web models with COPEC specific bioconcentration factors (BCFs) used to estimate total fish concentrations that are consumed as prey. Populations of piscivorous mammals were represented by river otter (*Lontra canadensis*), which are found in freshwater, estuarine, and some marine environments from coastal areas to mountain lakes. They inhabit food-rich coastal areas such as lower portions of streams and rivers, estuaries, non-polluted waterways, lakes, tributaries that feed rivers, and areas of little human impact. The bulk of their diet is fish, but they feed on a variety of prey depending on availability and ease of capture. They may also consume crustaceans, insects, amphibians, and reptiles (EPA 1993). Piscivorous mammals were evaluated by calculating a daily dose of constituents from sediment and aquatic biota (demersal fish). The daily dose was compared to TRVs for mammals.

Populations of piscivorous birds were represented by the great blue heron (*Ardea herodias*). These birds have long legs, necks, and bills that are adapted for wading in shallow water and stabbing prey. Most heron species build their nests in trees near their foraging habitat. Herons range in size from the least bittern to the great blue heron (EPA 1993). Great blue herons are assumed to consume demersal fish. Piscivorous birds were evaluated by calculating a daily dose of constituent from sediment and aquatic biota. The daily dose was compared to TRVs for birds.

The least bittern (*Ixobrychus exilis*) is a protected species under the Migratory Bird Act, and habitat for the species has been noted on the island. However, due to the lack of an available food web exposure model for the bittern, the species was represented by the great blue heron, which is a similar wading, piscivorous heron species that shares similar habitats and feeding behaviors. Both birds have long necks and spear-like bills. They feed primarily on aquatic life (e.g., fish) and are common along the margins of waterbodies and wetlands. Their long legs, necks, and bills are adapted for wading in shallow water and stabbing prey. The least bittern is the smallest of the wading birds, whereas the great blue heron is the largest (EPA 1993). Using an established allometric equation (Nagy 2001), the ingestion rate and contaminant dose normalized to body weight (i.e., in the denominator) of the least bittern would be approximately threefold higher than the blue heron; therefore, potential risks to the least bittern may be underestimated using the great blue heron as a surrogate receptor. The uncertainty associated with using surrogate receptors to evaluate risk to protected species is discussed further in Section 6.4.

The bald eagle (*Haliaeetus leucocephalus*) is a state and federal protected species that roosts along the Hudson River shoreline on Iona Island, especially during the winter months. Bald eagles are primarily opportunistic, consuming a variety of prey including ducks and birds or whatever prey is available and easiest to obtain (including carrion). They also consume dead and dying fish when available but will capture live fish swimming near the surface or fish in shallow water (EPA 1993). Due to the large home range and lack of site fidelity, the bald eagle was not evaluated in the ERA. However, evaluation of great blue heron, another piscivorous species, is considered to be protective of bald eagles due the heron's smaller home range and greater site fidelity (EPA 1993).

The osprey (*Pandion haliaetus*) is considered a species of special concern by the state of New York. It is an obligate piscivore (NYDEC 2023b), meaning it consumes only fish. Evaluation of the great blue heron, another obligate piscivore (though notably larger), will be considered protective of osprey.

Herptiles

Reptiles and amphibians could inhabit aquatic (marsh) areas and be exposed to site-related constituents through direct contact with sediments, surface water and ingestion of prey. In addition, the bog turtle *(Clemmys muhlenbergii*) is a federal and state listed threatened species with a range that overlaps with the site. In New York, the bog turtle is generally found in open wet meadows or boggy areas dominated by sedges or sphagnum moss, and they rely on a complex habitat featuring microhabitats for different parts of their life cycle (NYDEC 2023c). However, due to the lack of toxicological information, exposure factors, and ecological screening values for reptile and amphibian species, only a qualitative evaluation of potential risks is possible. Risks are assumed to be similar to other receptors evaluated. See Section 2.1.6.1 for the discussion of the use of surrogate receptors to evaluate risk to herptiles.

Summary

In summary, the aquatic receptors for evaluation are based on feeding guilds and availability of wildlife exposure models. As described above there are some instances noted where protected species may be present at the site (i.e., Least Bittern, Pie-billed Grebe), potential exposures to these species are modeled using the best representative receptors with similar life history traits that are data rich for use in exposure modeling. The aquatic receptors selected for evaluation include the following:

- Aquatic plant community
- Benthic invertebrate community (i.e., benthos)
- Aquatic life (zooplankton, demersal fish, and large pelagic fish)
- Populations of herbivorous birds, represented by mallard duck (*Anas platyrhynchos*)
- Populations of herbivorous mammals, represented by muskrat (*Ondatra zibethicus*)
- Populations of insectivorous birds, represented by lesser scaup (*Aythya affinis*)
- Populations of piscivorous mammals, represented by river otter (*Lontra canadensis*)
- Populations of piscivorous birds, represented by great blue heron (*Ardea herodias*)
- Populations of herptiles (i.e., amphibians and reptiles)

2.1.7 Conceptual Site Models

A graphical representation of the ecological CSM is depicted on **Figure 2-3**.

2.2 ASSESSMENT AND MEASUREMENT ENDPOINTS

Assessment and measurement endpoints are identified for each representative receptor species evaluated at the site. EPA guidance stresses the importance of ecologically significant endpoints. According to EPA (1998), "Assessment endpoints are explicit expressions of the actual environmental value that is to be protected, operationally defined by an ecological entity and its attributes." Failure to select appropriate assessment and measurement endpoints can result in the inability to answer the risk questions. Several criteria are applicable for endpoint selection (Suter 2007, EPA 1998):

- Unambiguous Definition—Assessment endpoints should indicate a subject and a characteristic of the subject (e.g., fish reproduction).

- Accessibility to Prediction and Measurement—Assessment endpoints should be reliably predictable from measurements.

- Susceptibility to the Hazardous Agent/Stressor—Susceptibility of an organism (plant or animal) results from the combination of potential for exposure and the sensitivity to the concentrations of constituents or other stressors of concern.

- Biological Relevance—Biological relevance of impacts to an individual organism is determined by the importance of the impact to higher levels of biological organization (e.g., populations or communities).

- Social Relevance and Policy Goals—Assessment endpoints should be of value to decision-makers and the public. The assessment endpoints should represent effects that would warrant consideration of site remediation or alteration of project plans. Assessment endpoint selection should also include endpoints that may be mandated legally (e.g., protected species).

For the Iona Island FUDS, the terrestrial assessment endpoints (AE) include the following:

- AE1: Protection and maintenance (i.e., survival, growth, and reproduction) of terrestrial plant community from adverse effects to survival, growth, or reproduction from exposure to COPECs in soil

- AE2: Protection and maintenance (i.e., survival, growth, and reproduction) of soil invertebrate community from adverse effects to survival, growth, or reproduction from exposure to COPECs in soil

- AE3: Protection and maintenance (i.e., survival, growth, and reproduction) of populations of herbivorous mammals, represented by meadow vole (*Microtus pennsylvanicus*), from exposure to COPECs in soil and biota (i.e., plant tissue)

- AE4: Protection and maintenance (i.e., survival, growth, and reproduction) of populations of insectivorous birds, represented by American robin (*Turdus migratorius*), from exposure to COPECs in soil and biota (i.e., earthworms)

- AE5: Protection and maintenance (i.e., survival, growth, and reproduction) of populations of insectivorous mammals, represented by short-tailed shrew (*Blarina brevicauda*), from exposure to COPECs in soil and biota (i.e., earthworms)

- AE6: Protection and maintenance (i.e., survival, growth, and reproduction) of populations of carnivorous (predatory) mammals, represented by red fox (*Vulpes vulpes*), from exposure to COPECs in soil and biota (i.e., small mammal tissue)

- AE7: Protection and maintenance (i.e., survival, growth, and reproduction) of populations of carnivorous (predatory) birds, represented by red-tailed hawk (*Buteo jamaicensis*), from exposure to COPECs in soil and biota (i.e., small mammal tissue)

For the Iona Island FUDS, the following assessment endpoint is relevant to terrestrial and aquatic environments:

- AE8: Protection of and maintenance (i.e., survival, growth, and reproduction) of populations of herptiles (amphibians and reptiles) from exposure to COPECs in soil, surface water, and sediment (qualitative evaluation due to minimal toxicological endpoints)

For the Iona Island FUDS, the aquatic assessment endpoints include the following:

- AE9: Protection and maintenance (i.e., survival, growth, and reproduction) of aquatic plant community from exposure to COPECs in sediment and surface water

- AE10: Protection and maintenance (i.e., survival, growth, and reproduction) of benthic invertebrate community from COPECs in sediment

- AE11: Protection and maintenance (i.e., survival, growth, and reproduction) of zooplankton community from exposure to COPECs in surface water

- AE12: Protection and maintenance (i.e., survival, growth, and reproduction) of demersal fish community from exposure to COPECs in surface water and sediment

- AE13: Protection and maintenance (i.e., survival, growth, and reproduction) of pelagic fish community from exposure to COPECs in surface water

- AE14: Protection and maintenance (i.e., survival, growth, and reproduction) of populations of herbivorous birds, represented by mallard duck (*Anas platyrhynchos*), from exposure to COPECs in sediment and biota (i.e., plant tissue)

- AE15: Protection and maintenance (i.e., survival, growth, and reproduction) of populations of herbivorous mammals, represented by muskrat (*Ondatra zibethicus*), from exposure to COPECs in sediment and biota (i.e., plant tissue)

- AE16: Protection and maintenance (i.e., survival, growth, and reproduction) of populations of insectivorous birds, represented by lesser scaup (*Aythya affinis*), from exposure of COPECs in sediment and biota (i.e., benthic invertebrates)

- AE17: Protection and maintenance (i.e., survival, growth, and reproduction) of populations of piscivorous mammals, represented by river otter (*Lontra canadensis*), from exposure to COPECs in sediment and biota (i.e., fish tissue)

- AE18: Protection and maintenance (i.e., survival, growth, and reproduction) of populations of piscivorous birds, represented by great blue heron (*Ardea herodias*), from exposure to COPECs in sediment and biota (i.e., fish tissue).

Measurement endpoints are measurable ecological characteristics that are related to the assessment endpoints (EPA 1998). Since it is difficult to "measure" assessment endpoints, measurement endpoints are selected to allow inference regarding the assessment endpoints described above. Measurement endpoints are used to assess the potential for effects on the assessment endpoints through their comparison to screening-level concentrations or toxicity values. The overall measurement endpoints are provided below. **Table 2-1** presents specific measurement endpoints for each assessment endpoint.

- Chemistry Data for Soil—The measurement of COPEC concentrations in soil provides the means, when compared to conservative (based on chronic or no effects levels) ecotoxicological-based screening concentrations, for drawing inferences regarding the assessment endpoints for terrestrial plants and soil invertebrates.

- Chemistry Data for Sediment—The measurement of COPEC concentrations in sediment provides the means, when compared to conservative (based on chronic or no effects levels) ecotoxicological-based screening concentrations, for drawing inferences regarding the assessment endpoints for aquatic plants, benthic invertebrates, and demersal fish.

- Chemistry Data for Surface Water—The measurement of COPEC concentrations in surface water provides the means, when compared to conservative (based on chronic or no effects levels) ecotoxicological-based screening concentrations, for drawing inferences regarding the assessment endpoints for zooplankton and demersal and pelagic fish.

- Modeled Doses of COPECs—The estimated dose of COPECs ingested by wildlife (birds and mammals) using chemistry data in site media when compared to wildlife TRVs provides the means for drawing inferences regarding the assessment endpoints for wildlife (i.e., birds and mammals).

- Quantitative measurements of physical parameters in site media assist with evaluating the bioavailability potential of each COPEC. Data for grain size, TOC, pH, CEC, and AVS/simultaneously extracted metals (SEM) are used to assess the potential bioavailability of each COPEC.

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3. ECOLOGICAL RISK ASSESSMENT DATASET

3.1 REMEDIAL INVESTIGATION SAMPLING

A two-phased investigation approach was conducted as part of the RI to facilitate data collection, evaluation, and discussion. Phase I field activities were conducted in March and April 2020 and consisted of surface soil and subsurface soil sampling using ISM. Phase I field activities were conducted in accordance with the HTRW RI UFP-QAPP (EA 2020) and are presented in the Phase I RI Data Summary Report (EA 2021).

Phase II field activities were conducted in April 2022 following the HTRW RI UFP-QAPP Addendum (EA 2022) and are documented in the RI Report to which this document is appended. Activities included surface water and sediment sampling to evaluate the potential for inorganic constituents to impact the shoreline of Iona Island. In addition, physical parameters in soil were collected in select upland decision units (DUs) to help evaluate potential terrestrial risk as part of the RSLERA.

3.1.1 Phase I Investigation

Surface soil ISM samples (0-6 inches [in.] below ground surface [bgs]) were collected in triplicate from 30 DUs: DU-1 through DU-7, DU-9 through DU-23, DU-25, and EXDU-1 through EXDU-7. Due to shallow bedrock and general lack of subsurface soil across much of the site, subsurface soil samples (6 in. to a maximum of 36 in. bgs) were collected from only 5 DUs (DU-17 through DU-21). Soil samples were submitted to an analytical laboratory for analysis of Target Analyte List (TAL) metals; PAHs; polychlorinated biphenyls (PCBs); explosives residues; and/or benzene, toluene, ethylbenzene, and xylenes (BTEX). DUs are presented in **Figure 3-1**. Most DUs were approximately 1 acre (200 feet [ft] x 200 ft) in size. A few smaller DUs were sized at 60 ft x 60 ft. In addition, surface soil ISM samples (0-6 in. bgs) were collected from 8 background DUs in Bear Mountain State Park to establish regional background concentrations of TAL metals and PAHs (**Figure 3-2**). A total of 90 surface soil samples (initial and replicates), 15 subsurface soil samples (initial and replicates), and 8 background surface soil samples were collected via ISM for laboratory analysis.

3.1.2 Phase II Investigation

Based on the results of the Phase I investigation, additional soil parameters, sediment, and surface water data were collected as part of the Phase II investigation. Following a preliminary evaluation of the Phase I data, which indicated that metals were the primary constituent in soil, only metals were evaluated in the shoreline media (i.e., aquatic habitats). Therefore, sediment and surface water samples were evaluated for metals only. Soil data were collected to help further evaluate the potential bioavailability of metals in soil at eight DUs: DU-4, DU-7, DU-9, DU-11, DU-13, DU-17, DU-18, and DU-19 (**Figure 3-3**). The following parameters were collected in triplicate: oxidation reduction potential (ORP) (field-measurement), TOC, CEC, and grain size.

To evaluate the potential transport of metals to the shoreline, particularly from the Former Dump Area (DU-17, DU-18, and DU-19), sediment and surface water data were collected from three shoreline DUs: the Iona Island Hudson River Shoreline (IHRS), a Riprap Drainage Swale (RRDS) that leads out from the Former Dump Area to the Round Island shoreline, and a Tidal Wetland Swale (TWS) that leads out from the Former Dump Area to the Iona Marsh shoreline (**Figure 3-3**). Each of these areas consists of about one-half acre. Sediment samples were collected using ISM. Surface water samples were collected as individual grab samples. TAL metals were analyzed in both surface water (dissolved) and sediment. Additional parameters in surface water included temperature, pH, dissolved oxygen (DO), ORP, specific conductivity, turbidity, salinity, and hardness. Additional parameters in sediment included pH, ORP, TOC, grain size, and AVS/SEM.

In addition, background sediment ISM and surface water grab samples were collected from an upstream location called Con Hook. Con Hook is similar to Iona Island in that it is an outcrop of land in the Hudson River with a marsh and a riverine shoreline, but it has not been impacted by former military activities (**Figure 3-4**). Eight ISM sediment samples were collected from the Con Hook Marsh Shoreline, and eight sediment samples were collected from the Con Hook Hudson River Shoreline. Sediment samples from Con Hook were analyzed for the same constituent and physical parameters as the Iona Island sediment samples, except for AVS/SEM, which was not collected from Con Hook. AVS/SEM is used to predict site-specific bioavailability of the metals cadmium, copper, nickel, lead, and zinc based on AVS and TOC content. Information on the bioavailability of metals from the background area is not needed to evaluate the bioavailability of these metals at the site. Twenty surface water grab samples were collected from each of the Con Hook Marsh and Con Hook Hudson River Shorelines and were analyzed for the same constituent and physical parameters as those analyzed in the Iona Island surface water. Following analysis, data were evaluated for usability.

3.2 DATA EVALUATION AND USABILITY ASSESSMENT

Analytical data packages were reviewed to ensure that required laboratory components were included, quality insurance and quality control (QC) requirements were performed, and data use restrictions were well defined. During data validation, the analytical data were qualified and appropriately flagged if criteria were not met as indicated below, and a data usability assessment was conducted to review the analytical results and data qualifiers. The data usability assessments are presented in the data summary reports included in Appendix D of the RI Report to which this document is appended. Overall, the data meet the data quality objectives and with few exceptions are deemed usable for the ERA. Additional detail on Phase 1 and Phase II data evaluations are provided in the subsequent sections.

The following qualifiers were applied to the reported data:

- No qualifier: The analyte was positively identified at the specified numerical value exceeding the limit of quantitation (LOQ), and no data quality issues requiring validation were identified

- U: The analyte was not detected at a level greater than or equal to the associated numerical value (limit of detection [LOD])

- J: The analyte was positively identified, but the associated numerical value is approximate and may be inaccurate or imprecise

- UJ: The analyte was not detected; however, the associated numerical value (LOD) is approximate and may be inaccurate or imprecise

- -: Result may be biased low. May be applied to J qualified data

- +: Result may be biased high. May be applied to J qualified data

- R: The analytical result was rejected.

The inclusion or exclusion of data for the ERA was based upon the analytical qualifiers. The following procedures were followed for sample results with data qualifiers:

- Analytical results bearing the U and UJ qualifiers (indicating that the analyte is not detected at or above the concentration presented) were retained in the dataset and considered non-detects. In nearly all cases, each non-detected COPC was assigned a numerical value equal to its LOD. For silver non-detected results in soil, the assigned numerical value was equal to the LOQ

- Analytical results bearing the J, J+, J- qualifiers (indicating that the reported value is estimated because the analyte is detected at a concentration below the LOQ or for data quality limitations identified during data validation) were retained at the reported concentration

- Analytical results bearing the R qualifier were not evaluated in the ERA.

PAHs were grouped into HMW and low molecular weight (LMW) classifications, and their concentrations were summed for evaluation (EPA 2007f). If an individual PAH was not detected in a sample, the concentration was assumed to be zero for the purposes of summing LMW and HMW PAHs. Concentrations of the following LMW PAHs were summed: acenaphthene, acenaphthylene, anthracene, fluorene, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, and phenanthrene. Concentrations of the following HMW PAHs were summed: benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-c,d)pyrene, and pyrene.

3.2.1 Phase I Data

Some soil data were qualified as estimated (J, J-, J+ or UJ) and one result was rejected during data validation due to QC issues, as discussed in the Phase I data usability assessment in Appendix D of the RI Report. Of the 3,848 results that were reported, 1,058 results were qualified during validation. Overall, approximately 28 percent of the dataset was qualified as estimated due to minor QC issues.

PAHs had the greatest number of qualified results. Of the 1,278 PAH results in soil, approximately half (660) of the results were qualified during data validation due to minor QC issues. Of these, 237 were J or UJ qualified because sample preparation exceeded holding times and 143 results were J qualified as they were below the LOQ. The majority of J qualifiers have a potential low bias, meaning the reported result may be lower than the actual concentration. Despite these qualifiers, the concentrations of PAHs are not anticipated to be impacted by holding times. PAHs, particularly HMW PAHs, are more tightly bound to soils than volatile organic compounds and LMW PAHs and are unlikely to be volatilized during sample holding. Additionally, one result for dibenz(a,h)anthracene in the background dataset was R qualified (rejected) due to a QC issue and was not used in the ERA. The seven remaining detected results were sufficient to calculate the 95th percent upper confidence limit (95UCL) of the mean for the background dataset.

Based on evaluation against the project data quality objectives specified in the UFP-QAPP (EA 2020) the Phase I data as qualified are usable for the intended purposes. The potential impact of the estimated values is addressed in Section 6. With the exception of the one rejected result, the results are deemed usable for the ERA. Results from the Phase I Investigation are presented in **Attachment C**.

3.2.2 Phase II Data

Various sediment and surface water data were qualified as estimated (J or UJ) during data validation due to QC issues as discussed in the Phase II data usability assessment in Appendix D of the RI Report. Of the 3,126 results that were reported, 200 results were qualified during validation. Overall, approximately 6 percent of the dataset was qualified as estimated due to minor QC issues. An additional 611 results (approximately 20 percent) that were reported at estimated concentrations between the LOD and LOQ were qualified as estimated. Based on evaluation against the project data quality objectives specified in the UFP-QAPP and UFP-QAPP Addendum (EA 2020, 2022), the Phase II data as qualified are usable for the intended purposes. The potential impact of the estimated values is addressed in Section 6 of this ERA. However, with the exception of the rejected CEC data (discussed below), the results are deemed of sufficient quality for use in the ERA.

Initial laboratory CEC results for soil collected during the Phase II investigation were rejected due to laboratory error, which resulted in values orders of magnitude greater than expected (e.g., 1,500 to 1,800 milli-equivalents per 100 grams [meq/100g]). No other soil physical parameters were affected. As such, CEC results were deemed unusable during data validation. Samples were reanalyzed for CEC by the laboratory, and results ranged from 23 to 39 meq/100g in the upland

soil, which is similar to estimated CEC in soils typical for New York State agricultural land (12-25 meq/100g) (Cornell University 2007). Soil samples reanalyzed for CEC were flagged as estimated (J) due to drying occurring between initial and reanalysis, which may influence CEC values (Meyer and Arp, 1994; Phillips et al. 1986). Samples were stored 140–144 days (20 weeks) at the laboratory prior to reanalysis. Meyer and Arp (1994) found that CEC values in soil increased slightly with storage time (up to 14 weeks) but were closely related to values obtained with non-dried samples. Conversely, Phillips et al. (1986) found that oven drying of soil samples significantly decreased CEC from original measurements, but that air drying had no significant effect; the latter is how these samples were dried. These data are considered usable in the ERA based on the supporting literature.

3.3 DATA SUMMARY BY MEDIA

The samples analyzed and detections of constituents are summarized below for each medium analyzed, including soil (surface and subsurface), sediment, and surface water.

3.3.1 Soil Dataset

Analytical data tables for soil collected via ISM from the Phase I investigation are presented in **Attachment C**. No soil analytical data were collected as part of the sampling design for Phase II. However, additional physical parameters evaluated in soil as part of the Phase II investigation are provided in **Attachment D (Table D-8).**

Attachment C tables provide the triplicate soil sample results (surface and subsurface) and their associated data qualifiers, as well as the calculated EPC for each DU, as discussed in Section 3.4. The lowest EcoSSL is presented to screen the data, as discussed in Section 4.4. In addition, the arithmetic mean, standard deviation, and relative standard deviation (RSD) were calculated for detected results for a subset of analytes that were selected for the RSLERA by DU where triplicate samples were collected (**Attachment E**). Constituents that were not analyzed in a DU are depicted as NA on the tables; constituents that were not detected in a DU are depicted as ND on the tables (**Attachment C**).

3.3.1.1 Surface Soil

Surface soil samples (0–6 in. bgs) were collected from 27 upland DUs (DU-1 through DU-7, DU-9 through DU-16, DU-20 through DU-23, DU-25, and EXDU-1 through EXDU-7) and 3 DUs encompassing Area of Concern (AOC) #16 – Area D (Former Dump Area, DU-17 through DU-19) for analysis of TAL metals, PAHs, PCBs, and/or explosives residues. Analytes detected in surface soil samples are presented in the list below:

- Up to 23 metals analytes (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, total chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc) at each of the 15 on-site upland DUs (DU-1 through DU-7 and DU-9 through DU-16) and each of the 3 DUs in the Former Dump Area (DU-17 through DU-19)

- 18 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-cd]pyrene, naphthalene, phenanthrene, and pyrene) at each of the 13 upland DUs sampled for PAHs and each of the 3 DUs in the Former Dump Area

- 1 PCB Aroclor, Aroclor 1260, at both upland DUs sampled for PCBs (DU-23 and DU-25) and 2 PCB Aroclors detected in surface soil samples collected from the 3 DUs (Aroclor-1248 at DU-17 and DU-18, and Aroclor-1260 at each of the 3 DUs in the Former Dump Area)

- 4 explosives analytes (1,3,5-trinitrobenzene, 1,3-dinitrobenzene, 2,4,6-trinitrotoluene, and 2,4-dinitrotoluene) at 1 of 7 upland DUs sampled for explosives (EXDU-1 only)

At several DUs (DU-17 through DU-19, DU-23, DU-25, and EXDU-1 through EXDU-7), samples collected had reporting limits greater than the ecological screening level for some analytes. The analytes for which the reporting limit was higher than the ecological screening level are presented in the list below:

- 2 PCB Aroclors (Aroclor 1221 and 1242) at each of the 3 DUs in the Former Dump Area as well as both upland DUs sampled for PCBs

- 3 explosive residue analytes (1,3-dinitrobenzene, 3-nitrotoluene, and Tetryl) at each of the 3 DUs in the Former Dump Area, as well as each of the upland DUs sampled for explosive residues (EXDU-1 through EXDU-7)

Reporting limits of individual non-detect Aroclors that exceeded the ecological screening level ranged from 0.045 to 0.079 milligrams per kilogram (mg/kg), which is approximately 1 to 2 times the ecological screening level (0.041 mg/kg). Other Aroclors were detected, and total PCBs were modeled in the risk assessment with an EPC of 0.15 mg/kg. Therefore, though there is some uncertainty as to whether the concentrations of non-detect Aroclors are greater or less than the screening level, any potential risk has been captured by total PCBs in the risk assessment. The uncertainty associated with analytical data, including detection limits, is discussed in Section 6.2.

Reporting limits in samples with non-detect 1,3-dinitrobenzene that exceeded the ecological screening level ranged from 0.038 to 0.041 mg/kg, which is approximately 1.1 to 1.2 times the ecological screening level (0.034 mg/kg). Reporting limits in samples with non-detect 3-nitrotoluene ranged from 0.19 to 0.2 mg/kg, which is approximately 1.5 times the ecological screening level (0.13 mg/kg). Given the low magnitude of exceedance of the ecological screening level, non-detect concentrations of 1,3-dinitrobenzene and 3-nitrotoluene are not expected to pose risks to ecological receptors.

Reporting limits in samples with non-detect concentrations of Tetryl were approximately 0.1 mg/kg and were approximately 5.5 times the ecological screening level (0.018 mg/kg). The

ecological soil screening level is from EPA Region 4 (2018) and is based on risk to soil invertebrates. The screening level presented is derived from an equation based on equilibrium partitioning theory and water quality benchmarks predicted from EPA's Ecological Structure Activity Relationships Predictive Model. This model predicts toxicity for aquatic organisms, and the minimum chronic value was used as the screening value. Therefore, there is inherent uncertainty associated with the soil invertebrate screening level as it is based on a predicted level of toxicity. The Tetryl reporting limits fall below the other available EPA Region 4 screening levels for plants and mammals (25 mg/kg and 1.5 mg/kg, respectively). Tetryl was not detected above the reporting limit of approximately 0.1 mg/kg, which falls over an order of magnitude below plant and mammal soil screening levels (25 mg/kg and 1.5 mg/kg, respectively). Therefore risks to plant and mammal receptors from Tetryl is not expected, though the possibility for risks to soil invertebrates cannot be ruled out.

3.3.1.2 Subsurface Soil

Soil encountered across most of the upland area during the Phase I investigation was shallow, with exposed/shallow bedrock and depth to refusal ranging from 6–12 in. bgs. Deeper soil in the upland area was encountered at DU-20 and DU-21 only, with refusal at 18 and 24 in. bgs, respectively. On-site subsurface soil samples were collected from DU-20 (6–18 in. bgs) and DU-21 (6–24 in. bgs) for analysis of PAHs and BTEX. Subsurface soil was not sampled at additional upland DUs due to the shallow depth to refusal. Subsurface soil was sampled at the same 3 upland DUs in AOC #16 – Area D (Former Dump Area, DU-17 through DU-19) and analyzed for metals, PAHs, PCBs, and explosives residues. Analytes detected in subsurface soil samples are presented in the list below:

- 23 metals analytes (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, total chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc) detected in subsurface soil samples collected from each of the 3 DUs in the Former Dump Area. Subsurface samples collected from the upland DUs (DU-20 and DU-21 only) were not analyzed for metals.

- 18 PAH analytes (1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-cd]pyrene, naphthalene, phenanthrene, and pyrene) were detected in subsurface soil samples collected from upland sites DU-20 and DU-21 and from each of the 3 DUs in the Former Dump Area.

- 2 PCB Aroclors detected in subsurface soil samples collected from the 3 DUs in the Former Dump Area (Aroclor-1260 at DU-17 and DU-19 and Aroclor-1262 at DU-18 only). Subsurface samples from the upland DUs were not collected.

- BTEX and explosives residues analytes were not detected in subsurface soil samples collected from any DU.

3.3.2 Sediment Dataset

Analytical data tables for sediment collected via ISM from the Phase II investigation are presented in **Attachment D.** These tables provide the triplicate ISM sediment sample results and their associated data qualifiers, as well as the calculated EPC for each DU, as discussed in Section 3.4. The ecological sediment screening value is presented to screen the data for identifying potential unacceptable risks, as discussed below in Section 4.4. In addition, the arithmetic mean, standard deviation, and the percent RSD of replicates was calculated for detected results for each analyte in each DU where triplicate samples were collected (**Attachment D**). The RSD was used in the calculation of the coefficient of variation (CV), which is used to measure the spread of data relative to sample size (EPA 2022a). Ultimately, the CV is determined to be low, medium, or high, which influences the selection of the 95UCL from the Student's t-test or Chebyshev calculation (see Interstate Technology and Regulatory Council [ITRC] 2020 for criteria definitions). The EPCs selected for sediment were derived from Chebyshev 95UCL following the approach outlined in ITRC Calculator (ITRC 2020; see section 3.4 below for details).

Metals samples were collected from three on-site sediment DUs established at the ends of preferential surface water migration pathways leading from AOC #16 – Area D (Former Dump Area) to the Hudson River and Iona Marsh shorelines as follows: IHRS-DU-01 along the Hudson River shoreline adjacent to AOC #16 – Area D (Former Dump Area), RRDS-DU-01 along the Iona Marsh shoreline at the outlet of the riprap drainage swale, and TWS-DU-01 along the Iona Marsh shoreline at the outlet of the tidal wetland drainage swale. Metals analytes detected in sediment from each DU are presented below:

- IHRS-DU-01: 17 metals analytes (aluminum, antimony, arsenic, barium, beryllium, cadmium, total chromium, cobalt, copper, iron, lead, manganese, nickel, silver, thallium, vanadium, and zinc)

- RRDS-DU-01 and TWS-DU-01: 18 metals analytes (aluminum, antimony, arsenic, barium, beryllium, cadmium, total chromium, cobalt, copper, iron, lead, manganese, nickel, selenium, silver, thallium, vanadium, and zinc).

In one area, Iona Island Hudson River Shoreline, non-detect sediment samples analyzed for selenium had reporting limits (0.77 mg/kg) that just exceeded the ecological screening level for selenium (0.72 mg/kg). Due to the very low magnitude of exceedance of the screening level, selenium in sediment at Iona Island Hudson River Shoreline is not expected to pose risk to ecological receptors.

3.3.3 Surface Water Dataset

Analytical data tables for dissolved surface water from grab samples collected as part of the Phase II investigation are presented in A**ttachment D**. These tables provide the results for individual samples collected as well as the calculated EPC for each area. The ecological surface water screening value is presented to screen the data for potential unacceptable risks, as discussed below in Section 4.4.

A total of 60 on-site discrete surface water samples were collected for analysis of dissolved TAL metals to evaluate the surface water migration pathways leading from AOC #16 – Area D (Former Dump Area) to the Hudson River and Iona Marsh shorelines, with 20 samples collected from each of the following areas:

- Source area at –OC #16 - Area D (Former Dump Area) (DUMP-SW-01 through DUMP-SW-20)
- Hudson River shoreline adjacent to –OC #16 - Area D (Former Dump Area) (IHRS-SW-01 through IHRS-SW-20)
- Iona marsh at the outlets of the Riprap Drainage Swale (RRDS-SW-01 through RRDS-SW-10) and Tidal Wetland Swale (TWS-SW-01 through TWS-SW-10)

Metals analytes detected in one or more surface water samples collected from each area are presented in the list below:

- AOC #16 – Area D (Former Dump Area): 18 metals analytes (aluminum, antimony, arsenic, barium, beryllium, calcium, total chromium, cobalt, copper, lead, magnesium, manganese, nickel, potassium, selenium, sodium, thallium, and zinc)
- Iona Island Hudson River Shoreline: 19 metals analytes (aluminum, antimony, arsenic, barium, calcium, total chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, sodium, thallium, and zinc)
- Iona Marsh shoreline: 17 metals analytes (aluminum, antimony, arsenic, barium, beryllium [Tidal Wetland Swale only], calcium, total chromium [Tidal Wetland Swale only], cobalt, copper, magnesium, manganese, nickel, potassium, sodium, thallium [Tidal Wetland Swale only], vanadium [Riprap Drainage Swale only], and zinc [Tidal Wetland Swale only]).

At several areas (AOC #16 – Area D, Iona Island Hudson River Shoreline, Riprap Drainage Swale, Tidal Wetland Swale, Con Hook Hudson River Shoreline [CHHRS], and Con Hook Marsh Shoreline [CHMS]), non-detect samples collected had reporting limits greater than the ecological screening level for certain analytes. The analytes for which the reporting limit was higher than the ecological screening level are presented in the list below:

- Cadmium at AOC #16 – Area D, Iona Island Hudson River Shoreline, Riprap Drainage Swale, Tidal Wetland Swale, CHHRS, and CHMS
- Lead at Iona Island Hudson River Shoreline

The reporting limits for the cadmium non-detect surface water samples were 0.75 micrograms per liter (µg/L), 1.25 times the ecological screening level (0.6 µg/L). There were no detections of cadmium evaluated in the ERA. The single non-detect lead sample with a reporting in exceedance

of the ecological screening level (2.057 µg/L) was 3 µg/L, approximately 1.5 times the screening level. The maximum detection of lead was 1.0 µg/L, and all other reporting limits for lead fell below 1.0 µg/L. Sample concentrations evaluated in the ERA were lower than the reporting limits of these non-detect samples. However, given the relatively low magnitude of exceedance of the ecological screening levels, risk due to non-detected cadmium and lead in surface water is not expected.

3.4 EXPOSURE POINT CONCENTRATIONS

The datasets described above were used to calculate EPCs for each detected analyte within each media (soil, sediment, surface water). An EPC is defined as the concentration of a COPEC in site media to which a receptor may be exposed.

The use of ISM results is a more precise estimate of the average concentration within an exposure area than would be calculated by collecting multiple discrete samples. ISM data have less variance than discrete samples and provides a more comprehensive characterization of COPEC distribution and extent. Each DU provides constituent analytical results in triplicate. A 95UCL of the mean was calculated for each soil and sediment DU based upon the results of the triplicate samples, and for background samples. The 95UCL is defined as a value that, when calculated repeatedly for randomly drawn subsets of site data, equals, or exceeds the true mean 95 percent of the time. The 95UCL provides a conservative estimate of the average (or mean) concentration and a reasonable confidence that the true site average will not be underestimated. The following sections discuss the process and procedures used to calculate EPCs for each media. Results are presented in the data tables in **Attachment** C (Phase I data) **and Attachment D (**Phase II data**).** ISM calculator outputs for grouped exposure areas for soil and ProUCL outputs for surface water EPCs are provided in **Attachment E.**

Soil and sediment samples were both collected via ISM, and EPCs were calculated using the ITRC. Soil samples were collected during Phase I, and EPCs were calculated prior to the release of the ITRC Calculator updates in 2020. Sediment samples were collected during Phase II, and EPCs were calculated with the updated ITRC Calculator (2020). The 2012 ITRC Calculator defaults to the Chebyshev 95UCL, which is generally higher than the Student's t-test 95UCL. Though the Phase I data would have slightly lower 95UCLs in some cases if EPCs were rerun using the updated calculator, the project team determined that data did not need to be rerun as the conclusions of the ERA were not likely to change.

3.4.1 Soil Exposure Point Concentrations

Soil 95UCLs were calculated from the ISM data using the (2012) ITRC Calculator. Two candidate equations that can accommodate ISM datasets were used to calculate the 95UCL: the Student's t-test and Chebyshev. The Student's t-test UCL is expected to provide valid 95UCL values when the distribution of means is approximately normal. The Chebyshev UCL is generally considered to be a conservative estimate of the 95UCL because it generally achieves or exceeds the desired coverage rates, even for non-normal distribution (ITRC 2012). ITRC (2012) guidance recommends using the Chebyshev 95UCL, which is generally higher than the Student's t-test 95UCL.

Therefore, the Chebyshev UCL was selected as the 95UCL for use for Phase I soil results. The implications of this are further discussed in Section 6. The resulting 95UCLs are presented in the Phase I soil data tables in **Attachment C**. Backup information (e.g., ISM 2012 ITRC Calculator results) are presented in **Attachment E**.

3.4.2 Sediment Exposure Point Concentrations

For sediment ISM results, the updated ITRC Calculator was used to calculate the 95UCL (ITRC 2020). The updated ITRC Calculator recommends the 95UCL from either the Student's t-test or Chebyshev method based upon CV. The ITRC Calculator recommends the Student's t-test 95UCL for datasets where the CV of increments is low (defined as CV < 1.5), and the Chebyshev 95UCL for datasets where the CV is medium (defined as 1.5 < CV < 3) or high (defined as CV > 3) (ITRC 2020). The CV of increments was estimated based on summary statistics of replicates. For the Phase II sediment DUs, the 95UCL for each analyte was selected as either the Student's t-test or Chebyshev 95UCL based upon the recommendation from the ITRC Calculator. The sediment EPCs were calculated within the Excel macros following ITRC (2020) and are presented in **Attachment D**.

3.4.3 Surface Water Exposure Point Concentrations

Surface water was collected as discrete grab samples and not incremental samples. Therefore, surface water EPCs (95UCLs) were calculated using EPA's ProUCL 5.2 (EPA 2022a) software for the 20 surface water sample results in each area. Surface water EPCs are presented in **Attachment D**. Results from ProUCL are provided in **Attachment E**.

The calculated EPCs for soil, sediment, and surface water were used to evaluate potential ecological risks in the SLERA and RSLERA, Sections 4 and 5, respectively.

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4. SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT

The SLERA represents a conservative initial assessment of potential risk and is consistent with Step 1 of EPA's 8-Step ERA Process (**Figure 1-1**) and the decision process depicted on Flowchart 1 (**Attachment A**). The following sections discuss the evaluation conducted as part of the SLERA:

- Evaluating if the constituents are related to DoD activities (Section 4.1),
- Selecting ecological risk-based screening values (Section 4.2)
- Determining the methodology for evaluating whether concentrations of constituents are similar to background or regional reference concentrations (Section 4.3)
- Comparing selected and screening values to the EPCs calculated in Section 3.4 and results of the background comparison for DoD-related COPECs (Section 4.4)

The SLERA concludes with a list of constituents that meet all criteria (DoD related, greater than background, and exceed screening values) to identify COPECs to be further evaluated in the RSLERA.

4.1 DEPARTMENT OF DEFENSE-RELATED CONSTITUENTS

The RI report, to which this appendix is attached, contains detailed descriptions of the site's history, uses, and constituents. The RI identified the following metals as preliminary contaminants of potential concern based on the prior site use: aluminum, antimony, arsenic, barium, beryllium, calcium, cadmium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc. Inorganic constituents, except for essential nutrients (calcium, magnesium, iron, potassium, and sodium) and aluminum, are assumed to be associated with DoD activities since historical constituents from on-site operations include metals (see Section 2.1.1 for brief description of prior site use).

Essential nutrients (calcium, magnesium, iron, potassium, and sodium) are necessary for metabolic processes in organisms; therefore, they are considered essential for wildlife. At naturally occurring concentrations, receptors are able to regulate uptake and metabolism of these elements. As such, they have been eliminated from further evaluation in this SLERA. The uncertainty associated with the toxicity of essential nutrients is discussed in Section 6.

In addition, only constituents considered to be Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substances per the Code of Federal Regulations (CFR) 40 CFR §302.4 are evaluated further. This eliminates the following inorganic constituents for which there are no CERCLA Reportable Quantity limits:

- Aluminum
- Barium

- Cobalt
- Manganese
- Vanadium

The RI also included PAHs, BTEX, PCBs, and explosives residues as preliminary contaminants of potential concern. Detected concentrations of these organic constituents are reportable under CERCLA and are assumed to be associated with former DoD activities; therefore, these constituents were evaluated further.

4.2 SCREENING VALUE COMPARISONS

Conservative ecological screening values, based on no effect levels, are available from the literature and government documents (see Sections below) for each media (soil, sediment, and surface water). EPCs were compared to screening values as described below. Screening value comparisons are only applicable to analytes found to be greater than background. Methods for comparison to background levels are described in Section 4.3. A hazard quotient (HQ) is the ratio of the EPC to the screening value. HQs greater than 1.0 indicate the potential for risk, and the analyte is retained as a COPEC for further evaluation in the RSLERA. It should be noted that the higher the HQ, the greater the potential for adverse effects; likewise, the lower the HQ, the lower potential for adverse effects.

4.2.1 Ecological Soil Screening Levels

Screening values used in the SLERA to screen the soil data and select COPECs for further evaluation are presented in **Table 4-1,** which were selected as part of the UFP-QAPP (EA 2020). Values are presented for plants, soil invertebrates (i.e., earthworms), mammals, and birds. The values were compiled by EPA Region 4 (EPA 2018) from various sources including the following in order of preference:

- EPA. 2007a. Ecological Soil Screening Levels. https://www.epa.gov/risk/ecological-soil-screening-level-eco-ssl-guidance-and-documents

- Los Alamos National Laboratory. 2018. Development of Ecological Preliminary Remediation Goals for Los Alamos National Laboratory. Revision 1.1 LA-UR-18-20670. EP2018-0017 February. https://permalink.lanl.gov/object/tr?what=info:lanl-repo/eprr/ESHID-602891

- Efroymson, et al. 1997a. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision. Oak Ridge National Laboratory, Oak Ridge, TN. ES/ER/TM-95/R4. https://rais.ornl.gov/documents/tm85r3.pdf

- Efroymson, et al. 1997b. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process: 1997 Revision. Oak Ridge National Laboratory, Oak Ridge, TN. ES/ER/TM-126/R2. https://rais.ornl.gov/documents/tm126r21.pdf

- Efroymson, et al. 1997c. Preliminary Remediation Goals for Ecological Endpoints. Oak Ridge National Laboratory, Oak Ridge, TN. 50 pp. ES/ER/TM-162/R2. https://rais.ornl.gov/documents/tm162r2.pdf

- Ecological Structure-Activity Relationship Model Version 2 (EPA 2017) and the Region 4 food-web soil model (EPA 2018).

4.2.2 Ecological Sediment Screening Values

Ecological sediment screening values (ESVs) are primarily based on chronic effects to benthic invertebrates. Since there are no sediment screening benchmarks specifically for aquatic plants or demersal fish that also live close to the sediments, the ESVs are used to evaluate these endpoints as well. In general, ESVs are based on constituent concentrations associated with a low probability of unacceptable risks to ecological receptors (EPA 2018). Exceedance of ESVs may indicate the need for further evaluation of the potential ecological risks. EPCs for sediment in each DU were compared to ESVs to select sediment COPECs during the SLERA.

Table 4-2 presents the sediment ESVs, which were selected as part of the UFP-QAPP Addendum for the Phase II Investigation (EA 2022) and were selected from the following sources identified by EPA (2018):

- Long et al. 1991. The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program. NOAA Technical Memorandum NOS OMA 52.

- MacDonald et al. 2003. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters. Florida Department of Environmental Protection, Tallahassee, FL. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters.

- MacDonald, D.D. 1994. Approach to the Assessment of Sediment Quality in Florida Coastal Waters. Florida Department of Environmental Protection. 1994 Florida Sediment Quality Assessment Guidelines for Florida Coastal Waters.

- Persaud et al. 1993. Guidelines for the protection and management of aquatic sediment quality in Ontario. Ontario Ministry of the Environment. Queen's Printer of Ontario.

4.2.3 Surface Water Screening Values

The latest available National Recommended Water Quality Criteria (NRWQC), continuous criteria for chronic effects are used to select surface water COPECs. Surface water EPCs are compared to these water quality criteria. For analytes without currently available NRWQC, additional values were selected from EPA compilations. Due to a lack of compiled EPA surface water screening values for Region 2 (the State of New York's EPA region), screening values from EPA Regions 3 and 4 were compared. These values include compilations from the following:

- The Great Lakes Initiative. 2013. Clearinghouse resources Tier II criteria revised 2013 http://www2.epa.gov/gliclearinghouse/
- Suter et al. 1996. Toxicological benchmarks for screening potential contaminants of concern for effects on aquatic biota: 1996 Revision. U.S. Department of Energy, Oak Ridge, Tennessee. ES/ER/TM-96/R2. https://rais.ornl.gov/documents/tm96r2.pdf
- Canadian Council of Ministries of the Environment (CCME). 2003. Canadian Environmental Quality Guidelines: Summary Table. December 2003. Canadian Council of Ministers of the Environment, Winnipeg, Manitoba. Available at: http://www.ccme.ca/en/resources/canadian_environmental_quality

The water quality criteria used to select surface water COPECs in the SLERA were selected as part of the UFP-QAPP Addendum for the Phase II Investigation (EA 2022b), and the selected values are presented in **Table 4-3**. The hierarchy for selection of criteria was identified as follows: NRWQC (current values), Great Lakes Initiative (2013), Suter et al. (1996), and CCME (2003). Note that CCME values were not selected as values from sources higher in the selection hierarchy were available for each constituent.

Surface water quality criteria for chronic effects (CCC; continuous chronic criteria) for cadmium, chromium, lead, nickel, and zinc are dependent on the water hardness. To calculate water quality criteria for these metals, the lowest confidence limit of the hardness data at the site and the background area [71 milligrams per liter (mg/L) of calcium carbonate] were incorporated into EPA's chronic equations (EPA 2022b) with the following form:

Equation 4-1

$$CCC = e^{[mC \times \ln(hardness) + bC]} \times CF$$

Where:

CCC	= continuous chronic criteria for dissolved metal (µg/L)
mC	= metal specific chronic parameter (EPA 2022b)
hardness	= site specific hardness (71 mg/L calcium carbonate)
bC	= metal specific chronic parameter (EPA 2022b)
CF	= freshwater chronic conversion factor, CFs for cadmium and lead are hardness-dependent

The site-specific hardness value was used in the following equations:

- **Cadmium:** EXP[0.7977 x ln(71)-3.909] x [1.101672-(ln(71) x 0.041838)] = **0.6 µg/L**
- **Chromium:** EXP[0.819 x ln(71)+0.6848] x 0.86 = **56 µg/L**
- **Lead:** EXP[1.273 x ln(71)-4.705] x [1.46203-[(ln(71) x 1.45712)] = **1.73 µg/L**
- **Nickel:** EXP[0.846 x ln(71) + 0.0584] x 0.997 = **38.9 µg/L**
- **Zinc:** EXP[0.8473 x ln(71) + 0.884] x 0.986 = **88.4 µg/L**

4.3 BACKGROUND COMPARISONS

Soil and sediment samples were collected via ISM, and surface water samples were collected via discrete grab samples. The different sample types require different statistical methods for comparison to background sample concentrations to determine if site concentrations are greater than background concentrations. The methodology for the soil and sediment background comparison is presented in Section 4.3.1, the methodology for the surface water background comparison is presented in Section 4.3.2, and the results of the comparisons are presented in Section 4.3.3.

4.3.1 Soil and Sediment Background Comparison

Permutation test of means (Student's t-test with adjusted p-value) at the 95 percent confidence level was used to evaluate whether on-site soil and sediment concentrations exceeded regional background concentration ranges for naturally occurring metals and PAHs. Concentrations for constituents within each DU were compared to background samples (for metals and PAHs) using a two-sample hypothesis test with the following null and alternative hypotheses:

$$H_0: \text{Site} \leq \text{Background}$$
$$H_1: \text{Site} > \text{Background}$$

Permutation tests are a subset of nonparametric statistics. The two-sample permutation test of means evaluates the difference between two group means, and the permutation test does not require that the data from each group follow a normal distribution or that the two groups have the same variance. For this reason, the permutation test is suitable for evaluating both small datasets and non-normal data distributions. Also, this permutation test does not require that the distribution of the two data groups have the same shape in order to be a central value test. For each test, 10,000 permutation resamples were used to yield a stable p-value.

The permutation test assumes only that the data from the two are "exchangeable" when H_0 is true. For a two-sample permutation test of means, the test statistic is the observed difference in the two group means (i.e., site versus background). If the H_0 is true, the group assignment is arbitrary, as there is no difference in the means and the data in essence come from the same population. Therefore, the data are randomly rearranged regardless of group assignment to produce a different set of group means in each rearrangement. The difference in group means is computed and stored after each rearrangement, and this process is repeated for either all possible rearrangements (if possible) or several thousand permutations for larger data sets. The proportion of differences from

the rearrangements that equal or exceed the one observed difference from the original data is the permutation p-value of the test (Helsel et al. 2020).

4.3.2 Surface Water Background Comparison

A quantitative statistical approach (statistical hypothesis tests) using the two-sample hypothesis test described above was also used to compare on-site and background metals concentrations in surface water. Mean concentrations from each on-site surface water area (Iona Island Hudson River Shoreline, Riprap Drainage Swale, and Tidal Wetland Swale) were compared to mean concentrations from the applicable background depositional environment (CHHRS and CHMS). Comparisons were made between similar environments. Mean concentrations from Iona Island Hudson River Shoreline were compared to only the CHHRS since they are both subject to influence as well as erosion from the Hudson River. Mean concentrations within the Riprap Drainage Swale and Tidal Wetland Swale were compared to the CHMS since these areas are more likely depositional and less likely impacted by the Hudson River. Mean concentrations in the Former Dump Area were compared to both the CHHRS and CHMS since the area is adjacent to the Hudson River but also may be less susceptible to scour and more of a depositional environment. If the Former Dump Area concentrations were similar to either background area (as described in 4.3.3), site concentrations were determined to not be greater than background.

4.3.3 Background Comparison Results

Summary statistics and the results of the permutation test are presented in **Attachment F**. When the value shown in "Right Tailed Prob" (the p-value) is less than 0.05, the null hypothesis is rejected for the alternative hypothesis the site mean is greater than the background mean. When the p-value > 0.05 there is insufficient evidence to reject the null hypothesis for the alternative hypothesis. If the resulting value in the Conclusion column is Do Not Reject H_0, then the null hypothesis is true and site concentrations are less than or equal to background. If the result is Reject H_0, then site concentrations are greater than background.

Adjusted p-values were computed with the Benjamini-Hochberg (1995) procedure to control the false discovery rate (FDR) at $\alpha = 5\%$. The FDR is the expected proportion of incorrectly rejected hypotheses among all rejected hypotheses. FDR-controlling methods are more powerful and reject more null hypotheses than adjustments controlling the familywise error rate (FWE) such as the Bonferroni adjustment. The Benjamini-Hochberg adjustment for ordered p-values $p_1 \leq \cdots \leq p_m$ is defined as

$$\tilde{p}_i = \begin{Bmatrix} p_m & \text{for } i = m \\ min\left(\tilde{p}_{i+1,} \frac{m}{i} p_i\right) & \text{for } i = m-1, \ldots, 1 \end{Bmatrix}$$

For example, the comparison to background of arsenic in sediment **(Table F-2, Attachment F)** consists of $m = 3$ independent tests corresponding to the three DUs (IHRS, RRDS, and TWS). The Benjamini-Hochberg adjusted p-values are computed from the above equation in step-up fashion starting with the largest unadjusted p-value as shown below.

Insert 4-1. Example of Benjamini-Hochberg Adjustment to p-values

i	DU	Unadjusted p-value	Adjusted p-value
3	TWS	0.008	$\tilde{p}_{i=m} = p_m = 0.008$
2	RRDS	0.004	$\tilde{p}_{i=2} = min\left(0.008, \frac{3}{2}0.004\right) = 0.006$
1	IHRS	0.004	$\tilde{p}_{i=2} = min\left(0.006, \frac{3}{1}0.004\right) = 0.006$

Table F-1 (Attachment F) depicts the analytes in soil that have concentrations that are greater than background and include the following DoD-related constituents: LMW and HMW PAHs, antimony, arsenic, cadmium, chromium, copper, lead, mercury, silver, thallium, and zinc. **Table F-2 (Attachment F)** depicts the analytes in sediment and surface water that have concentrations that are greater than background. The following DoD-related constituents in sediment were greater than background: antimony, arsenic, cadmium, chromium, copper, lead, nickel, silver, and zinc. The following DoD-related constituents in surface water were greater than background: arsenic, chromium, copper, and zinc. If they were found to exceed ecological screening values and were associated with the DoD, these constituents were carried forward for further evaluation in the RSLERA.

4.4 SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT RESULTS

The COPEC selection table for soil is provided in **Table 4-4**. The COPEC selection table for sediment is provided in **Table 4-5**; and the selection table for surface water COPECs is provided in **Table 4-6**.

Overall, the following COPECs were retained for further evaluation in soil since the most conservative ecological soil screening level was exceeded in at least one DU: antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel (subsurface only) selenium (subsurface only) thallium, zinc, HMW and LMW PAHs (surface only), total PCBs, and 1,3-dinitrobenzene (surface only). With the exception of DU-20, DU-21, and DU-25, each DU had at least one COPEC in soil.

The following COPECs were retained for further evaluation in sediment: antimony, arsenic, cadmium, chromium, copper, lead, nickel, silver, and zinc. No COPECs were identified in surface water. Identification as a COPEC indicates potential for ecological risk and the COPECs were carried through the RSLERA process for receptor-specific evaluations, as described in Section 5.

As discussed in more detail in Section 5.1, though the SLERA was evaluated on a DU basis, for the terrestrial component of the RSLERA the DUs have been grouped into the Former Dump Area (DU-17 through DU-19) and Iona Island (all other DUs) exposure areas. In some cases, the constituent identified as a COPEC for one receptor in the SLERA did not exceed ecological soil screening levels for all receptors. The RSLERA is limited to those receptors that had exceedance of the receptor-specific screening level (or lacked a screening level) in at least one DU within the

exposure area. Further details are given in the following Section 5.1. The following table presents the COPECs that will be evaluated for specific terrestrial receptors in the RSLERA.

Insert 4-2. COPECs Identified in the Screening-Level Assessment

COPECs Identified in the Screening-Level Risk Assessment	Plants	Soil Invertebrates	Mammals	Birds
Iona Island				
Antimony	-	-	✓	✓
Arsenic	✓	✓	✓	✓
Cadmium	-	-	✓	✓
Copper	✓	✓	✓	✓
Lead	✓	✓	✓	✓
Thallium	✓	✓	-	-
Zinc	✓	✓	✓	✓
LMW PAH	✓	✓	-	✓
HMW PAH	✓	✓	✓	✓
Total PCBs	-	-	-	✓
1,3-Dinitrobenzene (DNB)	✓	✓	-	-
Former Dump Area (DU 17, DU 18, DU19)				
Antimony	✓	-	✓	✓
Arsenic	✓	✓	-	-
Cadmium	✓	-	✓	✓
Chromium	✓	✓	✓	✓
Copper	✓	✓	✓	✓
Lead	✓	✓	✓	✓
Mercury	✓	✓	✓	✓
Nickel	✓	-	-	-
Selenium	✓	-	✓	✓
Thallium	✓	✓	✓	-
Zinc	✓	✓	✓	✓
LMW PAH	-	-	-	✓
HMW PAH	✓	✓	✓	✓
Total PCBs	-	✓	✓	✓

Notes:
"✓" indicates that the analyte-receptor was carried through to the RSLERA; "-" indicates that this analyte-receptor was not carried through to the RSLERA.

5. REFINED SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT METHODOLOGY

The following section discusses the methodology used for the RSLERA. The RSLERA comprises the second step of an ERA. The RSLERA further evaluates the COPECs selected during the SLERA (Section 4.4) and refines the conservative assumptions to be more site-specific and based on quantifiable effects to apical endpoints rather than no effects levels. Additional parameters and lines of evidence considered during the RSLERA include receptor area use factors (AUFs), TRVs based on both no observed adverse effect levels (NOAELs) and lowest observed adverse effect levels (LOAELs), and constituent bioavailability. Additionally, refinement screening values (RSVs), another lowest observed effects threshold value, are used for assessing risk to the benthos at this stage. AUFs are calculated based on the habitat range of a given receptor and account for the amount of time receptors are likely to be in the site area and exposed to COPECs, whereas receptors are assumed to occupy only the site area in the initial screening step. While the SLERA considers only highly conservative benchmarks based on NOAELs, LOAELs are considered less conservative and represent a more realistic assessment of the potential for adverse effects. Finally, the initial SLERA step assumes constituents are readily bioavailable, which is a highly conservative assumption. Consideration of factors impacting bioavailability including soil/sediment cation exchange capacity (CEC), percent clay, soil pH and additional physical parameters provide a more site-specific assessment of receptor constituent exposure.

The following section, 5.1., describes the methodology for the RSLERA by individual receptor group. The equations used to calculate total doses of COPECs to receptors are given in Sections 5.1.6.3 to 5.1.6.5, with details on receptor site usage given in Section 5.1.6.5. The ecological effects evaluation, including soil and physical parameters and TRVs, are discussed in Section 5.2, with calculation of hazard quotients highlighted in Section 5.3. The uncertainties inherent to the RSLERA approach are described in Section 6, and the quantitative results of the RSLERA are discussed and potential risks are characterized in Section 7. At the conclusion of the RSLERA, the risk manager and risk assessment team will decide whether the RSLERA is adequate to determine that ecological threats are negligible, or if the process should continue to a BERA (Steps 3 through 7 in **Figure 1-1**; **Flowchart 3 in Attachment A**).

5.1 ECOLOGICAL EXPOSURE EVALUATION METHODOLOGY

The ecological exposure evaluation compares EPCs to TRVs to characterize risk. TRVs are literature-based toxicity values, most often based on toxicological laboratory studies. To evaluate potential impacts to lower trophic level receptors (plants, invertebrates), the EPC is compared directly to the TRV. Potential ecological impacts to wildlife receptors (mammals and birds) are assessed by comparing calculated doses of COPECs to conservative wildlife TRVs that are derived from available toxicological data. Additional discussion and the selection of TRVs is provided in Section 5.2.3.

Though the SLERA was evaluated on a DU basis, for the terrestrial component of the RSLERA the DUs have been grouped into the Former Dump Area (DU-17 through DU-19) and the Iona Island (all other DUs) exposure areas. These two areas were grouped on the basis of the Former

Dump Area representing a potential source area for the site. The three one-acre DU's grouped as the Former Dump Area (DU's 17-19, Figure 3-3) incorporate and extend beyond the boundary of the approximately 0.85-acre AOC #16 designated previously as the Dumping Area.

Limited subsurface soil samples were collected in the Iona Island exposure area due to shallow bedrock and results of all subsurface soil samples from this exposure area fell below screening levels. Therefore, the 95UCL EPCs calculated for the Iona Island exposure area include surface soil results only from all DUs analyzed (except DU-17 through DU-19). Surface and subsurface soil samples in the Former Dump Area (DU-17 through DU-19) were collected from 0 to 6 inches and 6 to 36 inches, respectively. Ecological receptors are generally assumed to be exposed to surface soil only as that is the biologically active zone and the depth of this zone varies based on site conditions. EPA has quantified soil biological activity in forests and grasslands as a function of depth and recommends that soil samples for assessment of ecological risk include the top 25 to 30 centimeters (approximately 10 to 12 inches) (EPA 2015). The surface soil interval collected was relatively shallow (6 inches) and ecological receptors may be exposed to soil deeper than the surface soil interval in the Former Dump Area (EPA 2015). Since the subsurface sample results had exceedances of the screening levels and relatively high concentrations of COCs, as a conservative measure, the 95UCL EPCs calculated for the Former Dump Area were based on surface soil and subsurface soil from DU-17 through DU-19. The methods for calculating weighted 95UCLs for the grouped exposure areas followed the ITRC guidance (ITRC). Further details and methods are given in **Attachment E**.

5.1.1 Terrestrial Plants and Soil Invertebrates

Consistent with EPA (1997), the 95UCL EPC for each exposure area was compared to TRVs for plants and soil invertebrates. This was also done for the aquatic plant community, where sediment EPCs were compared to TRVs for plants. If the EPC concentration was greater than the TRV, there is the potential for adverse effects. TRVs for plants and soil invertebrates are discussed in Sections 5.2.3.1 and 5.2.3.2.

5.1.2 Terrestrial Wildlife

Food web modeling was used to derive dose-based exposure estimates for terrestrial wildlife (i.e., which were then compared to literature-based TRVs. Food web modelling was conducted for all terrestrial receptors which includes herbivorous, insectivorous, and predatory birds and mammals, as described above in Section 2.1.6.1. Food web models are presented in **Attachment G**. The following Sections 5.1.6.1 to 5.1.6.4. presents the methods that were used to quantify the potential exposure of wildlife to constituents via the ingestion of food and soil or sediment. The methods are based on equations presented in EPA (1993) and Sample et al. (1996). The equations and exposure parameters discussed below are consistent with EPA (1997) guidance and standard risk assessment practice. The food web modeling was conducted for constituents that were selected as COPECs for birds and mammals, based on the results of the SLERA (Section 4).

5.1.3 Aquatic Plants and Benthos

To evaluate potential risks to the benthos (i.e., demersal fish, aquatic plants, and benthic invertebrates), the 95UCL EPC for each sediment DU was compared to the sediment RSV. If the EPC was greater than the RSV, then there is the potential for adverse effects to the benthic community. The sediment RSVs are discussed in Section 5.2.3.3.

5.1.4 Aquatic Life (Fish, Zooplankton, Birds and Mammals)

Since there were no COPECs identified in surface water as part of the SLERA, risk to fish and zooplankton is not expected and no further evaluation was necessary in the RSLERA. For the herbivorous, insectivorous, and piscivorous aquatic receptors (described in Section 2.1.6.2), food web modeling was conducted as described above for terrestrial wildlife in Section 5.1.2. Models are shown in Attachment G.

5.1.5 Herptiles

As highlighted above in Sections 2.1.6.1 and 2.1.6.2, there is a lack of information such as exposure factors and ecological screening values for herptiles. Consequently, risks are assumed to be similar to other receptors evaluated and are not evaluated directly. The uncertainty associated with the use of surrogate receptors is discussed further in Section 6.4.2.

5.1.6 Exposure Parameters

Input parameters for the food web models include receptor-specific soil or sediment ingestion rates, food ingestion rates, body weights, foraging range, and fraction/proportion of diet. The primary source of this information and specific parameters is the *Wildlife Exposure Factors Handbook* (EPA 1993), with other sources shown in **Tables 5-1 and 5-2**. These tables also provide the food web modeling exposure/input parameters for each wildlife receptor that was evaluated (described in Sections 2.1.6.1 and 2.1.6.2) and were presented in the UFP-QAPP Addendum for the Phase II investigation (EA 2022).

5.1.6.1 Bioaccumulation Factors

For COPEC uptake from soil, food prey tissue (biota) concentrations were estimated using bioaccumulation factors (BAFs) that were from EPA's EcoSSL documents. These documents compile values from various literature sources (**Table 5-3**) and include BAF values for general biota items (e.g., plants, soil invertebrates, and small mammals, EPA 2007a).

For sediments and water, biota concentrations were estimated or derived from laboratory and field measurements (EPA 1999) (**Table 5-4**). For surface water, fish BCFs were derived from laboratory and field data. If field data were used for the derivation of fish BCF, the BAFs were converted to BCFs based on trophic level position (EPA 1999). BCFs for sediment-to-benthic invertebrates were derived for cadmium, chromium, copper, lead, inorganic mercury, and zinc using laboratory and field data; all other BCFs are the arithmetic average of these metals (EPA 1999). All values

were converted to mg/kg dry weight assuming a moisture content of 80 and 83.3 percent for fish and invertebrates, respectively (Holcombe et al. 1976, Pietz et al. 1984)

The following sections provide the equations used to calculate doses of COPECs to upper-trophic level wildlife receptors.

5.1.6.2 Ingestion of COPECs from Soil or Sediment

Wildlife may ingest soil or sediment while foraging or grooming. Therefore, food web models account for incidental ingestion of soil or sediment. Equation 5-1 was used to calculate the dose of COPEC wildlife would obtain from the ingestion of soil or sediment ($Dose_s$, milligrams soil or sediment per kilogram body weight per day [mg/kg bw-d]):

Equation 5-1 $$Dose_s = SI \times C_s$$

Where:

$Dose_s$ = COPEC concentration ingested per day from soil or sediment (mg/kg bw-d)
SI = Soil or sediment ingestion rate (kilograms soil or sediment per kilogram body weight per day [kg/kg bw-d])
C_s = COPEC 95UCL concentration in soil or sediment (mg/kg)

Soil or sediment ingestion values were obtained from the scientific literature for the wildlife species of concern. The primary sources for soil and sediment ingestion values were Beyer (1994) and EPA (2007a). If soil or sediment ingestion values were obtained as percent incidental ingestion, values were converted to kilograms per kilogram body weight per day (kg/kg bw-day) by multiplying the percent value by the food ingestion rate.

5.1.6.3 Ingestion of COPECs from Food

Equation 5-2 was used to calculate the dose of COPEC that wildlife could obtain from the ingestion of food items including plants, invertebrates, and mammals. The equation for ingestion of fish is shown separately in Equation 5-3. The equation for fish considers a different moisture content and is focused on uptake from surface water only.

Equation 5-2 $$Dose_{biota} = FI \times \left(C_s \times \left[\frac{BCF}{0.167}\right]\right) \times \%$$

Where:

$Dose_{biota}$ = COPEC concentration ingested per day from food (mg/kg bw-d)
FI = Food ingestion rate (kg/kg bw-d)
C_s = COPEC 95UCL concentration in soil or sediment (mg/kg)
BCF = Bioconcentration factor from sediment to biota tissue (liters per kilogram wet weight). Converted to mg/kg dw, assuming 83.3% moisture content

% = Percentage of diet

For the ingestion of fish tissue, the following equation was used:

Equation 5-3 $$Dose_{biota} = FI \times \left(C_{sw} \times \left[\frac{BCF}{0.20}\right]\right) \times \%$$

Where:

$Dose_{biota}$ = COPEC concentration ingested per day from food (mg/kg bw-d)
FI = Food ingestion rate (kg/kg bw-d)
C_{sw} = COPEC 95UCL concentration in surface water (mg/L)
BCF = Bioconcentration factor from water to fish tissue (liters per kilogram wet weight). Converted to mg/kg dw, assuming an 80% moisture content
% = Percentage of diet.

For the SLERA, EPCs were compared to conservative soil screening levels to determine COPECs requiring further assessment, assuming 100% constituent bioavailability. In the RSLERA, food web modelling and realistic assumptions of receptor diet are included. For example, within the RSLERA, American robins were assumed to consume a diet that consists of both invertebrates (97%) and plant matter (e.g., seeds, fruit) (3%) at seasonally appropriate inhabitance of Iona Island (EPA 1993).

5.1.6.4 Total COPEC Ingestion

The total dietary exposure doses ($Dose_{total}$, mg/kg bw-d) to wildlife for the evaluated COPECs were estimated using Equation 5-4. Ingestion of water was not included as a significant exposure pathway (Section 2.1.5.3), therefore total doses were the sum of COPEC amounts in soil/sediment and dietary items.

Equation 5-4 $$Dose_{total} = (Dose_{biota} + Dose_s) \times AUF$$

Where:

$Dose_{total}$ = Total amount of COPEC ingested per day from food and soil or sediment (mg/kg bw-d)
$Dose_{biota}$ = Amount of COPEC ingested per day from food (mg/kg bw-d); refer to Equations 5-2 and 5-3
$Dose_s$ = Amount of COPEC ingested per day from soil or sediment (mg/kg bw-d)
AUF = Area use factor (1 or less).

5.1.6.5 Site Usage

The area use factor (AUF) was calculated based on the habitat range for each receptor. The following terrestrial receptors have habitat ranges that are approximately 1 acre: vole, shrew, and

robin. Therefore, an AUF based on habitat range was not applied to these receptors as they could spend 100 percent of life at the site, though a temporal adjustment based on migration was applied to the robin. Alternatively, for the remaining terrestrial receptors (fox and hawk), the home ranges are large (at least as large as the exposure areas) but due to the variability in home ranges, an AUF of 1 was selected to be conservative.

Average home ranges of the short-tailed shrew are less than 1 acre (EPA 1993; Blair 1940; Buckner 1966; Jones et al. 1983), thus, it is assumed they spend 100 percent of their life within an exposure area. However, home range size varies based on habitat type sampled (Jones et al. 1983) and there are recorded instances where an individual male short-tail shrew had a larger home range (4.5 acres; Blair 1940, Jones et al. 1983) and for those individuals the exposure estimates may be high. For example, the home range of a shrew may be greater than one acre in an area inundated with tidal waters twice daily as it is in the Former Dump Area, since this habitat is not ideal for the receptor's foraging requirements.

For the robin, a migratory receptor, a temporal adjustment was made to the AUF for the time the receptor is actually in the area. Robins are assumed to be in the northern United States and New York area for approximately 8 months of the year (i.e., March through October) (EPA 1993). The AUF was adjusted to 0.67 (8/12 months) to reflect this annual temporal use.

For all the aquatic wildlife receptors with a habitat range >1 acre (mallard, scaup, otter, and heron), the AUF was adjusted by dividing the habitat range for each receptor by the size of the sediment DU (0.5 acre). The muskrat has a small habitat range (<1 acre); therefore, the AUF was not adjusted.

The total dietary intakes were then compared to TRVs to evaluate if adverse effects are possible from exposure to COPECs in food and soil or sediment. Results are presented in Section 7. The following sections described the ecological effects evaluation (Section 5.2) and the calculation of hazard quotients (Section 5.3).

5.2 ECOLOGICAL EFFECTS EVALUATION

This section discusses the physical parameters that affect the bioavailability of constituents and selects TRVs for each receptor group. In general, the toxicities of constituents are related to their bioavailability, which is influenced by various physical and chemical characteristics. Many constituents may form complexes or compounds that bind them to soil and make them chemically inaccessible to ecological receptors. Alternatively, these elements and compounds may be present in forms that are easily dissolved and absorbed, or in forms that tend to bind to biological tissues. It is these forms of easily absorbed constituents that are most toxic. Most TRVs are based on forms of constituents that are readily bioavailable.

Toxicological benchmarks are often developed based on readily bioavailable forms of metals; these benchmarks may overestimate toxicity for less bioavailable forms or underestimate toxicity for more bioavailable forms. The primary factors controlling the potential bioavailability of metals are pH, the availability/characteristics of sorption sites on soil/sediment surfaces, and the content

of organic matter, and clay minerals. Acidity increases the bioavailability of many cationic metals, such as barium, chromium, copper, lead, vanadium, and zinc, which may become more soluble at pH below 5 (EPA 1992). Increasing the soil pH increases the sorption of metals to soil particles, making the metal less bioavailable. Some metals may also form complexes with iron oxides and hydroxides; this also causes the metals to be less bioavailable and less mobile. The following sections discuss the physical characteristics and properties of soil and sediment that can impact metals bioavailability in more detail.

5.2.1 Soil Physical Parameters

Soil physical parameters collected as part of the Phase II investigation are provided in **Attachment D (Table D-8**) and means are summarized by DU in **Table 5-5**. The importance of soil physical parameters in determining constituent bioavailability and potential risk to receptors is discussed throughout Section 7. To provide a quantitative assessment of the potential reduction in bioavailable concentrations for receptors, the EPA (2020) method for classifying metal bioavailability in soil based on percent clay and pH was used. This method was based on literature review of cadmium, cobalt, copper, nickel, lead, and zinc bioavailability studies to soil organisms (EPA 2020). Within the RSLERA, the percent bioavailability of the previously identified metals are refined based on the site-specific measured soil parameters following EPA (2020).

5.2.1.1 Total Organic Carbon and Clay Content

The soils are high in organic matter, with TOC values ranging from approximately 28,000 mg/kg at DU-4 to 230,000 mg/kg in DU-18. The soils primarily consist of sands and silts. Clay content ranges from 1.5 percent at DU-17 to 9.12 percent in DU-7. Comparing the Former Dump Area (DU-17 through DU-19) and Iona Island (all other DUs), TOC ranged from 33,000 – 233,333 mg/kg and 28,667 – 43,667 mg/kg at the Dump Area and Iona Island, respectively. Clay content was higher in Iona Island compared to the Dump Area, with ranges of 1.98 – 9.12 percent and 1.5 – 1.97 percent, respectively. Concentrations of metals can be evaluated as a function of effective clay fraction. Higher inorganic constituent concentrations are allowable for soils with higher effective clay fraction due to the adsorptive nature of clay and very small particles because of their large surface area, reactive surfaces, and edges. This higher binding capacity reduces the bioavailability of metals as they are bound tightly to clays. Clay and organic matter particles have a net negative charge, which attracts and binds cations (i.e., metals).

5.2.1.2 Soil Cation Exchange Capacity

A measure of the ability of soil to bind cations is referred to as CEC. If the CEC value is low, few cations are able to bind to the soil particles; if the CEC value is high, a larger number of cations can bind to the soil. The CEC of a soil is expressed in centimol positive charge per kilogram of soil ($cmol_c/kg$) or milli-equivalents per 100 grams of soil (meq/100g), and the expressions are numerically equivalent. Sandy soils low in organic matter have a very low CEC (i.e., less than 3 meq/100g) while heavier clay soils or soils high in organic matter generally have a much higher CEC (i.e., greater than 20 meq/100g) (Cornell University 2007). CEC values across all DUs ranged

from 24 – 53 meq/100g, with a range of 24 – 36 and 33 – 53 meq/100g in the Iona Island and Former Dump Area, respectively. Overall, the high CEC across the site indicates a high organic matter content and a high number of cations for binding to metals. The high organic matter content will restrict mobilization of metals and, therefore, the soils will tend to accumulate metals. Since the metals will be sorbed tightly to soil particles they will be less bioavailable for uptake into plants and soil invertebrates.

5.2.2 Sediment Physical Parameters

In sediments, sulfides, grain size, and TOC content play significant roles in the bioavailability and, ultimately, toxicity of metals. Sediment physical parameters collected during the Phase II investigation are provided in **Attachment D (Tables D-9 and D-10)**. Three replicate sediment samples from each area (Iona Island Hudson River Shoreline, drainage swale, and tidal wetland swale) were analyzed for each sediment parameter. A summary of average physical parameters in each sediment DU is provided in **Table 5-6**. The implications of the sediment physical parameters for potential risk to receptors is discussed throughout Section 7.

5.2.2.1 Grain Size and TOC

The sediments along the Iona Island Hudson River Shoreline differ from the swales located on the marsh side of the island. Along the river, the sediments have low organic content, with TOC of around 3,000 mg/kg. The sediments are primarily coarse and medium sands with an absence of silt and around 6 percent clay. However, along the marsh side of the island, the organic carbon content is much higher with TOC values ranging from 62,000 to 78,000 mg/kg. Sediments on this side of the island contain much higher clays (around 30 percent) and silts (around 50 percent) and minimal coarse sands (1 percent). Observations during the reconnaissance confirmed the differences in sediments on either side of the island. The marsh shoreline areas consisted of soft, mucky, marsh sediments; whereas the river side of the island was sandier and had much less organic matter.

5.2.2.2 Sediment Cation Exchange Capacity

Sediments typically have higher CEC than soil due to the high organic matter and water content. Sediment CEC values ranged from 30 to 91 meq/100g in DUs 17, 18, and 19, which contain the frequently flooded Former Dump Area (**Figure 3-1**).

5.2.2.3 Acid Volatile Sulfides/Simultaneously Extracted Metals

Sediments with similar concentrations of metals may have different toxic effects, depending on the amount of organic carbon and/or sulfide available to bind and render the metals non-bioavailable. The AVS/SEM approach developed by EPA (2005f) accounts for differences in sulfide and refines predictions of heavy metal toxicity in sediments. AVS/SEM predicts toxicity in sediments containing the following divalent metals: copper, cadmium, nickel, lead, and zinc.

In the laboratory, sulfide is volatilized from sediments by the addition of acid, and SEM are the metals extracted during the AVS procedure. One mole of SEM will react with one mole of AVS in sediments. The reaction forms an insoluble metal sulfide that is not available for uptake by benthic organisms. Therefore, the amount of AVS present in sediments serves a critical role in setting limits to metal availability and toxicity. The AVS/SEM method gives a better indication of sediment toxicity to benthic organisms than measurements of "total" metals by measuring only the "bioavailable" fraction of metals present. The difference between the sum of the molar concentrations of SEM minus the molar concentration of AVS, normalized to the fraction of organic carbon (f_{oc}) predicts which sediments are toxic. The equation is $(\sum SEM\text{-}AVS)/f_{oc}$ and the toxicity thresholds are as follows (EPA 2005f):

- If $(\sum SEM\text{-}AVS)/f_{oc}$ <130 micromoles per gram organic carbon ($\mu mol/g_{oc}$), metals are unlikely to be bioavailable/toxic.
- If 130 $\mu mol/g_{oc} < (\sum SEM\text{-}AVS)/f_{oc} < 3000\ \mu mol/g_{oc}$, metals may be bioavailable/toxic.
- If $(\sum SEM\text{-}AVS)/f_{oc} > 3000\ \mu mol/g_{oc}$, metals are likely to be bioavailable/toxic.

The field collection of sediments for AVS/SEM analysis requires limiting the sediment's exposure to oxygen, which can reduce the level of sulfides in the sample. Therefore, a discrete sediment sample (i.e., not homogenized, not ISM) is required. Three discrete samples were collected from each sediment exposure area, for a total of nine AVS/SEM samples. Results of AVS/SEM analyses at the three DUs are provided in **Table 5-7**.

Results from the marsh side of Iona Island (Riprap Drainage Swale and Tidal Wetland Swale) are less than 130 $\mu mol/g_{oc}$, which indicates that the metals in sediment are unlikely to be bioavailable; therefore, they are unlikely to cause toxicity to sediment-dwelling organisms. Results from Iona Island Hudson River Shoreline are much higher, with values over 25,000 $\mu mol/g_{oc}$, which indicates that the metals are likely to be bioavailable and cause toxicity.

5.2.3 Toxicity Reference Values and Refinement Screening Values

The RSLERA allows for more site-specific and less conservative evaluations of potential risk compared to the SLERA. The SLERA focused on comparison of constituents to highly conservative ecological soil screening levels that were not receptor-specific. The refinements at the RSLERA stage involve consideration of receptor-specific NOAELs and LOAELs for mammals and birds, RSVs for benthos, and benchmarks associated with a 20 percent effect for plants and soil invertebrates. This section describes the TRVs used in the RSLERA including both no-level effects thresholds and low-level effects thresholds, as discussed in the following sections. TRVs for plants and soil invertebrates are provided in **Table 5-8**. TRVs for benthos are based on the RSVs and are provided in **Table 4-2**. TRVs for mammals are provided in **Table 5-9**, and TRVs for birds are provided in **Table 5-10**.

5.2.3.1 Plants

To assess the potential for COPECs to adversely affect the plant community, EPCs were compared to concentration-based TRVs protective of plants (**Table 5-8**). Resources used included EcoSSLs that are protective of plants (EPA 2005a-e, 2006, 2007a-g, 2008) and Efroymson et al. (1997a) who established values associated with a 20 percent reduction in growth, reproduction, or other measured toxicological endpoints.

5.2.3.2 Soil Invertebrates

Similar to plant TRVs, to assess the potential for COPECs to adversely affect the soil invertebrate community, EPCs were compared to concentration-based TRVs protective of soil invertebrates (**Table 5-8**). Resources used included EcoSSLs protective of earthworms (EPA 2005a-e, 2006, 2007a-g, 2008) and Efroymson et al. (1997b). TRVs from studies listed in Efroymson et al. (1997b) were established at a level associated with a 20 percent mortality or other measured toxicological endpoints for earthworms.

5.2.3.3 Benthos

The RSV represents a probable effects level, above which adverse effects are expected to occur and are appropriate for use in the RSLERA (EPA 2018). To evaluate the potential for COPECs to adversely affect the benthos, which includes benthic invertebrates as well as benthic-feeding fish and rooted plants, EPCs were compared to RSVs for freshwater sediments (**Table 4-2**), as compiled by EPA Region 4 (2018) from the sources identified in Section 4.2.2. These values are less conservative than the ESVs and are appropriate for use in the RSLERA.

5.2.3.4 Wildlife Toxicity Reference Values

COPECs identified as having the potential to adversely affect wildlife species (based on comparison to the avian and/or mammalian EcoSSLs in the SLERA) were further evaluated using dose-based TRVs in the RSLERA. Two types of TRVs were used, each corresponding to a different level of potential ecological impacts for mammals and birds (**Tables 5-9 and 5-10**). No observed adverse effect levels (NOAELs) are doses that have been shown to cause no adverse impacts in test species. NOAELs were obtained from studies compiled for EPA's EcoSSLs (EPA 2005a-e, 2006, 2007a-g, 2008) and Oak Ridge National Laboratory (Sample et al. 1996). The Oak Ridge National Laboratory NOAELs were derived based on measurements of survival, growth, or reproduction in the laboratory. Values from EPA's EcoSSLs were derived through statistical analyses of results from multiple toxicological studies with multiple endpoints. NOAELs are conservative and considered protective which are appropriate for use in bounding the potential risk conclusions. Since NOAELs are associated with no observed effects in a test study, it is uncertain if the values are close to or far below the threshold value at which effects would first be observed.

Lowest observed adverse effects levels (LOAELs) are the lowest concentrations at which a significant adverse effect has been observed at an exposure concentration in comparison to a control. For risk assessments seeking to protect populations of organisms, LOAELs correspond to

an adverse effect in survival, growth, or reproduction. LOAELs are useful because there is considerable uncertainty associated with NOAELs. LOAELs serve to bound the range of NOAELs, and the threshold of toxic effects is considered to lie somewhere between the NOAEL and the LOAEL.
In some cases, LOAELs were available from EPA's EcoSSLs documents or by Oak Ridge National Laboratory studies (Sample et al. 1996). The corresponding LOAEL was used from the EPA EcoSSL document when available. When there was no corresponding LOAEL value, the geometric mean of the LOAELs for growth and reproduction was calculated; this approach is similar to that used to derive the EcoSSL NOAEL value. In the absence of LOAEL data for a specific receptor/COPEC, it was assumed that the LOAEL is 10 times the value of the NOAEL. Therefore, LOAELs are considered less conservative than NOAELs and present more realistic potential for adverse effects to an individual and potentially a population. LOAEL exceedances are the primary focus in the RSLERA.

In general, COPECs are evaluated on an individual basis. However, combined effects were evaluated for PAHs and PCBs. Since Aroclor PCBs are mixtures of individual PCB congeners, toxicity from PCBs is evaluated based on a mixture of total PCBs.

5.3 HAZARD QUOTIENTS

Quantitative risk was estimated using the exposure estimates and the toxicity values (EcoSSLs or TRVs). The HQ approach was used to estimate risk by comparing EcoSSLs, TRVs, or RSVs to EPCs. If the HQ was greater than 1, there was the potential for adverse effects and subsequently lines of evidence including bioavailability and magnitude of exceedance are used for further evaluation. EcoSSLs are equivalent to a documented and/or best conservatively estimated chronic NOAEL. However, since the RSLERA focuses on evaluating risk to populations of organisms and not individuals with the exception of protected species, the LOAEL is a more appropriate benchmark used for comparison, and risks were characterized based on LOAEL-based results. Therefore, both a conservative evaluation against the NOAEL, or no effect levels, and an evaluation against the lowest effect levels, or LOAEL, was conducted as provided in Equation 5-4 (EPA 1997).

Equation 5-4

$$HQ = \frac{Dose}{TRV_{NOAEL\ or\ LOAEL}}\ or\ HQ = \frac{EPC}{RSL}$$

Where:

HQ	= Hazard quotient (unitless)
Dose	= Estimated COPEC intake (mg/kg bw-d)
EPC	= Exposure point concentration (mg/kg)
$TRV_{NOAEL\ or\ LOAEL}$	= Toxicity reference value NOAEL or LOAEL-based (mg/kg bw-d)
RSL	= Refined screening level (mg/kg).

It should be noted that an HQ is not a statistical value or a defined measurement of risk. For example, an HQ of 0.01 does not indicate a 1 in 100 probability of adverse effects occurring. Rather, it indicates that the exposure-related dose is one hundred times less than the TRV for the constituent. In addition, the HQ does not infer a linear relationship (i.e., the hazards posed by exposure to the constituent do not increase linearly as the HQ increases) (USACE 2010).
Sometimes risks are evaluated using a hazard index (HI) approach, which sums individual HQs for similar constituent groups. Metals are not typically evaluated based on HIs, an approach that is consistent with EPA framework for metals (EPA 2007b). The calculation of HIs is primarily completed for constituent groups that exhibit a well-defined toxic action (e.g., organochlorine pesticides, Aroclors) and tend to occur as mixtures (PAHs). Most metals express multi-organ toxicity as opposed to well-defined mechanisms of toxicity such as organochlorine pesticides. Bioavailability can vary widely due to environmental factors including organometallic transformations. Toxicological responses to a given metal may vary among species due to differences in toxicokinetics (absorption, distribution, elimination) and toxicodynamics (relative potency). In addition, most TRVs are based on laboratory studies using metal salts as opposed to the species/complexes that are typically found in nature. USACE (2010) risk assessment guidance cautions on the use of HIs, which should only be calculated for constituents with the same toxic effect mechanisms (e.g., PAHs). As such, only HQs were calculated and used to evaluate potential risk in this RSLERA at the Iona Island FUDS." (Section 5.3).

The following Section, Section 6, provides the uncertainty analysis associated with environmental sampling, analytical data, exposure and toxicity estimates, and assessment of risks. The results and conclusions of the RSLERA are outlined in Sections 7 and 8, respectively.

6. UNCERTAINTY ASSESSMENT

It is important to document sources of uncertainty associated with the risk assessment process. This is because many conservative assumptions are built into the evaluation, from determining the appropriate EPC to uncertainty factors used to derive TRVs. Uncertainties have the potential to either underestimate or overestimate actual risk to receptors. The main areas of uncertainty associated with the ERA include:

- Environmental sampling
- Analytical data
- Estimated exposure and toxicity data
- Characterization of risk

This section provides a general discussion of the uncertainty associated with the risk assessment process and individual lines of evidence. The interpretation of the overall degree of uncertainty is the culmination of all lines of evidence which is discussed along with the findings in Section 7.

6.1 ENVIRONMENTAL SAMPLING

Of the potential uncertainties associated with environmental sampling, the sample design is likely to have the greatest impact on the evaluation of risks to ecological resources. The sample design was developed based on the available historical information regarding the activities that occurred at the site. Focusing the study design to provide analyses for certain constituents specific to suspected source areas is a valid and accepted means of maintaining a practical and efficient limit on the field effort. However, there is always a possibility that the study design could miss samples where constituents are present or miss other types of constituents in a specific sample. The ISM sampling design was used in efforts to prevent missing quantifiable constituents. However, only 1-acre grids were sampled across the site in areas of suspected historical activities. A total of 26 individual 1-acre DUs were targeted for soil sampling with the boundary of the site comprising approximately 125 acres of land and inland water. A total of 90 and 16 surface and subsurface ISM soil samples were collected respectively across all grids. Therefore, the areas where no grids were sampled present an uncertainty in that, over time, as the soils have been reworked and spread across the site, these areas were not sampled and may contain DoD-related constituents. The sampling areas were focused on previously identified areas of concern at the site, therefore ensuring the study design captured the most contaminated areas. Furthermore, the ISM sampling design has been shown to yield more reliable and reproducible results and better predict the average concentration across an area than discrete samples.

In an effort to address the uncertainties discussed above, and in accordance with the conservative nature of SLERAs, the 1-acre and smaller DUs established in areas of most likely to contain the highest levels of contamination, but each DU was sampled randomly. For example, the food web models assume that mammals and birds with small foraging ranges obtain all their food from within one DU, clearly a highly conservative assumption. With the exception of fixed or limited mobility receptors (e.g., plants), ecological receptors are unlikely to utilize only those areas of

highest contamination and are more likely to forage over a larger area that includes areas of contamination as well as less contaminated areas.

6.2 ANALYTICAL DATA

Additional uncertainties are associated with the analytical data used within the RSLERA, including the selection of EPCs, constituent detection limits, and data quality. These uncertainties are discussed within this section.

6.2.1 Exposure Point Concentrations

The 95UCL was used as an upper estimate of mean exposures. In almost all cases, both the Student's t-test and Chebyshev 95UCLs calculated from the triplicate ISM soil samples produced results that were higher than any of the each replicate concentrations. Due to the distribution of the data, variability in the results, and the apparent heterogeneity of site soil, the Chebyshev value was recommended over the Student's t-test value, which was generally a lower number. However, both values are typically higher than the replicate sample results, are conservative, and may overestimate risks. For sediment, an updated version of the ITRC Calculator was used to identify the appropriate 95UCL. Therefore, the conservatism was reduced in the calculation of EPCs for sediment. Given that the 95UCL still represents a conservative exposure estimate, no bias is expected as a result of using the updated calculator for sediment EPCs.

6.2.2 Detection Limits

There are some cases where a constituent is not detected at the LOD or LOQ, but the LOD or LOQ exceeds a screening value. In such cases, other lines of evidence including the magnitude of the HQ exceedance, properties of the constituent and its bioavailability, and other mitigating factors will be considered to identify potential risk. For instance, in soil, the LODs of non-detect results for Aroclor-1221, Aroclor-1242, 3-nitrotoluene, 1,3-dinitrobenzene, and Tetryl are greater than their respective ecological screening levels. Concentrations of Aroclor-1221 and Aroclor-1242 exceeded their screening values at DU-23 and DU-25. Several explosive compounds had concentrations that exceeded ecological screening levels in the DUs evaluated only for explosives. Based on the low detections of these compounds and their volatile nature, they are not anticipated to be present at concentrations that would cause adverse impacts to ecological receptors. However, there is some uncertainty with risks from these constituents as they cannot be quantified.

6.2.3 Data Quality

As discussed in Section 3.2, approximately 20 percent of the soil sample results were J-flagged for minor laboratory interferences including matrix interference, trace contamination in blank samples, and/or exceeding holding times. J qualifiers indicate estimated values. In some cases, the J qualifier is biased low, indicating the reported result may be lower than the actual concentration. In these cases, risks may be underestimated. In the cases where the J qualifier is biased high, then the potential risks associated with these data may be overestimated because the reported result is

potentially higher than the actual concentration. This occurs for several metals and PAHs in DUs 9, 11, 14, 19, and 20 and will be elaborated on in the risk characterization in Section 7.

Many of the soil background samples, particularly for PAHs, were J- flagged due to holding time exceedances. Per the UFP-QAPP (EA 2020), holding times for PAHs are 14 days until extraction. The long processing time for the ISM samples prevented their timely extraction, and the samples were not extracted until 25 or 26 days after receipt, which could bias values low for these constituents. For other constituent groups including metals and PCBs, maximum holding times were 180 – 365 days per the UFP-QAPP (EA 2020); thus, these groups were not impacted. While this adds some uncertainty to the background data, background samples that are biased low provide a more conservative evaluation than ones biased high.

6.3 ESTIMATES OF EXPOSURE AND TOXICITY

Additional uncertainty is associated with exposure assumptions and the toxicity benchmarks used to evaluate risk. These parameters are discussed in more detail in Sections 6.3.1 and 6.3.2.

6.3.1 Exposure Assumptions

A major source of uncertainty is associated with the estimation of each receptor's exposure to COPECs. Generally, food web models used to estimate exposure from soil/sediment and biota are created to represent a worst-case scenario of possible risks to the receptor groups; and thus, conservative assumptions are incorporated into the models. The models assume that receptors are exposed to the 95UCL concentrations of constituents in environmental media consistently on a daily basis. It is expected that such a conservative scenario would overestimate risk for highly mobile receptors.

Furthermore, the exposure parameters used in the food web models are not site-specific. Since site-specific habitat characteristics (e.g., availability, distribution, and quality of food) influence feeding strategies and, therefore, exposure parameters, there is uncertainty associated with using non-site-specific exposure parameters. Non-site-specific modeled uptake/bioaccumulation factors were utilized to estimate dietary tissue uptake, which introduces a high degree of uncertainty.

In addition, soil/sediment ingestion rates are literature-based (e.g., EPA 2007a, Beyer et al., 1994) and are not available for all species. For example, soil ingestion rates for the American robin were not available; thus, the value for American woodcock was used (Table 5-1). Dose estimates for wildlife are significantly affected by soil/sediment ingestion rates, which can over- or underestimate risk estimates depending on the accuracy of the soil/sediment ingestion rate.

6.3.2 Toxicity Reference Values

The assessment of risks was primarily based on the comparison of estimated doses to TRVs from the literature. There are many uncertainties associated with these evaluation tools and the assessment of risks based upon them. The quality of the TRV can influence the estimate of potential risk. With metals, TRVs are typically generated using the most bioavailable/toxic form

of the metal. Whereas the form of metal that is most likely present on-site would be a much less toxic, inert, or complexed form. The TRVs selected for this ERA are those most often recommended by EPA and allow for a conservative estimate of potential risk.

LOAEL TRVs are not always available and may be estimated from the NOAEL using an uncertainty factor. When insufficient studies are available, uncertainty factors are applied to NOAEL TRVs to estimate a LOAEL TRV. As such, these TRVs are highly uncertain. In addition, there is a paucity of toxicological data in the literature for soil invertebrates and plants, and TRVs (i.e., EcoSSLs) are generally developed to be extremely conservative for these receptors. Sporadic elevations of concentrations of metals in soil would not necessarily be toxic to communities or populations of plants and soil invertebrates, which is how these groups of receptors are typically evaluated. Many plants are tolerant of high concentrations of metals and will accumulate significant concentrations without demonstrating any adverse effects. Some metals, such as copper, are nutrients for plants.

Due to the lack of adequate toxicity studies, there are no EcoSSLs for chromium for soil invertebrates or plants. More current toxicological literature associated with chromium and zinc could not be found. There are also no EcoSSL values for mercury. Efroymson et al. (1997a) cautions that their plant "benchmarks are to serve primarily for contaminant screening" In addition, availability of constituents for uptake by earthworms is controlled by soil characteristics such as grain size, pH, organic carbon content, and moisture content (Efroymson et al. 1997b).

USACE's Risk Assessment Handbook (USACE 2010) cautions on the use of EcoSSLs for cleanup levels:

> *The USEPA EcoSSLs provide screening values for soil invertebrates and plants. It is emphasized that the EcoSSLs are soil screening numbers, and as such are not appropriate for use as cleanup levels. Screening ecotoxicity values are derived to avoid underestimating risk. Requiring a cleanup based solely on EcoSSL values would not be technically defensible.*

RSVs used to evaluate the benthos (benthic invertebrates, aquatic plants, and demersal fish) are primarily based on statistical evaluations of toxicological data for a few benthic invertebrate species. The values are based on bulk sediment toxicity tests from contaminated sediments throughout different areas of the United States. These bulk sediments were often from heavily industrialized areas and contained multiple constituents including both metals and organic compounds (e.g., PCBs, pesticides, PAHs). While the RSVs may be appropriate for the benthic invertebrate community, they are not truly reflective of toxicity values for aquatic plants or demersal fish. However, since there are no screening values for these species, available sediment benchmarks for benthic invertebrates are used as surrogates.

6.4 ASSESSMENT OF RISKS

6.4.1 Individual- vs. Population-Level Effects

Another uncertainty results from the extrapolation of assumptions about the potential for adverse effects from individual organisms to populations. The intent of ERAs, as set forth in the assessment endpoints, is to ultimately evaluate risks to populations. Few methods are available to extrapolate the potential for adverse effects from the individual level to the population level. This would include individual based population models that would incorporate demographic and density information on a selected population(s) at the study site. Following, stochasticity of model parameters (such as life history traits and exposure concentrations), population-level impacts may be evaluated in the context of risk assessment. Forbes et al. (2008) provides a critical review on incorporating population models into ERAs.

Without site-specific demographic data on targeted populations, the standard practice is to generally assume that if there is no potential for direct adverse effects to individual organisms then it is also unlikely for there to be the potential for direct adverse effects to populations. Similarly, it is assumed that if there is the potential for adverse effects to individual organisms there is also the potential for adverse effects to populations. However, it is conservative to assume that potential damage at the individual level will impact the populations in the surrounding ecosystem. See Sections 7.4 and 7.5 for context using site-specific parameters.

6.4.2 Surrogate Receptor

Protected species that may be present at the site were identified in Section 2.1.4.1. With the exception of the osprey, which was observed during the Shoreline Reconnaissance Survey in April 2020 (Section 2.1.4.2), the actual presence of these protected species on-site is an uncertainty. Surrogate receptors for which complete exposure information was available were selected to estimate exposure parameters for the listed species (Section 2.1.6). Efforts were made to select surrogate receptors with similar biology and life histories, with a focus on the life history aspects that would most influence exposure parameters, such as diet and foraging strategies. However, there is significant uncertainty inherent in the use of surrogate receptor species to estimate risk to represented species. Firstly, every species is unique, and special status species often have unique features of their life histories that have made them vulnerable to population declines which would not be reflected in the exposure parameters of the selected surrogate species. Also, it is not possible to select a "perfect" surrogate receptor for which exposure parameters are available. For instance, the size of the surrogate and protected species may vary even though diet and foraging strategies are similar. For example, the American robin was chosen as the surrogate receptor for the cerulean warbler, which is roughly half the size of a robin. This could lead to underestimates of risk to the protected species. Ultimately, in the absence of suitable research studies to determine species-specific exposure factors for each special status species, the uncertainty associated with the use of surrogate receptors cannot be eliminated.

There is also uncertainty regarding the assessment and characterization of risks to herptiles. With the exception of bioassays, there is a lack of adequate methods for assessing risks to amphibians

and reptiles. Consequently, these receptors were not evaluated quantitatively in the risk assessment. The greatest uncertainty with respect to the characterization of risks to amphibians and reptiles is the lack of receptor-specific chemical benchmarks, uptake data, and bioconcentration rates. Approved TRVs and other comparative values to measure adverse effects to amphibians and reptiles from chemicals in soil have not yet been developed from literature. Available toxicity literature and databases provide some usable information, though they are still under development and are not yet comprehensive or consistent enough to allow development of reliable TRVs. Thus, uncertainties associated with toxic effects of constituents at particular concentrations on adults, juveniles, larvae, or eggs, or the specific effects of chemical exposure on development, reproductive capacity, or survival remain unresolved. It has been demonstrated that for reptile exposure specifically to lead, growth effects were seen at similar exposure doses to the lead EcoSSL TRV for avian ground insectivores (Salice et al. 2009), indicating the risk would occur at similar thresholds for birds and reptiles. Therefore, risks from lead to other receptors, especially birds, may be used to indicate risk to reptiles and amphibians.

6.4.3 Hazard Quotient Approach

There are several limitations associated with the use of HQs to determine the potential for risk to ecological receptors. While the HQ is a standard tool in ERAs set forth in EPA guidance (EPA 1997), an article in the scientific literature points out a number of limitations to the use of this method (Tannenbaum et al. 2003). The use of the HQ identifies a potential for risk as opposed to an actual risk, because the HQ result is not a probability. The HQ identifies whether a dose or concentration exceeds a benchmark, and by how much; and therefore, it is not a linear or scalable metric. Also, the HQ cannot be used to quantitatively extrapolate between individual and population level effects. HQs based on NOAELs for the most sensitive species are often exceeded by concentrations that occur naturally in the environment. These limitations should be considered before using HQ-based estimates of the potential for risk to draw conclusions or make decisions based on assessment results.

6.5 SUMMARY

This section aimed to provide a generic discussion of the uncertainty associated with the risk assessment process, including sampling designs, analytical data, and parameters used for exposure and toxicity calculations. These uncertainties, along with other site-specific details, are incorporated into the following results section (Section 7) to characterize risks to receptors.

7. REFINED SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT RESULTS AND RISK CHARACTERIZATION

The quantitative results of the RSLERA and additional characterization that interprets the potential risk for each receptor group are provided in the sections below. Consistent with ERA guidance (EPA 1997), results of the RSLERA are designed to estimate an upper-bound potential for adverse effects to the selected representative receptor species. Therefore, exceedance of a TRV indicates the potential for adverse effects; however, it does not indicate that an adverse effect is occurring from the COPEC (Tannenbaum et al. 2003). It does, however, indicate that additional evaluation may be necessary.

In risk characterization, a qualitative weight of evidence approach is applied to understanding any HQs that are >1. Site-specific environmental data and life history traits of the potential ecological receptors at the site are used to understand risks that were identified (HQ >1) in the RSLERA. Those may include factors that influence bioavailability of the COPECs, expected habitat use of receptors, and other potential uncertainties such as limitations in available data (as identified in Section 6).

The text below characterizes risks for each assessment endpoint. For assessment endpoints with inconclusive findings, further evaluation was conducted using weights of evidence. The weight of evidence approach is the process by which measurement endpoints are related to an assessment endpoint to evaluate whether a significant risk of harm is posed to the environment. Results are presented by exposure area. Terrestrial exposure areas include the Former Dump Area and Iona Island. Aquatic exposure areas include Iona Island Hudson River Shoreline, Riprap Drainage Swale, and Tidal Wetland Swale.

7.1 AE1: TERRESTRIAL PLANT COMMUNITY

When the 95UCL EPCs for surface soil (Iona Island) and surface and subsurface soil (Former Dump Area) were compared to EcoSSLs (i.e., TRVs) for plants (**Table 7-1**), the following COPECs had HQs greater than 1:

Insert 7-1. Risk Characterization for Terrestrial Plants.

Receptor	Exposure Area	COPEC	HQ	Bioavailability Adjusted HQ	Risk Characterization Conclusions
Terrestrial Plants	Iona Island	Lead	3	1	No risk due to adjusted HQ≤1
		Thallium	3	-	No risk due to qualitative bioavailability assessment
		HMW PAHs	2	-	No risk due to qualitative bioavailability assessment
	Former Dump Area	Chromium	82	-	Potential for risk
		Copper	22	9	Potential for risk
		Lead	15	6	Potential for risk
		Mercury	6	-	Potential for risk
		Selenium	2	-	No risk due to low magnitude of exceedance
		Thallium	6	-	No risk due to low effect level HQ<1
		Zinc	21	9	Potential for risk

- Not calculated; bioavailability adjustment method was not developed for these analytes (EPA 2020).

In the Iona Island exposure area, though there are concentrations of metals in exceedance of plant TRVs (i.e., arsenic, chromium, copper, lead, mercury, selenium, thallium, and zinc) in individual DUs, the HQs for the combined 95UCL EPC are all 3 or less. Using the EPA's soil bioavailability classification procedure, Iona Island and the Former Dump Area soil can be classified as 'Medium-Low' metal bioavailability, based on pH levels > 6.5 in all soils and percent clay < 26 percent (EPA 2020). The corresponding percent bioavailability is 41 percent, which decreases the lead HQ to 1 for the Iona Island area. The soil bioavailability classification was not developed for thallium and HMW PAHs (Huang et al. 2018; Wick et al. 2020), which also showed exceedances at Iona Island; however, the high CEC values and organic carbon content are likely to reduce bioavailability of these compounds. Thus site-wide concentrations of COPECs are not expected to pose risk to terrestrial plants.

In the Former Dump Area, the HQ for the combined 95UCL EPC for selenium is 2. Due to the low magnitude of exceedance of the EcoSSL, site-wide concentrations of selenium in the Former Dump Area soil are not expected to pose risk to terrestrial plants. The HQs for the remaining COPECs range from 6 to 82, indicating risk may be more likely. To evaluate the potential magnitude of risk, a weight of evidence evaluation was conducted that incorporates multiple lines of evidence into the determination of risk.

Adjusting for an assumed 41 percent bioavailability of copper, lead, and zinc (EPA 2020), HQs remain above 1 for terrestrial plants in the Former Dump Area; thus, potential risk to terrestrial plants from these compounds at the Former Dump Area is anticipated. Though the soil bioavailability method was not developed based on literature for mercury, chromium, or thallium, pH and percent clay are major factors driving bioavailability of these compounds (Hussain et al. 2022; Huang et al. 2018; Wick et al. 2020; Reijonen and Hartikainen 2016; Sewart et al. 2003). Consequently, assuming a similar percent bioavailability for these compounds (i.e., 41 percent), HQs would still be above 1 for all compounds, indicating risk from chromium, mercury, and thallium to terrestrial plants at the Former Dump Area.

Importantly, significant uncertainty exists regarding the TRV used for thallium of 0.05 mg/kg. The TRV is lower than the mean background concentration of thallium measured in this assessment of 0.13 mg/kg (Table 4-4). When using the corresponding low effect level for thallium of 0.5 mg/kg (Los Alamos National Laboratory 2018), the HQ falls below 1. Consequently, risk to populations of terrestrial plants from thallium at the Former Dump Area is unlikely; however, risk from chromium, copper, lead, mercury, and zinc is potentially present.

As discussed in Section 2.1.6.1, the small whorled pogonia, which is federally listed as threatened and state listed as endangered, is not known to occur on the site but is believed to occur in Rockland County, New York, and could be present at upland forested portions of the site. The small whorled pogonia is a terrestrial plant that is sensitive to competition with other species. Therefore, this species would not use the frequently flooded Former Dump Area as habitat due to its moisture regime and predominance of *Phragmites australis* coverage. The risks to terrestrial plants from chromium, copper, lead, mercury, and zinc in the Former Dump Area are not expected to impact small whorled pogonia plants.

7.2 AE2: SOIL INVERTEBRATE COMMUNITY

When the 95UCL EPCs for surface soil (Iona Island) and surface and subsurface soil (Former Dump Area) were compared to EcoSSLs (i.e., TRVs) for soil invertebrates (**Table 7-2**), the following COPECs had HQs greater than 1:

Insert 7-2. Risk Characterization for Soil Invertebrates.

Receptor	Exposure Area	COPEC	HQ	Bioavailability Adjusted HQ	Risk Characterization Conclusions
Soil Invertebrates	Iona Island	Arsenic	2	-	No risk due to qualitative bioavailability assessment
		HMW PAHs	2	-	No risk due to qualitative bioavailability assessment
	Former Dump Area	Arsenic	2	-	No risk due to qualitative bioavailability assessment
		Chromium	205	-	Potential for risk
		Copper	19	8	Potential for risk
		Mercury	34	-	Potential for risk
		Zinc	28	12	Potential for risk

- Not calculated; bioavailability adjustment method was not developed for these analytes (EPA 2020).

In the Iona Island exposure area, though there are concentrations of metals in exceedance of soil invertebrate TRVs (i.e., arsenic, chromium, copper, lead, mercury, and zinc) in individual DUs, the HQs for the combined 95UCL EPC are all 2 or less. The high CEC values and organic carbon content of the soil are likely to reduce bioavailability of these compounds; thus, site-wide concentrations of COPECs in the Iona Island exposure area surface soil are not expected to pose risk to soil invertebrates.

In the Former Dump Area, the HQ for the combined 95UCL EPCs for arsenic is 2. Due to the low magnitude of exceedance of the EcoSSL and likely reduced bioavailability due to the soil physical parameters, the site-wide concentrations of arsenic in the Former Dump Area soil are not expected to pose risk to soil invertebrates. The HQs for the remaining COPECs range from 19 to 205, indicating risk may be more likely. Assuming a 41 percent bioavailability, HQs for all compounds excluding arsenic remain above 1, indicating that risk from chromium, copper, mercury, and zinc to soil invertebrates is potentially present at the Former Dump Area. As highlighted previously, the Former Dump Area is frequently inundated and includes areas with thick stands of *Phragmites* that may prevent habitation by soil invertebrates, though core samples taken from a tidally influenced phragmites marsh in NJ have found macroinvertebrate presence and community richness including Oligochaeta, Nematoda and Polychaeta (Angradi et al. 2001).

Therefore, based on the high HQ exceedances (HQs of 205, 19, 34, and 28 for chromium, copper, mercury, and zinc, respectively) and lack of site-specific information on the invertebrate community, potential risk to this receptor group cannot be ruled out.

7.3 AE3: TERRESTRIAL HERBIVOROUS MAMMALS

Potential risks to herbivorous mammals were evaluated using a food web model for meadow voles (**Table G-1**). Ingestion doses were calculated for each exposure area based on the 95UCL EPCs for surface soil (Iona Island) and surface and subsurface soil (Former Dump Area), which were used to predict the concentration in plant tissue that would be consumed by voles. The dose from soil and dose from biota were summed to calculate a total dose, which was then compared to NOAEL and LOAEL-based TRVs to calculate an HQ. HQs greater than 1 indicate potential risk. None of the constituents in any DU had NOAEL or LOAEL-based HQs greater than 1; therefore, there is no potential risk to herbivorous mammals in either exposure area.

7.4 AE4: TERRESTRIAL INSECTIVOROUS BIRDS

Potential risks to insectivorous birds were evaluated using a food web model for the American robin (**Table G-2**). Robins were assumed to be migratory, spending only a portion of their time (8 months) at the site. Ingestion doses were calculated for each exposure area based on the combined 95UCL EPCs for surface soil (Iona Island) and surface and subsurface soil (Former Dump Area), which were also used to predict a concentration in plant and invertebrate tissue that would be consumed by robins. The dose from soil and dose from biota were summed to calculate a total dose, which was then compared to NOAEL and LOAEL-based TRVs to calculate an HQ. HQs greater than 1 indicate potential risk. The table below presents the HQs ($HQ_{NOAEL,}$ HQ_{LOAEL}, and Bioavailability Adjusted HQ_{LOAEL}) as well as risk characterization conclusions for all COPECs that exceeded the NOAEL-based TRVs.

Insert 7-3. Risk Characterization for Terrestrial Insectivorous Birds.

Receptor	Exposure Area	COPEC	HQ_{NOAEL}	HQ_{LOAEL}	Bioavailability Adjusted HQ_{LOAEL}	Risk Characterization Conclusions
Insectivorous birds (American robin)	Iona Island	Lead	6	3	1	No risk due to adjusted HQ≤1
		HMW PAH	3	<1	-	No risk, HQ_{LOAEL}<1
	Former Dump Area	Cadmium	3	<1	<1	No risk, HQ_{LOAEL}<1
		Copper	21	7	3	Potential for risk
		Lead	29	15	7	Potential for risk
		Zinc	2	<1	<1	No risk, HQ_{LOAEL}<1

- Not calculated, bioavailability adjustment method was not developed for these analytes (EPA 2020).

When the doses are compared to the NOAEL-based TRVs, lead and HMW PAHs HQs exceed 1 in the Iona Island exposure area and cadmium, copper, lead, and zinc HQs exceed 1 in the Former Dump Area. When the doses are compared to the LOAEL-based TRVs, all HQs fall to 1 or below 1 with the exception of lead in the Iona Island exposure area and copper and lead in the Former Dump Area. It is important to consider that the LOAEL TRV for HMW PAHs is highly uncertain. EPA (2007f) did not derive a TRV for HMW PAHs due to a lack of data; thus, an uncertainty

factor was applied to the available NOAEL to estimate a LOAEL. Consequently, the HQ based on this value is uncertain.

Adjusting the soil EPC by 41 percent, the HQ based on the comparison of the LOAEL-based TRV for lead to the dose to insectivorous birds at Iona Island falls to 1. Consequently, site-wide concentrations of lead in the Iona Island exposure area surface soil are not expected to pose risk to terrestrial insectivorous birds.

Adjusting the soil EPC in the Former Dump Area by 41 percent, resultant HQs would be 3 and 7 based on comparison to the LOAEL-based TRVs for copper and lead, respectively. Consequently, measured soil physical parameters and the resultant lower bioavailability would not mitigate potential risks from copper and lead to insectivorous birds at the Former Dump Area.

Several uncertainties exist with regards to the models and assumptions used to assess risks to terrestrial insectivorous birds. In the absence of site-specific tissue, the oligochaete tissue concentrations are modeled based on an uptake factor and equation for copper and lead, respectively. The uptake factor and equations developed by Sample et al. (1998a) and suggested for use in EcoSSL guidance (EPA 2007a) are generalized, as they represent multiple oligochaete species, seasons, and soil types and characteristics, which have all been shown to affect uptake (Sample et al. 1998a). Therefore, the uncertainty with the oligochaete tissue estimate for any specific location may be high (Sample et al. 1998a), and thus the exposure estimates to the wildlife receptors that eat oligochaetes are also uncertain.

Further uncertainty exists relating to the suitability of the Former Dump Area habitat for soil invertebrate foraging by insectivorous birds. As highlighted previously, thick stands of *Phragmites* cover a limited area of the Former Dump Area, which may provide a barrier to soil invertebrate foraging by insectivorous birds. Though *Phragmites* colonization is likely to have a negative overall impact on bird communities, some species are known to have preference for *Phragmites* dominated habitat. A literature search found support for the use of *Phragmites* habitat by ecological receptors, including several species that have been identified on site such as the marsh wren, red-winged blackbird, and Virginia rail (Benoit and Askins 1999; Whyte et al. 2015).

The area is frequently inundated which may limit the presence of soil invertebrate prey items within the area. A previous study of *Phragmites* dominated marsh in New Jersey found presence of macroinvertebrates including Oligochaeta, Nematoda, and Polychaeta, suggesting that suitable prey items are likely present (Angradi et al. 2001). Macroinvertebrate densities were high in *Phragmites* reeds on Iona Island, based on surveys conducted in 1999 and 2000 (Yozzo and Osgood 2013). Though some of the species identified in the aforementioned studies were aquatic or semiaquatic, bioaccumulation of copper and lead in benthic macroinvertebrates would be higher in these species compared to terrestrial soil invertebrates based on bioaccumulation factors. In addition, bird species known to use *Phragmites* dominated habitat, such as the marsh wren, consume both terrestrial and aquatic invertebrates (Beaubien et al. 2020). Consequently, it is assumed that the Former Dump Area could support habitation and foraging by insectivorous birds.

The America robin was selected as the surrogate receptor for the cerulean warbler and the golden-winged warbler, which are both considered species of special concern by the state of New York. Both protected species are smaller than the robin and use of the robin as a surrogate receptor may underestimate risk to these species based on differences in ingestion rate relative to body weight. The diet of both cerulean and golden-winged warblers primarily consists of insects (NYDEC 2023); thus, the American robin model was adjusted to consume almost entirely insects to more closely represent the two state species of concern. The cerulean warbler prefers deciduous forest habitats (Cornell Lab of Ornithology 2023a) and the golden-winged warbler prefers mosaic forest near wetlands (Cornell Lab of Ornithology 2023b). Both habitat types exist on-site; thus, both species may be present at the site. Thick stands of *Phragmites australis* are not their preferred habitat, meaning it is unlikely either species will spend all their time inhabiting the Former Dump Area. Consequently, risks to these threatened species may be overestimated based on the lack of habitat suitability, though the use of the Former Dump Area for foraging by species of concern cannot be ruled out based on this assessment.

There is potential for population-level impacts to terrestrial insectivorous birds given LOAEL-based HQs exceed 1 for lead and copper even when bioavailability is incorporated into the exposure model. The LOAEL-based HQs for lead and copper are based on comparisons to TRVs that are derived from chronic exposures with effects on reproductive endpoints. Given this impact is directly linked to population sustainability (fecundity and recruitment), it is prudent to highlight the potential for population-level impacts to insectivorous avian species for lead and copper at the Former Dump Area. However, population-level effects on this receptor group cannot be determined or ruled out without further site-specific ecological data. Information on populations present within the Former Dump Area (abundance and density as well as other parameters) would be needed to reduce this uncertainty and to provide insight into population impacts from these metals. Equally important, species of concern may be present in the area, for which effects at the individual effect level are significant. Consequently, potential risks to species of concern from copper and lead exposure in the Former Dump Area cannot be ruled out. Therefore, it is concluded there is potential risk to insectivorous birds and consequently two bird species of special concern due to copper and lead at the Former Dump Area.

7.5 AE5: TERRESTRIAL INSECTIVOROUS MAMMALS

Potential risks to insectivorous mammals were evaluated using a food web model for short-tailed shrew (**Table G-3**). Ingestion doses were calculated for each exposure area based on the 95UCL EPCs for surface soil (Iona Island) and surface and subsurface soil (Former Dump Area), which were also used to predict a concentration in plant, small mammal, and invertebrate tissue that would be consumed by shrews. The dose from soil and dose from biota were summed to calculate a total dose, which was then compared to NOAEL and LOAEL-based TRVs to calculate an HQ. HQs greater than 1 indicate potential risk. The table below presents the HQs ($HQ_{NOAEL,}$ HQ_{LOAEL}, and Bioavailability Adjusted HQ_{LOAEL}) as well as risk characterization conclusions for all COPECs that exceeded the NOAEL-based TRVs.

Insert 7-4. Risk Characterization for Terrestrial Insectivorous Mammals.

Receptor	Exposure Area	COPEC	HQ_{NOAEL}	HQ_{LOAEL}	Bioavailability Based HQ_{LOAEL}	Risk Characterization Conclusions
Insectivorous mammals (shrew)	Iona Island	Lead	2	<1	<1	No risk, HQ_{LOAEL}<1
		HMW PAHs	10	<1	-	No risk, HQ_{LOAEL}<1
	Former Dump Area	Antimony	9	<1	-	No risk, HQ_{LOAEL}<1
		Cadmium	6	<1	<1	No risk, HQ_{LOAEL}<1
		Copper	12	7	3	Potential for risk
		Lead	7	4	2	Potential for risk
		Thallium	3	<1	-	No risk, HQ_{LOAEL}<1
		Zinc	2	<1	<1	No risk, HQ_{LOAEL}<1
		HMW PAHs	3	<1	-	No risk, HQ_{LOAEL}<1

- Not calculated, bioavailability adjustment method was not developed for these analytes (EPA 2020).

When the doses are compared to the NOAEL-based TRVs, lead and HMW PAHs HQs exceed 1 in the Iona Island exposure area and antimony, cadmium, copper, lead, thallium, zinc, and HMW PAHs HQs exceed 1 in the Former Dump Area. When the doses are compared to the LOAEL-based TRVs, all HQs fall below 1 except for copper and lead in the Former Dump Area. Accounting for bioavailability based on soil parameters as discussed previously (i.e., assuming 41 percent bioavailability), HQs still exceed 1 for both copper and lead when compared to NOAEL and LOAEL-based TRVs, indicating that the lower bioavailability could not mitigate the potential for risk to terrestrial insectivorous mammals.

The shrew was a surrogate receptor for the Indiana bat (*Myotis sodalis*) and northern long-eared bat (*Myotis septentrionalis*), which are both federal and state-listed endangered species. There is uncertainty associated with the use of the short-tailed shrew as a surrogate for these species based on differences in size and life history (Section 2.1.6.1). Additional uncertainty exists regarding the models used to estimate soil invertebrate tissue concentrations as discussed in the preceding section. The short-tailed shrew is assumed to spend all its time at the site based on the published home range (EPA 1993), which is a conservative assumption given that the area is inundated twice daily, with previous studies suggesting that short-tailed shrews favor forested habitats over tidally inundated marshes (Ekernas and Mertes 2006). As such, risks based on exposure within the Former Dump Area to this receptor group may be overestimated. In addition, the endangered bat species for which the shrew was a surrogate receptor are unlikely to forage entirely in the Former Dump Area; thus, risks may be further overestimated. Despite this, the potential for population-level effects on this receptor group cannot be determined or ruled out without further site-specific ecological data; though effects may be possible based on exceedance of TRVs associated with effects on reproduction. Risk to both federal and state-listed endangered species of bats (Indiana bat (*Myotis sodalis*) and northern long-eared bat (*Myotis septentrionalis*)) is based upon a conservative exposure scenario for the surrogate receptor, the shrew and as such may be overestimated. However, to be conservatively protective, it is concluded there is potential risk to protected bat species from copper and lead at the Former Dump Area.

7.6 AE6: CARNIVOROUS MAMMALS

Potential risks to carnivorous mammals were evaluated using a food web model for red fox (**Table G-4**). Ingestion doses were calculated for each exposure area based on the 95UCL EPCs for surface soil (Iona Island) and surface and subsurface soil (Former Dump Area), which were also used to predict a concentration in small mammal tissue that would be consumed by fox. The dose from soil and dose from biota were summed to calculate a total dose, which was then compared to NOAEL and LOAEL-based TRVs to calculate an HQ. HQs greater than 1 indicate potential risk. None of the HQs exceeded the threshold of 1 so risk to carnivorous mammals is not expected.

7.7 AE7: CARNIVOROUS BIRDS

Potential risks to carnivorous birds were evaluated using a food web model for red-tailed hawk (**Table G-5 in Attachment G**). Ingestion doses were calculated for each exposure area based on the 95UCL EPCs for surface soil (Iona Island) and surface and subsurface soil (Former Dump Area), which were also used to predict a concentration in small mammal tissue that would be consumed by hawks. The dose from soil and dose from biota were summed to calculate a total dose, which was then compared to NOAEL and LOAEL-based TRVs to calculate an HQ. HQs greater than 1 indicate potential risk.

When the doses were compared to the NOAEL-based TRVs, HQs were less than 1 except for the HQ for lead which was 3. The HQ for lead dropped to 1 when the dose was compared to the LOAEL-based TRV. Consideration of soil physical parameters and the associated reduced bioavailability of constituents would reduce risk further. Based on the lack of exceedance of the LOAEL-based TRVs, risk to carnivorous birds is not expected. The red-tailed hawk was a surrogate species for the northern harrier (*Circus cyaneus*), a state-listed threatened species. Risk to this protected bird species is not expected.

7.8 AE8: HERPTILE POPULATIONS

As discussed above in Section 2.1.6.1, herptiles (i.e., reptiles and amphibians) were evaluated based on a qualitative evaluation using other receptors as surrogate species. For reptiles, potential risks are expected to be most similar to that of birds (Salice et al. 2009), but risks to any receptor could indicate potential risks to herptiles. This assumption is made due to the lack of toxicological and exposure information for herptiles. The RSLERA results and risk characterization for terrestrial species are presented above in Section 7.1 through 7.7, and the risk characterization for aquatic species are presented below in Sections 7.9 through 7.18.

There is potential risk to herptiles in the Former Dump Area due to copper and lead in the soil because of the potential risk to terrestrial insectivorous birds as well as terrestrial plants and soil invertebrates (copper only). There are also potential risks to herptiles due to chromium, mercury, and zinc due to risks to plants and/or soil invertebrates.

Since there were no COPECs identified in surface water or potential risks to other aquatic life, there are no anticipated risks to herptiles due to concentrations of COPECs in surface water. There is potential risk to aquatic insectivorous birds, aquatic plants, benthic invertebrates, demersal fish, and, therefore, herptiles due to lead in the sediment at the Iona Island Hudson River Shoreline. There are also risks to herptiles due to antimony, cadmium, nickel, and zinc in the sediment at Iona Island Hudson River Shoreline due to risks to aquatic plants, benthic invertebrates, and demersal fish.

Given that box and painted turtles have been recorded in the study area, it is possible that bog turtles, a federally threatened and state endangered species, could be present on site. However, of the areas with potential risks to herptiles, adequate habitat is likely not present. The Former Dump Area is densely vegetated with primarily *Phragmites australis*, an invasive species known to eliminate the microhabitats important to the bog turtle (NYDEC 2023c). Iona Island Hudson River Shoreline also does not feature the preferred habitat of the bog turtles (open wet meadows and boggy areas). Therefore, bog turtles are not likely to be found in these areas of potential risk, and risk is not expected to bog turtles.

Overall, using other receptors as surrogates for herptiles, potential risk was identified for this group at the Former Dump Area from chromium, copper, lead, mercury, and zinc. At the Iona Island Hudson River Shoreline, potential risk from antimony, cadmium, lead, nickel, and zinc was identified for herptiles based on exceedances for other receptors including birds and soil invertebrates.

7.9 AE9: AQUATIC PLANT COMMUNITY

As discussed above in 2.1.6.2 and 4.2.2, there are no sediment screening values protective of aquatic plants. Therefore, aquatic plants rooted in sediments were evaluated by comparing EPCs for sediment to refined sediment screening benchmarks. See **Table 7-3** for the refined HQs. The HQs for six metals at Iona Island Hudson River Shoreline (antimony, cadmium, copper, lead, nickel, and zinc) exceeded 1. Only zinc exceeded its RSV in the Riprap Drainage Swale with an HQ of 3. Zinc in this area may be attributed to the metal debris (e.g., rebar, old fencing, and other metal pieces) observed in the Riprap Drainage Swale. AVS/SEM results from the Riprap Drainage Swale indicate that metals in sediment are unlikely to be bioavailable; therefore, zinc is not expected to pose risk in the Riprap Drainage Swale exposure area. No concentrations of metals exceeded RSVs in the Tidal Wetland Swale. In addition, none of the concentrations of metals in any surface water samples exceeded surface water quality criteria in any area. Therefore, aquatic plants are not at risk in the Riprap Drainage Swale or the Tidal Wetland Swale.

As discussed below in Section 7.10, metals in sediments are bioavailable at the Iona Island Hudson River Shoreline based on AVS/SEM results and low TOC content. Despite the low concentrations in surface water, due to the exceedance of the RSVs and bioavailability of metals, risk to aquatic plants from antimony, cadmium, copper, lead, nickel, and zinc in sediment is possible at the 0.5-acre Iona Island Hudson River Shoreline exposure area.

7.10 AE10: BENTHIC INVERTEBRATE COMMUNITY

The refined sediment screen for benthos using RSVs is provided in **Table 7-3**. When the sediment EPCs for each aquatic DU (Iona Island Hudson River Shoreline, Riprap Drainage Swale, and Tidal Wetland Swale) were compared to the RSVs, the following COPECs had HQs greater than 1:

Insert 7-5. Risk Characterization for Benthic Invertebrates.

Receptor	Exposure Area	COPEC	HQ	Risk Characterization Conclusions
Benthic Invertebrates	Iona Island Hudson River Shoreline	Antimony	5	Potential for risk
		Cadmium	2	Potential for risk
		Copper	68	Potential for risk
		Lead	147	Potential for risk
		Nickel	3	Potential for risk
		Zinc	9	Potential for risk
	Riprap Drainage Swale	Zinc	3	No risk due to AVS/SEM results

None of the COPECs in the Tidal Wetland Swale had HQs greater than 1. Only one COPEC, zinc, has an HQ greater than 1 in the Riprap Drainage Swale. Zinc in this area may be attributed to the metal debris (e.g., rebar, old fencing, and other metal pieces) observed in the drainage swale. AVS/SEM results from the Riprap Drainage Swale are less than 130 µmol/g_{oc}, which indicates that the metals in sediment are unlikely to be bioavailable; therefore, zinc is not expected to pose risk to benthic invertebrates in the Riprap Drainage Swale exposure area.

At Iona Island Hudson River Shoreline, AVS/SEM results combined with low TOC content and sandy sediments indicate that the area provides suitable conditions for metals in sediment to be bioavailable. During the Shoreline Reconnaissance, benthic organisms were observed beneath large boulders and riprap along the shoreline, but none were observed within the river shoreline sediments during sampling. The area is primarily gravel, riprap, and course-grained sand with the exception of pockets of deposited sediment (EA 2020); thus, limited habitat may be present for benthic invertebrates. A benthic community assessment on the Hudson River Shoreline sediments would need to be completed in order to confirm the lack of benthos and lack of suitable habitat. The lack of observed benthic organisms in the sediment could also be an indicator that concentrations of COPECs in the sediment are contributing to benthic organism toxicity.

This exposure area is spatially limited to one-half acre, immediately adjacent to the Former Dump Area. Just beyond this shallow shelf, river bathymetry indicates a steep slope leading to a deep river channel. Concentrations of metals in surface water are low, indicating dilution from the Hudson River current or that metals are not desorbing from sediment particles and are not dissolving into surface water at concentrations that would cause adverse effects

Due to the exceedance of the RSVs and bioavailability of metals, risk to benthic invertebrates from antimony, cadmium, copper, lead, nickel, and zinc in sediment is possible.

7.11 AE11: ZOOPLANKTON COMMUNITY

Zooplankton were evaluated by comparing surface water concentrations to freshwater surface water quality criteria. There were no exceedances of any water quality criteria; therefore, risks to the zooplankton community are not expected.

7.12 AE12: DEMERSAL FISH COMMUNITY

Demersal fish (i.e., benthic-feeding fish) were evaluated by comparing EPCs for sediment to RSVs and by comparing surface water concentrations to water quality criteria. There were no exceedances of any water quality criteria. The HQs for six metals in sediment at Iona Island Hudson River Shoreline (antimony, cadmium, copper, lead, nickel, and zinc) exceeded 1. As highlighted above, the AVS/SEMs results coupled with sandy sediments and low organic carbon at Iona Island Hudson River Shoreline suggest that metals may be bioavailable.

Evaluating risk to demersal fish from the drainage swales may be a conservative evaluation as the areas may be dry for at least part of the year. However, aerial images show drainage swales connecting to water (Figure 3-3). With the available information, use of the drainage swales by these receptors cannot be dismissed. Only zinc exceeded its RSV in the Riprap Drainage Swale with an HQ of 3. Zinc in this area may be attributed to the metal debris (e.g., rebar, old fencing, and other metal pieces) observed in the drainage swale. AVS/SEM results from the Riprap Drainage Swale indicate that metals in sediment are unlikely to be bioavailable; therefore, zinc is not expected to pose risk in the Riprap Drainage Swale exposure area. No concentrations of metals exceeded RSVs in the Tidal Wetland Swale. Therefore, demersal fish are not at risk in the Riprap Drainage Swale or the Tidal Wetland Swale.

Demersal fish will not use the Former Dump Area as habitat. Thus, the Former Dump Area is not evaluated as an exposure area for this receptor. As previously mentioned, the small shelf area at Iona Island Hudson River Shoreline adjacent to the Former Dump Area is lined with boulders and riprap. Beyond the rocky shoreline, sandy sediments that lack organic matter are prevalent. As a result, there may be a lack of sufficient habitat for infaunal benthic invertebrate communities and aquatic plants. Without this base of the food web for foraging and sufficient habitat for spawning, small benthic-feeding fish (i.e., demersal fish) are also unlikely to inhabit this area, minimizing the potential for exposure and risk in these receptor groups.

Concentrations of metals in surface water are low, indicating dilution from the Hudson River current or that metals are not desorbing from sediment particles and are not dissolving into surface water at concentrations that would cause adverse effects. As discussed above in Section 7.10, metals in sediments are bioavailable based on AVS/SEM results and low TOC content. Due to the exceedance of the RSVs and bioavailability of metals, risk to demersal fish from antimony, cadmium, copper, lead, nickel, and zinc in sediment is possible.

The endangered Atlantic sturgeon and shortnose sturgeon are demersal fish. Atlantic sturgeon migrate up the Hudson River from the Atlantic beginning in April for reproduction and migrate back to the ocean in the late summer through fall (NOAA 2023a, New York Heritage Program

2023a). Shortnose sturgeon spawn in the Hudson River using large rocky substrate (New York Heritage Program 2023b), which is found at the littoral zone of the Iona Island Hudson River Shoreline. Juvenile shortnose sturgeon may remain at the saltfront during maturation. Within the Hudson River the saltfront is dynamic and is identified by specific conductance at 500 µS cm^{-1}. The United States Geological Survey defines the saltfront and provides daily and historical measurements of the river as supported by the Hudson River Saltfront Data and Project (https://ny.water.usgs.gov/projects/dialerplots/saltfront.html).

Juvenile Atlantic sturgeon have been harvested near and south of Iona (Peterson et al. 2000; Sweka 2007) indicating they could be present at the Iona Island Hudson River Shoreline. Adult sturgeon are likely to be transient in nature and thus risks to that lifestage may be limited; however, juvenile sturgeon could be at risk due to lead in the sediment at Iona Island Hudson River Shoreline.

7.13 AE13: PELAGIC FISH COMMUNITY

Pelagic fish inhabit the water column. They were evaluated by comparing surface water concentrations to water quality criteria. There were no exceedances of any water quality criteria; therefore, risks to the pelagic fish community are not expected.

7.14 AE14: AQUATIC HERBIVOROUS BIRDS

Potential risks to herbivorous birds were evaluated using a food web model for mallard duck (**Table G-6**). Ingestion doses were calculated for each aquatic DU (Iona Island Hudson River Shoreline, Riprap Drainage Swale, and Tidal Wetland Swale) based on the EPC in sediment, which was also used to predict a concentration in plant tissue that would be consumed by ducks. The dose from sediment and the dose from biota were summed to calculate a total dose, which was then compared to NOAEL and LOAEL-based TRVs to calculate an HQ. Mallard duck has a large habitat/foraging range (1,075 acres) and, therefore, the AUF was adjusted to account for the expected proportion of time the species would spend in 0.5-acre DUs. HQs greater than 1 indicate potential risk. None of the constituents in any DU had NOAEL or LOAEL-based HQs greater than 1; therefore, risks to aquatic herbivorous birds are not expected.

7.15 AE15: AQUATIC HERBIVOROUS MAMMALS

Potential risks to herbivorous mammals were evaluated using a food web model for muskrat (**Table G-7**). Ingestion doses were calculated for each aquatic DU (Iona Island Hudson River Shoreline, Riprap Drainage Swale, and Tidal Wetland Swale) based on the EPC in sediment, which was also used to predict a concentration in plant tissue that would be consumed by muskrat. In addition, muskrat was evaluated in the Former Dump Area (DUs 17,18, and 19) because this area is frequently inundated and contains an abundance of *Phragmites australis*, which could be consumed by muskrat (**Table G-8**). Ingestion doses were calculated for the Former Dump Area based on the soil EPC, which was also used to predict concentrations in plant tissue.

The dose from sediment/soil and the dose from biota were summed to calculate a total dose, which was then compared to NOAEL and LOAEL-based TRVs to calculate an HQ. HQs greater than 1

indicate potential risk. None of the constituents in the Riprap Drainage Swale, Tidal Wetland Swale, or the Former Dump Area had NOAEL or LOAEL-based HQs greater than 1; therefore, there is no potential risk to herbivorous mammals. The HQs (HQ_{NOAEL} and HQ_{LOAEL}) as well as risk characterization conclusions for all COPECs in exceedance of the NOAEL-based TRV at Iona Island Hudson River Shoreline for aquatic herbivorous mammals are presented in the following table.

Insert 7-6. Risk Characterization for Aquatic Herbivorous Mammals.

Receptor	Exposure Area	COPEC	HQ_{NOAEL}	HQ_{LOAEL}	Risk Characterization Conclusions
Aquatic herbivorous mammals (muskrat)	Iona Island Hudson River Shoreline	Antimony	5	<1	No risk, HQ_{LOAEL}<1
		Copper	2	1	No risk, HQ_{LOAEL}≤1
		Lead	4	2	No risk due to low HQ and habitat considerations

When the doses from Iona Island Hudson River Shoreline are compared to the NOAEL-based TRVs, antimony, copper, and lead, exceed 1. When the doses are compared to the LOAEL-based TRVs, the HQ for antimony falls below 1, and to a value of 1 for copper. Therefore, risk to aquatic herbivorous mammals is not expected due to antimony and copper in sediment.

The shoreline area consists of sandy sediment and lacks aquatic vegetation due to the high-energy environment, which is subject to scouring. It is unlikely that muskrat would spend 100 percent of its time in this area (as the food web models assume due to a relatively small range of 0.33 acre) when there are areas such as the Former Dump Area with vegetation nearby. Habitat suitability studies have shown that muskrat burrows and foraging are positively related to aquatic vegetation coverage, with muskrat occupancy also negatively related to percent sand in soil (Cotner and Schooley 2011; Nadeau et al. 1995). Taking this into account with the relatively low HQs based on comparison to the LOAEL-based TRV (HQ of 2), risk to aquatic herbivorous mammals from lead is not expected.

7.16 AE16: AQUATIC INSECTIVOROUS BIRDS

Potential risks to insectivorous birds were evaluated using a food web model for lesser scaup (**Table G-9 in Attachment G**). Ingestion doses were calculated for each aquatic DU (Iona Island Hudson River Shoreline, Riprap Drainage Swale, and Tidal Wetland Swale) based on the EPC in sediment, which was also used to predict a concentration in invertebrate tissue that would be consumed by scaup. The dose from sediment and the dose from biota were summed to calculate a total dose, which was then compared to NOAEL and LOAEL-based TRVs to calculate an HQ. Lesser scaup has a large habitat/foraging range (219 acres) and, therefore, the AUF was adjusted to account for the expected proportion of time the species would spend in 0.5-acre DUs.

HQs greater than 1 indicate potential risk. When the doses were compared to the NOAEL-based TRVs, HQs were less than 1 except for the HQ for lead at Iona Island Hudson River Shoreline only which was 6. The HQ for lead dropped to 3 when the dose was compared to the LOAEL-based TRV. Based on the exceedance of the LOAEL-based TRV, there is potential for risk to

insectivorous birds due to lead at the Iona Island Hudson River Shoreline. As highlighted above in Section 7.15, AVS/SEM results, low TOC content, and sandy sediments indicate that the area provides conditions for metals in sediment to be bioavailable. Thus, it is concluded that potential risks to aquatic insectivorous birds may be present. The HQs (HQ_{NOAEL} and HQ_{LOAEL}) as well as risk characterization conclusions for lead at Iona Island Hudson River Shoreline for aquatic insectivorous birds are presented in the following table.

Insert 7-7. Risk Characterization for Aquatic Insectivorous Birds.

Receptor	Exposure Area	COPEC	HQ_{NOAEL}	HQ_{LOAEL}	Risk Characterization Conclusions
Aquatic insectivorous birds (lesser scaup)	Iona Island Hudson River Shoreline	Lead	6	3	Potential for risk

The lesser scaup was selected as a surrogate receptor for the pied-billed grebe, a protected species that prefers wetland habitats with both open water and aquatic vegetation cover available. The Iona Island Hudson River Shoreline does not provide suitable habitat for the species. Therefore, the pied-billed grebe is not likely to use the exposure area for nesting and foraging and is unlikely to be at risk due to lead in sediment.

As highlighted previously, effects at the population-level cannot be determined based on the magnitude of HQ exceedances, though effects at this level are considered possible based on the exceedances of TRVs derived from studies of reproductive effects. Additional data collection and modeling approaches would be necessary to fully elucidate the potential for population-level effects on aquatic insectivorous birds at the Iona Island Hudson River Shoreline.

7.17 AE17: PISCIVOROUS MAMMALS

Potential risks to piscivorous mammals were evaluated using a food web model for river otter (**Table G-10 in Attachment G**). Ingestion doses were calculated for the site based on the EPC in sediment for each aquatic DU (Iona Island Hudson River Shoreline, Riprap Drainage Swale, and Tidal Wetland Swale). Concentrations in fish tissue were calculated using surface water concentrations and BCFs. The dose from sediment and the dose from biota were summed to calculate a total dose, which was then compared to NOAEL and LOAEL-based TRVs to calculate an HQ. River otter have a large habitat/foraging range (859 acres) and, therefore, the AUF was adjusted to account for the expected proportion of time the species would spend in 0.5-acre DUs. HQs greater than 1 indicate potential risk. None of the HQs exceeded the threshold of 1; therefore, risk to piscivorous mammals is not expected.

7.18 AE18: PISCIVOROUS BIRDS

Potential risks to piscivorous birds were evaluated using a food web model for great blue heron (**Table G-11 in Attachment G**). Ingestion doses were calculated for the site based on the EPC in sediment for each aquatic DU (Iona Island Hudson River Shoreline, Riprap Drainage Swale, and

Tidal Wetland Swale). Concentrations in fish tissue were calculated using surface water concentrations and BCFs. The dose from sediment and the dose from biota were summed to calculate a total dose, which was then compared to NOAEL and LOAEL-based TRVs to calculate an HQ. Great blue heron habitat/foraging range is expected to be approximately 11 acres and, therefore, the AUF was adjusted to account for the expected proportion of time the species would spend in 0.5-acre DUs. HQs greater than 1 indicate potential risk. None of the HQs exceeded the threshold of 1; therefore, risk to piscivorous birds is not expected.

The great blue heron was selected as a surrogate receptor for the following protected species: least bittern, bald eagle, and osprey. Since no risks to piscivorous birds are expected, no risks to the protected species are expected.

7.19 SUMMARY AND CONCENTRATION COMPARISONS

Potential risk identified is limited to the Former Dump Area and Iona Island Hudson River Shoreline exposure areas. In contrast to the size of Iona Island (approximately 125 acres), the exposure areas are small. In the Former Dump Area, risk is generally limited to two of three of the 1-acre DUs (DU-17 and DU-18), so risk is limited to a total area of about two acres. Given the size of the area, it is unlikely that populations of receptors will spend all their time inhabiting or foraging only in these DUs. Site characteristics at the Former Dump Area including inundation and dense stands of *Phragmites* may reduce foraging for soil invertebrates by receptors which is assumed in the food web models. However, review of the literature found that receptors that have been recorded on site may favor the use of *Phragmites* dominated habitat (Benoit and Askins 1999; Whyte et al. 2015); thus, occupancy and foraging at the Former Dump Area is possible.

Even with the consideration of the low bioavailability of metals in the soil as discussed in Section 7, concentrations of COPECs in the soil indicate potential risk to ecological receptors. For perspective of the magnitude of metal concentrations in the Former Dump Area, the table below presents the comparison of 95UCL background concentrations (Table C-2), the Former Dump Area EPC used in the food web models (Attachment G), and the range of EPCs for DU-17 and DU-18 used in the SLERA (Table 4-4). Maximum EPCs from DU-17 and DU-18 range from approximately 15 (chromium and mercury) to over 200 times (copper) the 95UCL background concentrations.

Insert 7-8. Comparison of Background and Dump Area Soil Concentrations.

COPEC	95UCL Soil Background Concentration (mg/kg)	Former Dump Area EPC used in ERA (Combined surface and subsurface soil from DU-17, DU-18, and DU-19) (mg/kg)	Range of DU-17 and DU-18 surface and subsurface soil EPCs used in SLERA (mg/kg)
Chromium	30	82	14 – 411
Copper	28	1,538	219 – 6070
Lead	82	1,825	1,580 – 4,150
Mercury	0.35	1.7	1 – 6.33
Zinc	69	3,413	3,520 – 10,200

The Iona Island Hudson River Shoreline exposure area is approximately half an acre. The range of the mean background sediment concentrations from Con Hook Marsh Shoreline and Con Hook Hudson River Shoreline (Table D-2) are presented with the Iona Island Hudson River Shoreline EPCs (Table 4-5) in the table below. EPCs from Iona Island Hudson River Shoreline range from 5 (nickel) to 330 times (lead) the 95UCL background concentrations.

Insert 7-9. Comparison of Background and Iona Island Sediment Concentrations.

COPEC	Range of 95UCL Background Sediment Concentrations (mg/kg)	Iona Island Hudson River Shoreline EPC (mg/kg)
Antimony	0.63 – 1.1	123
Cadmium	0.80 – 1.3	9.86
Copper	38 – 50	10,100
Lead	57 – 67	18,800
Nickel	29 – 38	140
Zinc	155 – 176	3,930

The potential for risk following exposure to the metals noted above is demonstrated both quantitatively and qualitatively using multiple lines of evidence; however, elevated concentrations do not necessarily indicate risk to populations. There are a number of uncertainties inherent in the assessment of risks that should be considered in interpretation of results. One of the greatest uncertainties inherent to risk assessment is the assumption that effects on individuals, as indicated by benchmark exceedances, are indicative of population-level effects. For wildlife, the LOAEL-based TRVs are derived in part from studies focusing on reproductive effects (EPA 2005g, 2007c); thus, it is reasonable to assume that exceedance of these levels could indicate a reduction in reproductive output and subsequent population-level impacts on these receptors due to copper and lead exposures. However, based on the available information, population-level impacts could not be confirmed.

8. REFINED SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT CONCLUSIONS

The ERA evaluated both terrestrial and aquatic receptors. After the completion of the SLERA, only those receptors potentially at risk were evaluated using a site-specific RSLERA.

The terrestrial exposure areas were: 1) Iona Island Exposure Area; and 2) Former Dump Exposure Area. Representative terrestrial receptor categories included plants, soil invertebrates, herbivorous mammals (representative species meadow vole), insectivorous birds (representative species American robin), insectivorous mammals (representative species short-tailed shrew), carnivorous birds (representative species red tailed hawk), carnivorous mammals (representative species red fox), and herptiles.

The aquatic exposure areas were: 1) Iona Island Hudson Shoreline; 2) riprap drainage swale; and 3) tidal wetland swale. Representative aquatic receptor categories included plants, benthic invertebrates, zooplankton, demersal fish, pelagic fish, herbivorous birds (representative species mallard duck), herbivorous mammals (representative species muskrat), insectivorous birds (representative species lesser scaup), piscivorous mammals (representative species river otter) piscivorous birds (representative species great blue heron), and herptiles.

No receptors were found to be at risk in the terrestrial Iona Island exposure area, which does not include the Former Dump Area. These risk findings apply also to two federal/state-listed species of bats (i.e. Indiana bat, northern long-eared bat) and two state listed species of insectivorous birds (i.e. cerulean warbler and golden-winged warbler). No risks to aquatic receptors were found in the riprap drainage swale or the tidal wetland swale exposure areas.

In the Former Dump Area soil exposure area, plants, soil invertebrates, insectivorous mammals, insectivorous birds, and herptiles are potentially at risk from metals (chromium, copper, lead, mercury, and/or zinc), with risk being driven by avian exposure to lead. This risk potentially extends to two federal/state-listed species of bats (i.e. Indiana bat, northern long-eared bat) and two species of insectivorous birds which are New York State listed species of special concern (i.e. cerulean warbler and golden-winged warbler). In the Iona Island Hudson Shoreline sediment exposure area, plants, benthic invertebrates, demersal fish, herptiles and insectivorous birds are potentially at risk from metals (antimony, cadmium, copper, lead, nickel and zinc), with risk being driven by exposure to lead. This risk from sediment potentially extends to two species of endangered demersal fish (juvenile sturgeon) (i.e. Atlantic sturgeon, short-nosed sturgeon).

Risk from soil in the Former Dump Area is mitigated for common species by the small spatial extent of the area (< 2 acres), dense phragmites stands and twice daily inundation during tidal cycles; population level effects are unlikely from soils in this area. Similarly, population level risk is unlikely for common species due to the small extent of sediment in shoreline areas immediately adjacent to the Former Dump Area. The attenuation of risk these factors is not as clear for the two listed bats species, two listed bird species and two endangered fish species (listed because of preferred riverine habitat by the Former Dump Area for a juvenile life stage), as value is put on a single individual in these instances.

Insert 8-1. Summary of Risk Characterization for All Receptors.

Habitat Type	Exposure Area	Media	COPEC	Receptors
Terrestrial	Iona Island	No receptors are at risk due to COPECs in soil.		
	Former Dump Area	Soil (surface and subsurface)	Chromium	• Terrestrial plants • Soil invertebrates • Herptiles
			Copper	• Terrestrial plants • Soil invertebrates • Terrestrial Insectivorous Birds (including 2 NY species of special concern) • Terrestrial Insectivorous Mammals (including 2 federal and state-listed endangered bat species) • Herptiles
			Lead	• Terrestrial plants • Terrestrial Insectivorous Birds (including 2 NY species of special concern) • Terrestrial Insectivorous Mammals (including 2 federal and state-listed endangered bat species) • Herptiles
			Mercury	• Terrestrial plants • Soil invertebrates • Herptiles
			Zinc	• Terrestrial plants • Soil invertebrates • Herptiles
Aquatic	Iona Island Hudson Shoreline	Sediment	Antimony, Cadmium, Copper, Lead, Nickel, and Zinc	• Aquatic plants • Benthic invertebrates • Demersal fish (including 2 species of endangered sturgeon) • Herptiles
			Lead	• Aquatic insectivorous birds
	Riprap Drainage Swale	No receptors are at risk due to COPECs in surface water or sediment.		
	Tidal Wetland Swale	No receptors are at risk due to COPECs in surface water or sediment.		

The purpose of the RSLERA was to incorporate easily obtained site specific information to refine the ecological risk evaluation. With the introduction of these sub-tiers of evaluation, the SLERA was refined to provide fewer generic conclusions of ecological risk; however, even with these refinements, hazard calculations show potentially significantly greater risks in this isolated area due to the presence of federal/state-listed or endangered species in the Former Dump Area. These species include two federal/state-listed species of bats (i.e. Indiana bat, northern long-eared bat) and state listed/Special Concern avian species (cerulean warbler and golden-winged warbler), as well as two endangered species of fish (shortnose sturgeon and Atlantic sturgeon) potentially

exposed to sediments at the waterline in front of the Former Dump Area along the shoreline of Iona Island on the Hudson River.

The risk conclusions of the SLERA/RSLERA after these sub-tiers of evaluation show that potential risks are confined to a small area of the site with a sharply defined lateral extent of contamination due to island topography and the Hudson River, as well as a sharply defined vertical extent of contamination due to bedrock at approximately three (3) ft bgs based on test pitting and shoreline bathymetric data. Size notwithstanding, based upon current nature and extent information, the Former Dump Area represents on-going source area due to the presence of ash from the former on-site incinerator, as encountered during test pitting.

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Figures

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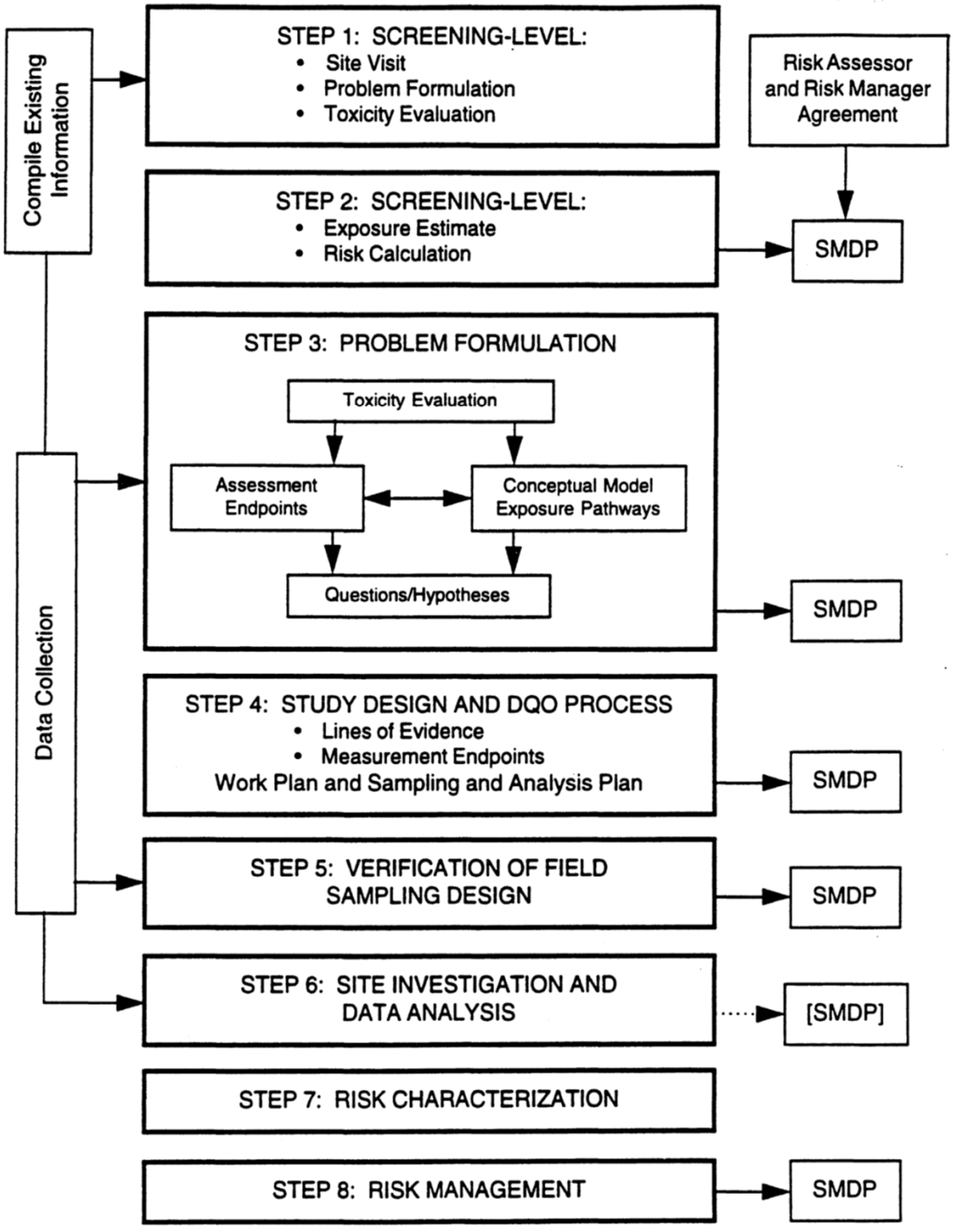
Figure 1-1. EPA's 8-Step Ecological Risk Assessment Process



SMDP = Scientific Management Decision Point

VICINITY MAP

Legend

- FUDS Boundary
- Bear Mountain State Park Boundary (NYS Office of Parks, Recreation & Historic Preservation, 2018)

0 0.5 1
Miles
1 in = 1 miles

N

FIGURE 2-1
Site Location
HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Basemap: ESRI World Street Map - ArcGIS Online Map Service (ESRI 2009).
DEM: 2012, Photo Science, Inc., Coastal New York LiDAR (Hydro Flattened Raster DEM), 1-Meter Resolution, New York State GIS
Map Date: 9/19/2022

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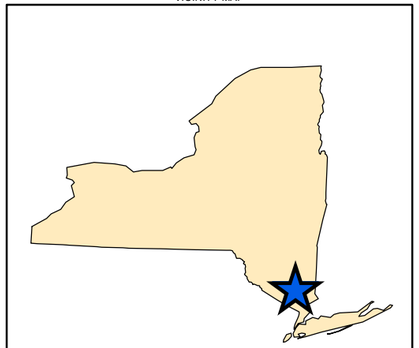
HTRW Areas of Concern		
AOC #	**Building(s)/Area**	**Historical Use**
1	Former Building 103	Paint and Oil Storage
2	Former Building 121	Incinerator
3	Former Building 123	Garage Building
4	Former Buildings 124 to 128	Sewage Disposal Plant (and Suspected Outfall)
5	Former Building 207	Marine Garage Building
6	Former Building 213	Paint Locker for Building 202
7	Former Building 215	Garage Building
8	Former Building 219	Garage Building
9	Former Building 220	Garage Building
10	Former Building 406	Tin, Electrical and Annealing Shop Building
11	Former Building 407	Paint Shop and Pipe Shop
12	Former Building 410	Power House
13	Area A	One Former Fuel Oil AST (2,500 gallons) located near Former Building 233
14	Area B	One Former Fuel Oil AST (size unknown) located near Dock 131
15	Area C	Two Former Fuel Oil ASTs (size unknown) located near Former Building 417
16	Area D	Dumping Area
17	Area E	Former Coal Trestle and Storage Area – located near Former Building 410
18	Area F	Former Coal Storage Area – located near Former Building 215
19	Transformers 1, 2, 3	Three Former Transformers
Former Buildings with Significant Potential for Explosive Hazard		
Building		**Historical Use**
Former Building 609		Mine Loading Plant
Former Building 506		Filling House #3 (Bombproof)
Former Building 503		Filling House #6
Former Building 404		Filling House #1
Former Building 307		Filling House #5
Former Building 306		Filling House #2
Former Building 202		Shell House #5 & D Plant

VICINITY MAP



Legend

- FUDS Boundary
- HTRW Project Areas of Concern
- FormerTransformers
- Former Buildings with Significant Potential for Explosive Hazard (Included in the HTRW RI pending a contract modification)
- Disturbed Ground/Fill Area

Wetland Type

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland

0 300 600
Feet

1 in = 300 ft

N

Area between Iona Island and Round Island along Hudson River was filled during Navy use (Dumping Area)

Western shoreline area between Iona Island and Round Island was filled by PIPC following transfer of the FUDS from the Navy in 1965.

FIGURE 2-2
Wetland Resources

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial: EA Engineering, Science, and Technology. April, 7 2020
Wetlands: U.S. Fish and Wildlife Services National Wetlands Inventory Mapper 2018.

Map Date: 9/1/2020

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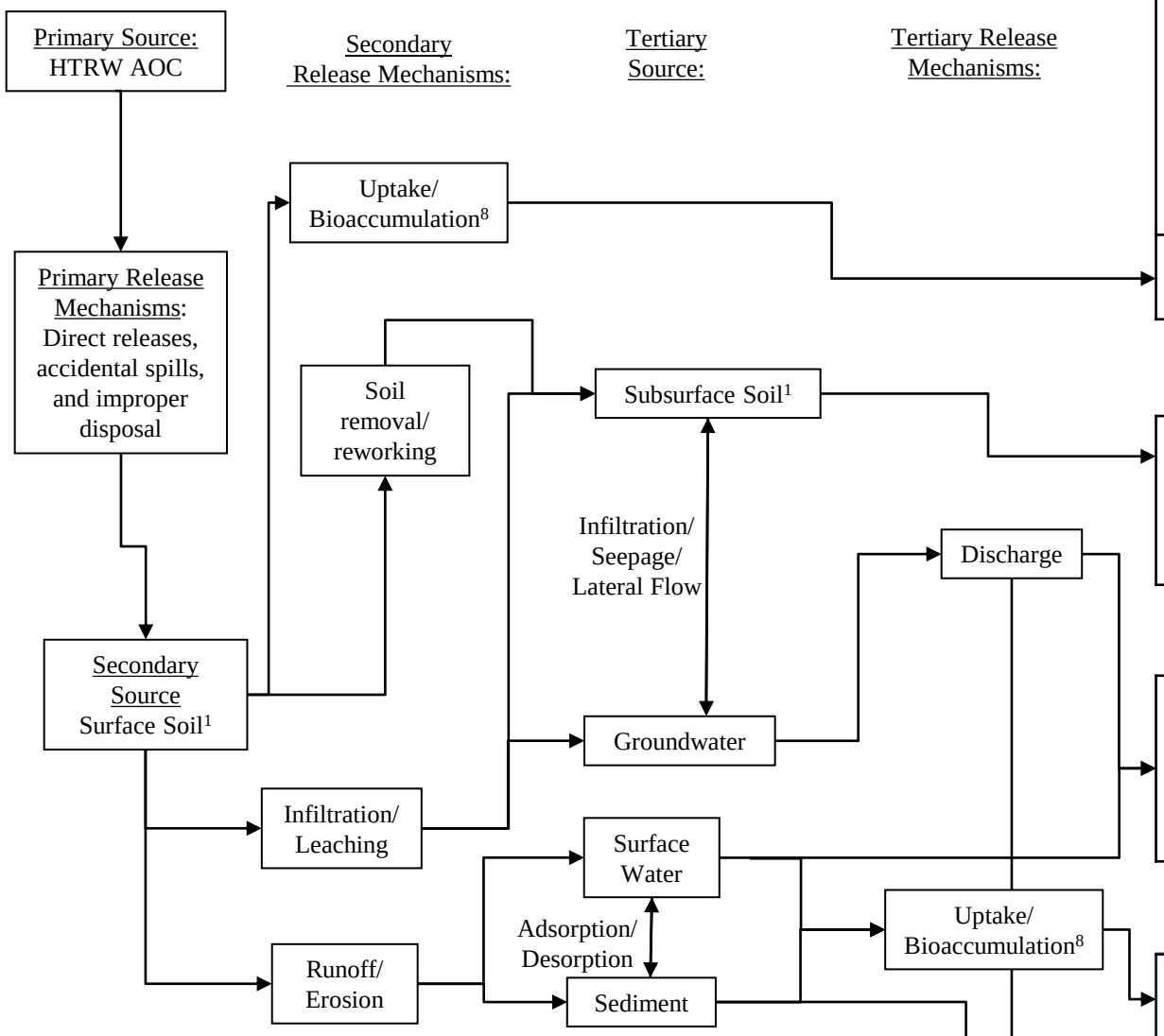


Exposure Media[2]:	Exposure Routes[3]:	Terrestrial Plants	Soil Invertebrates	Terrestrial Birds and Mammals[4,5]	Herptiles[6]	Aquatic Plants	Benthic Invertebrates	Zooplankton	Demersal Fish	Pelagic Fish	Aquatic Birds and Mammals[4,7]
Terrestrial Biota[9]	Ingestion	○	○	●	●	○	○	○	○	○	○
Surface and Subsurface Soil[1]	Ingestion	○	●	●	●	○	○	○	○	○	◐
	Direct Contact	●	●	◐	●	○	○	○	○	○	◐
Surface Water	Ingestion	○	○	◐	◐	○	◐	●	●	●	◐
	Direct Contact	○	○	◐	●	◐	◐	●	●	●	◐
Aquatic Biota[10]	Ingestion	○	○	○	●	○	○	○	◐	◐	●
Sediment	Ingestion	○	○	○	●	○	●	○	●	◐	●
	Direct Contact	○	○	○	●	●	●	○	●	◐	◐

NOTES

1. Surface soil = 0 to 6 inches below ground surface, and subsurface soil = 6 to 36 inches below ground surface. Surface and subsurface soil are normally considered separately. Since the surface soil layer is so shallow the two were grouped together in the evaluation of areas where subsurface soil was collected.
2. Groundwater exposure is not complete for any ecological receptors and is not shown as exposure media in the CSM. Exposure to porewater for aquatic plants and benthic invertebrates is a complete pathway but since porewater was not sampled, it is not shown here for simplicity.
3. The inhalation pathway is complete but not significant compared to ingestion pathways (EPA 2007a) and, therefore, is not quantitatively evaluated in the ERA.
4. Direct contact pathways for mammals and birds is limited by fur and feathers and is considered in incidental soil ingestion during grooming.
5. Mammals such as voles, shrews, and foxes may be exposed to subsurface soil during burrowing activities.
6. Herptiles are evaluated qualitatively using other receptors as surrogate species due to the lack of ecotoxicity values for these receptors. Risks to any receptor could indicate potential risks to herptiles.
7. Aquatic birds and mammals may be exposed to soil when burrowing or foraging on the bank, but exposure to these receptors expected to be less than that captured by exposure to terrestrial birds and mammals. Primary abiotic media of concern to aquatic wildlife is sediment.
8. Only bioaccumulation directly into biota that will be consumed by a receptor is shown here for simplicity, though there can be several trophic levels.
9. Terrestrial biota identified as terrestrial plants, soil invertebrates, and small wildlife.
10. Aquatic biota identified as aquatic plants, benthic invertebrates, and demersal fish.

● Complete Pathway; confirmed receptor and media interaction (i.e., a source, migration route, and receptor have been identified). Exposure is evaluated quantitatively.

◑ Complete Pathway, but not Significant; There is confirmed receptor and media interaction. However, pathway is not significant and exposure is not evaluated quantitatively.

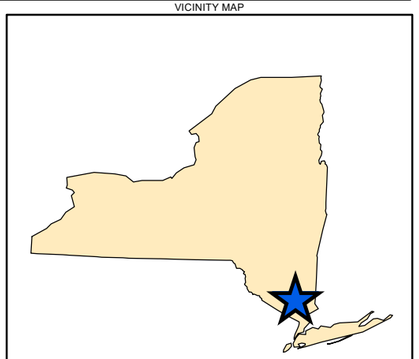
○ There is no receptor and media interaction. No evaluation is conducted.

Figure 2-3 Ecological Conceptual Site Model

Iona Island Naval Ammunition Depot Formerly Used Defense Site
Stony Point, Rockland County, New York

HTRW Areas of Concern		
AOC #	**Building(s)/Area**	**Historical Use**
1	Former Building 103	Paint and Oil Storage
2	Former Building 121	Incinerator
3	Former Building 123	Garage Building
4	Former Buildings 124 to 128	Sewage Disposal Plant (and Suspected Outfall)
5	Former Building 207	Marine Garage Building
6	Former Building 213	Paint Locker for Building 202
7	Former Building 215	Garage Building
8	Former Building 219	Garage Building
9	Former Building 220	Garage Building
10	Former Building 406	Tin, Electrical and Annealing Shop Building
11	Former Building 407	Paint Shop and Pipe Shop
12	Former Building 410	Power House
13	Area A	One Former Fuel Oil AST (2,500 gallons) located near Former Building 233
14	Area B	One Former Fuel Oil AST (size unknown) located near Dock 131
15	Area C	Two Former Fuel Oil ASTs (size unknown) located near Former Building 417
16	Area D	Dumping Area
17	Area E	Former Coal Trestle and Storage Area – located near Former Building 410
18	Area F	Former Coal Storage Area – located near Former Building 215
19	Transformers 1, 2, 3	Three Former Transformers
Existing Structures / Not FUDS Eligible		
Building		**Historical Use**
Building 201		Empty Projectile Magazine
Building 212		Former Marine Barracks
Building 217		Fire Station and Labor Office Building
Building 222		Miscellaneous Storage Building
Building 508		Bag Charge Magazine
Building 603		Pyrotechnic Magazine

VICINITY MAP



Legend

- FUDS Boundary
- HTRW Project Areas of Concern
- FormerTransformers
- Former Buildings with Significant Potential for Explosive Hazard (Included in the HTRW RI pending direction of contracting offer)
- Remaining Structure (Not FUDS Eligible)
- Previous Elevated Concentration of COPC (Greeley-Polhemus 1997 and Alion 2008)
- 1-Acre DU
- 60 x 60 ft DU
- Explosives Building DU

0 300 600
Feet
1 in = 300 ft

N

FIGURE 3-1
Phase I Soil Sampling Locations

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial: EA Engineering, Science, and Technology. April, 7 2020

Map Date: 9/22/2020

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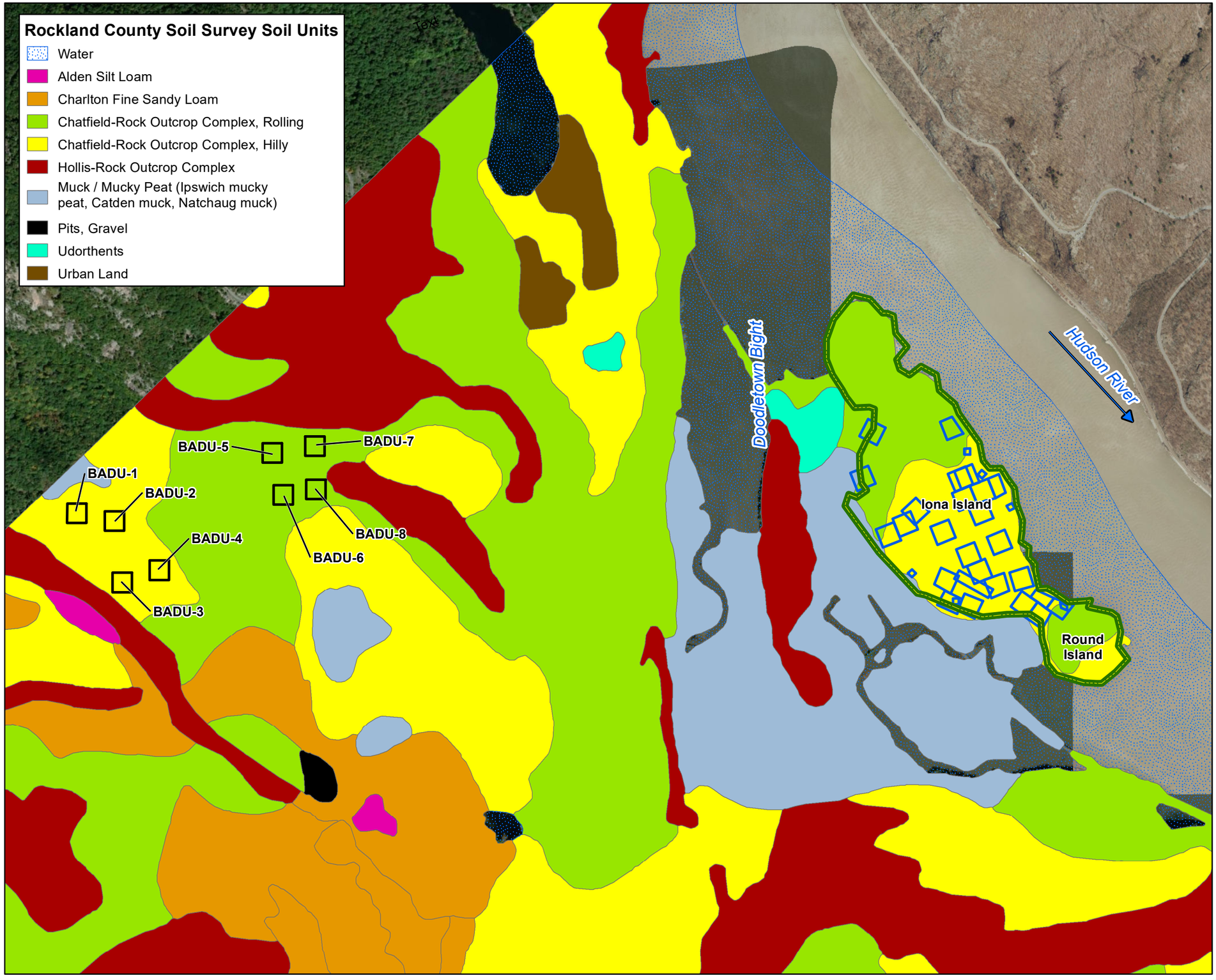

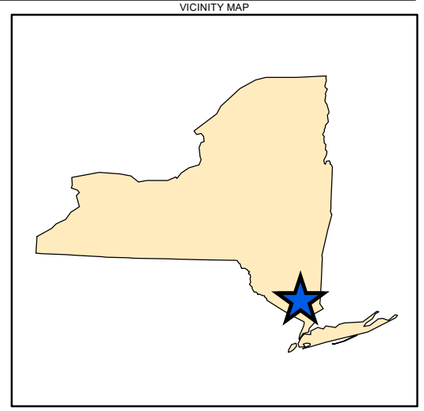

Legend

- FUDS Boundary
- Bear Mountain State Park 200x200 ft Surface and Subsurface Soil DU
- Onsite DU

0 1,000 2,000
Feet
1 in = 1,000 ft

N

FIGURE 3-2
Phase I Background Soil Sampling Locations

HAZARDOUS TOXIC AND RADIOACTIVE WASTE REMEDIAL INVESTIGATION REPORT

Sources
Aerial: October, 12, 2018. Maxar Technologies. ESRI ArcGIS Online Map Service.
Soil Units: USDA NRCS 2013

Map Date: 9/1/2020

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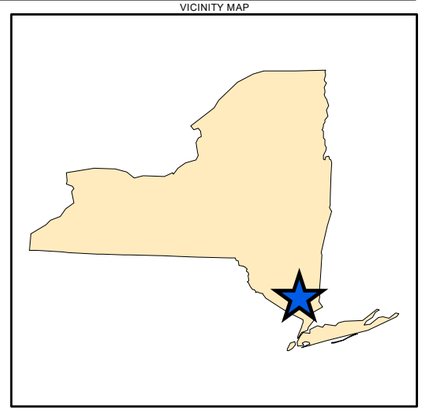
VICINITY MAP



Legend

- FUDS Boundary
- Phase I Former Building/Structure
- AOC #16 – Area D (former Dumping Area)
- Phase I Soil Decision Unit
- Upland
- Marsh/Wetland
- Surface Water Migration Pathway
- Phase II Sediment Decision Unit
- Surface Water Flow Direction

0 200 400
Feet
1 in = 220 ft

N

FIGURE 3-3
Phase II Sampling Locations

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REMEDIAL INVESTIGATION REPORT

Source
Aerial: EA Engineering, Science, and Technology. April, 7 2020
AOC Boundary: USAGC 2018
Upland and Marsh/Wetland: Cornell Cornell Institute
for Resource Information Sciences (IRIS) 2011

Map Date: 1/31/2022

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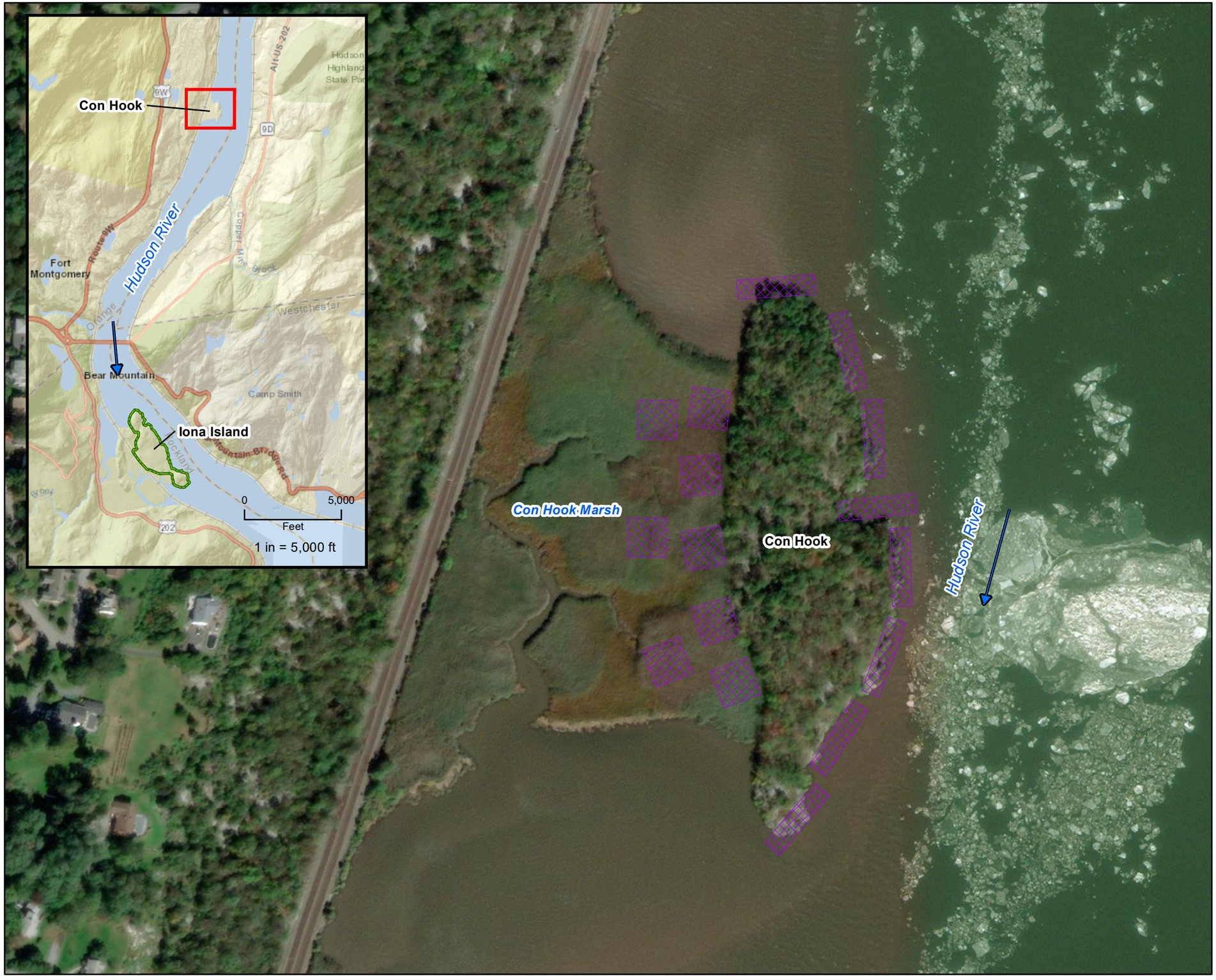
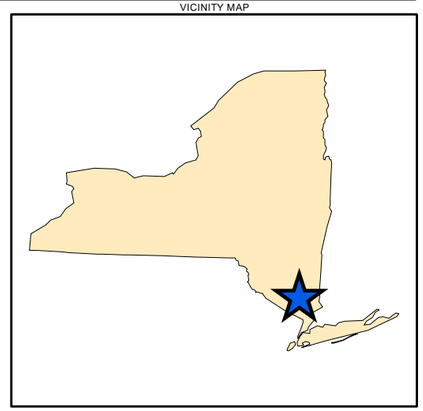


VICINITY MAP



Legend

- FUDS Boundary
- Phase II Background Sediment Sampling Unit
- Surface Water Flow Direction

FIGURE 3-4
Phase II Background Locations

HAZARDOUS TOXIC AND RADIOACTIVE WASTE
REEMEDIAL INVESTIGATION REPORT

Source
Aerial: ESRI ArcGIS Online Map Service (ESRI 2009a and b).
Inset Basemap: ESRI World Street Map - ArcGIS Online Map Service (ESRI 2009a).
Inset DEM: 2012, Photo Science, Inc., Coastal New York LiDAR (Hydro Flattened Raster DEM), 1-Meter Resolution, New York State GIS

Map Date: 1/31/2022

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Tables

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Table 2-1
Ecological Risk Assessment and Measurement Endpoints

Assessment Endpoint Number	Assessment Endpoints	Representative Receptors	Measurement Endpoints
AE1	Protection and maintenance (i.e., survival, growth, and reproduction) of terrestrial plant community from adverse effects to survival, growth, or reproduction from exposure to COPECs in soil	Terrestrial Plant community	Comparison of site soil EPCs to EcoSSLs protective of plants Comparison of site EPCs to BTVs for soil Evaluation of soil pH, TOC, and CEC to predict bioavailability potential of metals in soil
AE2	Protection and maintenance (i.e., survival, growth, and reproduction) of soil invertebrate community from adverse effects to survival, growth, or reproduction from exposure to COPECs in soil	Soil Invertebrate community	Comparison of site soil EPCs to EcoSSLs protective of soil invertebrates Comparison of site EPCs to BTVs for soil Evaluation of soil pH, TOC, and CEC to predict bioavailability potential of metals in soil
AE3	Protection and maintenance (i.e., survival, growth, and reproduction) of populations of herbivorous mammals, represented by meadow vole (*Microtus pennsylvanicus*), from exposure to COPECs in soil and biota (i.e., plant tissue)	Meadow vole	HQs calculated by comparing modeled food web doses using soil EPCs to TRVs for mammals Evaluation of soil pH, TOC, and CEC to predict bioavailability potential of metals in dietary items Biota tissue EPCs used in food web model calculated using plant BAFs
AE4	Protection and maintenance (i.e., survival, growth, and reproduction) of populations of insectivorous birds, represented by American robin (*Turdus migratorius*), from exposure to COPECs in soil and biota (i.e., earthworms)	American robin	HQs calculated by comparing modeled food web doses using soil EPCs to TRVs for birds Evaluation of soil pH, TOC, and CEC to predict bioavailability potential of metals in dietary items Biota tissue EPCs used in food web model calculated using soil invertebrate BAFs
AE5	Protection and maintenance (i.e., survival, growth, and reproduction) of populations of insectivorous mammals, represented by short-tailed shrew (*Blarina brevicauda*), from exposure to COPECs in soil and biota (i.e., earthworms)	Short-tailed shrew	HQs calculated by comparing modeled food web doses using soil EPCs to TRVs for mammals Evaluation of soil pH, TOC, and CEC to predict bioavailability potential of metals in dietary items Biota tissue EPCs used in food web model calculated using soil invertebrate BAFs
AE6	Protection and maintenance (i.e., survival, growth, and reproduction) of populations of carnivorous (predatory) mammals, represented by red fox (*Vulpes vulpes*), from exposure to COPECs in soil and biota (i.e., small mammal tissue)	Red fox	HQs calculated by comparing modeled food web doses using soil EPCs to TRVs for mammals Evaluation of soil pH, TOC, and CEC to predict bioavailability potential of metals in dietary items Biota tissue EPCs used in food web model calculated using small mammal BAFs
AE7	Protection and maintenance (i.e., survival, growth, and reproduction) of populations of carnivorous (predatory) birds, represented by red-tailed hawk (*Buteo jamaicensis*), from exposure to COPECs in soil and biota (i.e., small mammal tissue).	Red-tailed hawk	HQs calculated by comparing modeled food web doses using soil EPCs to TRVs for birds Evaluation of soil pH, TOC, and CEC to predict bioavailability potential of metals in dietary items Biota tissue EPCs used in food web model calculated using small mammal BAFs

Table 2-1
Ecological Risk Assessment and Measurement Endpoints

Assessment Endpoint Number	Assessment Endpoints	Representative Receptors	Measurement Endpoints
AE8	Protection of and maintenance (i.e., survival, growth, and reproduction) of populations of herptiles (amphibians and reptiles) from exposure to COPECs in soil, surface water, and sediment (qualitative evaluation due to minimal toxicological endpoints)	Herptile populations	Qualitative evaluation based upon: Amphibians: comparison of surface water EPCs to relevant screening values Reptiles: comparison of modeled food web doses for other receptors (i.e., birds) to TRVs. Evaluation of supplemental soil and sediment parameters to predict bioavailability potential of metals
AE9	Protection and maintenance (i.e., survival, growth, and reproduction) of aquatic plant community from exposure to COPECs in sediment and surface water	Aquatic plant community	Comparison of site sediment EPCs to effects level concentrations for benthos Comparison of surface water EPCs to site-specific freshwater chronic surface water quality criteria Evaluation of grain size, AVS/SEM, and TOC to predict bioavailability potential of metals in sediment
A10	Protection and maintenance (i.e., survival, growth, and reproduction) of benthic invertebrate community from COPECs in sediment	Benthic invertebrate community	Comparison of site sediment EPCs to effects level concentrations for benthos Comparison of site EPCs to BTVs for sediment Evaluation of grain size, AVS/SEM, and TOC to predict bioavailability potential of metals in sediment

Table 2-1
Ecological Risk Assessment and Measurement Endpoints

Assessment Endpoint Number	Assessment Endpoints	Representative Receptors	Measurement Endpoints
AE11	Protection and maintenance (i.e., survival, growth, and reproduction) of zooplankton community from exposure to COPECs in surface water	Zooplankton community	Comparison of surface water EPCs to site-specific freshwater chronic surface water quality criteria Comparison of site EPCs to BTVs for surface water
AE12	Protection and maintenance (i.e., survival, growth, and reproduction) of demersal fish community from exposure to COPECs in surface water and sediment	Demersal fish community	Comparison of surface water EPCs to site-specific freshwater chronic surface water quality criteria Comparison of site EPCs to BTVs for surface water
			Comparison of sediment EPCs to effects level concentrations for benthos Comparison of site EPCs to BTVs for sediment
AE13	Protection and maintenance (i.e., survival, growth, and reproduction) of pelagic fish community from exposure to COPECs in surface water	Pelagic fish community	Comparison of surface water EPCs to site-specific freshwater chronic surface water quality criteria
			Comparison of site EPCs to BTVs for surface water
AE14	Protection and maintenance (i.e., survival, growth, and reproduction) of populations of herbivorous birds, represented by mallard duck (*Anas platyrhynchos*), from exposure to COPECs in sediment and biota (i.e., plant tissue)	Mallard duck	HQs calculated by comparing modeled food web doses using sediment EPCs to TRVs for birds
			Biota tissue EPCs used in food web model calculated using plant BAFs
AE15	Protection and maintenance (i.e., survival, growth, and reproduction) of populations of herbivorous mammals, represented by muskrat (Ondatra zibethicus), from exposure to COPECs in sediment and biota (i.e., plant tissue)	Muskrat	HQs calculated by comparing modeled food web doses using sediment EPCs to TRVs for mammals
			Biota tissue EPCs used in food web model calculated using plant BAFs
AE16	Protection and maintenance (i.e., survival, growth, and reproduction) of populations of insectivorous birds, represented by lesser scaup (*Aythya affinis*), from exposure of COPECs in sediment and biota (i.e., benthic invertebrates)	Lesser scaup	HQs calculated by comparing modeled food web doses using sediment EPCs to TRVs for birds
			Biota tissue EPCs used in food web model calculated using BSAFs
AE17	Protection and maintenance (i.e., survival, growth, and reproduction) of populations of piscivorous mammals, represented by river otter (*Lontra canadensis*), from exposure to COPECs in sediment and biota (i.e., fish tissue)	River otter	HQs calculated by comparing modeled food web doses using sediment EPCs to TRVs for mammals
			Biota tissue (i.e., fish) EPCs used in food web model calculated using BCFs
AE18	Protection and maintenance (i.e., survival, growth, and reproduction) of populations of piscivorous birds, represented by great blue heron (*Ardea herodias*), from exposure to COPECs in sediment and biota (i.e., fish tissue)	Great blue heron	HQs calculated by comparing modeled food web doses using sediment EPCs to TRVs for birds
			Biota tissue (i.e., fish) EPCs used in food web model calculated using BCFs

NOTE:
AVS/SEM = acid volatile sulfides/simultaneously extracted metals
BAF = bioaccumulation factor
BCF = bioconcentration factor
BSAF = biota sediment accumulation factor
BTV= background threshold value
CEC = cation exchange capacity
COPEC = constituent of potential ecological concern
EcoSSL = ecological soil screening level
EPC = exposure point concentration
HQ = hazard quotient
TOC = total organic carbon
TRV = toxicity reference value

Table 4-1. Ecological Soil Screening Levels

Analyte	Ecological Soil Screening Levels (mg/kg)			
	Plants	Soil Invertebrates	Mammals	Birds
Acenaphthene	See LMW PAH	See LMW PAH	See LMW PAH	See LMW PAH
Acenaphthylene	See LMW PAH	See LMW PAH	See LMW PAH	See LMW PAH
Anthracene	See LMW PAH	See LMW PAH	See LMW PAH	See LMW PAH
Fluorene	See LMW PAH	See LMW PAH	See LMW PAH	See LMW PAH
1-Methylnaphthalene	See LMW PAH	See LMW PAH	See LMW PAH	See LMW PAH
2-Methylnaphthalene	See LMW PAH	See LMW PAH	See LMW PAH	See LMW PAH
Naphthalene	See LMW PAH	See LMW PAH	See LMW PAH	See LMW PAH
Phenanthrene	See LMW PAH	See LMW PAH	See LMW PAH	See LMW PAH
LMW PAH	20	29	100	3.4
Benzo(a)anthracene	See HMW PAH	See HMW PAH	See HMW PAH	See HMW PAH
Benzo(b)fluoranthene	See HMW PAH	See HMW PAH	See HMW PAH	See HMW PAH
Benzo(k)fluoranthene	See HMW PAH	See HMW PAH	See HMW PAH	See HMW PAH
Benzo(g,h,i)perylene	See HMW PAH	See HMW PAH	See HMW PAH	See HMW PAH
Benzo(a)pyrene	See HMW PAH	See HMW PAH	See HMW PAH	See HMW PAH
Chrysene	See HMW PAH	See HMW PAH	See HMW PAH	See HMW PAH
Dibenz(a,h)anthracene	See HMW PAH	See HMW PAH	See HMW PAH	See HMW PAH
Fluoranthene	See HMW PAH	See HMW PAH	See HMW PAH	See HMW PAH
Indeno(1,2,3-c,d)pyrene	See HMW PAH	See HMW PAH	See HMW PAH	See HMW PAH
Pyrene	See HMW PAH	See HMW PAH	See HMW PAH	See HMW PAH
HMW PAH	18	18	1.1	0.73
Antimony	5	78	0.27	--
Arsenic	18	6.8	46	43
Beryllium	2.5	40	21	--
Cadmium	32	140	0.36	0.77
Chromium	1	0.4	63	23
Copper	70	80	49	28
Lead	120	1700	56	11
Mercury	0.3	0.1	1.7	0.013
Nickel	38	280	130	210
Selenium	0.52	4.1	0.63	1.2
Silver	560	--	14	4.2
Thallium	0.05	--	0.42	4.5
Vanadium	60	--	280	7.8
Zinc	160	120	79	46
Total PCBs	40	0.33	0.371	0.041
1,3-Dinitrobenzene (DNB)	--	0.034	0.072	0.079

Notes:

1. Supplemental values for LMW PAH, HMW PAH, and chromium from Efroymson et al. 1998a, 1998b

2. Chromium and mercury based on total

3. LMW and HMW PAH values not available for birds. Value for LMW PAHs is based on naphthalene from Los Alamos National Laboratory (LANL; 2018). Value for HMW PAHs based on benzo(a)anthracene from LANL.

-- indicates no value is available

HMW = High molecular weight

mg/kg = Milligram(s) per kilogram

LMW = Low molecular weight

PAH = Polycyclic aromatic hydrocarbon

Table 4-2. Ecological Sediment Screening Values

Analyte	CAS No.	Freshwater Sediment Screening Value		
		Ecological Screening Value	Refinement Screening Value	Source
Metals (mg/kg dw)				
Aluminum	7429-90-5	25,000	58,000	i
Antimony	7440-36-0	2	25	a
Arsenic	7440-38-2	9.8	33	b
Barium	7440-39-3	20	60	b
Cadmium	7440-43-9	1	5	b
Chromium (Total)	7440-47-3	43.4	111	b
Cobalt	7440-48-4	50		b
Copper	7440-50-8	31.6	149	b
Iron	7439-89-6	20,000	40,000	g
Lead	7439-92-1	35.8	128	b
Manganese	7439-96-5	460	1,100	g
Mercury (inorganic - aquatic life)	7439-97-6	0.18	1.1	b
Mercury (inorganic - wildlife based)	7439-97-6	0.17	0.17	i
Methylmercury (wildlife based)	22967-92-6	0.00045	0.0045	i
Nickel	7440-02-0	22.7	48.6	b
Selenium	7782-49-2	0.72	2.9	i
Selenium (wildlife)	7782-49-2	0.8	1.2	i
Silver	7440-22-4	1	2.2	b
Uranium	7440-61-1	100	1,000	i
Zinc	7440-66-6	121	459	b
Other Inorganics (mg/kg dw)				
Ammonia	7664-41-7	230	300	h
Sulfides (Total)	18946-25-8	39	61	h

Notes:

From EPA. 2018. Region 4 Ecological Risk AssessmentSupplemental Guidance. March. Update.

a. Long, Edward R., and Lee G. Morgan. 1991. The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program.

b. MacDonald, et al. 2003. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters. Florida Department of Environmental Protection, Tallahassee, FL. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters. Used threshold effect concentration (TEC) for the ESV and probable effect concentration (PEC) for

c. MacDonald, D.D. 1994. Approach to the Assessment of Sediment Quality in Florida Coastal Waters. Florida Department of Environmental Protection. 1994 Florida Sediment Quality Assessment Guidelines for Florida Coastal Waters.

g. Persaud, D., R. Jaagumagi and A. Hayton. 1993. Guidelines for the protection and management of aquatic sediment quality in Ontario. Ontario Ministry of the Environment. Queen's Printer of Ontario.

h. Washington State Sediment Management Standards, Cleanup Objectives.

i. Los Alamos National Laboratory ECORISK Database. September 2017.

CAS = Chemical Abstracts Service
EPA = U.S. Environmental Protection Agency
mg/kg dw = Milligram(s) per kilograms dry weight
No. = Number

Table 4-3. Ecological Screening Values for Surface Water

Analyte	Chemical Abstracts Service Number	National Recommended Water Quality Criteria (current values)[1]	EPA BTAG Region 3 Freshwater Screening Values 2006 (µg/L)	Source[1,2]	EPA Region 4 Ecological Screening Levels Freshwater Chronic 2018 (µg/L)	Source[1,2,3]
Target Analyte List Metals						
Aluminum	7429-90-5	NA	87	NRWQC 2004	**87**	NRWQC
Antimony	7440-36-0	NA	30	Suter et al. 1996	**190**	GLI
Arsenic	7440-38-2	**150**	5	CCME	150	NRWQC
Barium	7440-39-3	NA	4	Suter et al. 1996	**220**	GLI
Beryllium	7440-41-7	NA	0.66	Suter et al. 1996	**11**	GLI
Cadmium	7440-43-9	**0.6***	0.25	NRWQC 2004	0.45	NRWQC
Calcium	7440-70-2	NA	116,000	Suter et al. 1996	**116,000**	Suter et al. 1996
Chromium	7440-47-3	**56***	85	NRWQC 2004	42	NRWQC
Cobalt	7440-48-4	NA	23	Suter et al. 1996	**19**	GLI
Copper	7440-50-8	NA	9	NRWQC 2004	**4.95**	NRWQC
Iron	7439-89-6	**1,000**	300	CCME	1,000	NRWQC
Lead	7439-92-1	**1.73***	2.5	NRWQC 2004	1.25	NRWQC
Magnesium	7439-95-4	NA	82,000	Suter et al. 1996	**82,000**	Suter et al. 1996
Manganese	7439-96-5	NA	120	Suter et al. 1996	**93**	GLI
Mercury	7439-97-6	**0.77**	0.026	CCME	0.77	NRWQC
Nickel	7440-02-0	**38.9***	52	NRWQC 2004	28.9	NRWQC
Potassium	9/7/7440	NA	53,000	Suter et al. 1996	**53,000**	Suter et al. 1996
Selenium	7782-49-2	NA	1	CCME	**5**	NRWQC
Silver	7440-22-4	**1.6**	3.2	NRWQC 2004	0.06	NRWQC
Sodium	7440-23-5	NA	680,000	Suter et al. 1996	**680,000**	Suter et al. 1996
Thallium	7440-28-0	NA	0.8	CCME	**6**	GLI
Vanadium	7440-62-2	NA	20	Suter et al. 1996	**27**	GLI
Zinc	7440-66-6	**88.4***	120	NRWQC 2004	66	NRWQC

Notes:

Ecological screening values for freshwater, chronic exposure. **Bold values selected.** Hierarchy for selected values is as follows:

1. NRWQC, current values. available: https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table

2. Values from the publication by Suter et al. 1996. Toxicological benchmarks for screening potential contaminants of concern for effects on aquatic biota: 1996 Revision. ES/ER/TM-96/R2. https://rais.ornl.gov/documents/tm96r2.pdf. This source was used when no other values were available.

3. Great Lakes Initiative (GLI), Clearinghouse Resources Tier II criteria revised 2013. Available: https://www.epa.gov/gliclearinghouse. These values were selected over Canadian Council of Ministries of the Environment (2003), per USACE NAE.

µg/L = Microgram(s) per liter

EPA = U.S. Environmental Protection Agency

*The following NRWQC were hardness adjusted using a 95%LCL of 71 mg/L $CaCO_3$ for hardness:

Cadmium: EXP[0.7977 x ln(71)-3.909] x [1.101672-(ln(71) x 0.041838)] = 0.6 µg/L

Chromium: EXP[0.819 x ln(71)+0.6848] x 0.86 = 56 µg/L

Lead: EXP[1.273 x ln(71)-4.705] x [1.46203-[(ln(71) x 1.45712)] = 1.73 µg/L

Nickel: EXP[0.846 x ln(71) + 0.0584] x 0.997 = 38.9 µg/L

Zinc: EXP[0.8473 x ln(71) + 0.884] x 0.986 = 88.4 µg/L

Table 4-4. Constituents of Potential Ecological Concern in Soil

Analyte	Location	95UCL (mg/kg)	Ecological Soil Screening Levels (mg/kg)				COPECs				Background Comparison			Included in RSLERA?
			Plants	Soil Invertebrates	Mammals	Birds	Plants	Soil Invertebrates	Mammals	Birds	Site Mean (mg/kg)	Background Mean (mg/kg)	Exceeds Background	
Surface Soil														
Antimony	DU-01	0.567	5	78	0.27	--	N	N	Y	--	0.50	0.99	N	N
Arsenic		14.6	18	6.8	46	43	N	Y	N	N	10.63	5.33	Y	Y
Beryllium		0.587	2.5	40	21	--	N	N	N	--	0.52	0.44	N	N
Cadmium		0.431	32	140	0.36	0.77	N	N	Y	N	0.28	0.17	Y	Y
Chromium		14.8	1	0.4	63	23	Y	Y	N	N	13.33	14.66	N	N
Copper		22.8	70	80	49	28	N	N	N	N	21.33	14.93	N	N
Lead		108	120	1700	56	11	N	N	Y	Y	64.33	55.00	N	N
Mercury		0.0884	0.3	0.05	1.7	0.013	N	Y	N	Y	0.08	0.23	N	N
Nickel		14	38	280	130	210	N	N	N	N	14.00	13.03	N	N
Selenium		0.539	0.52	4.1	0.63	1.2	Y	N	N	N	0.36	0.96	N	N
Silver		ND	560	--	14	4.2	Y	--	Y	Y	0.10	0.27	N	N
Thallium		0.156	0.05	--	0.42	4.5	Y	--	N	N	0.13	0.13	N	N
Zinc		110	160	120	79	46	N	N	Y	Y	78.33	42.38	Y	Y
HMW PAH		2.11	18	18	1.1	0.73	N	N	Y	Y	1.56	4.05	N	N
LMW PAH		0.415	20	29	100	3.4	N	N	N	N	0.31	0.67	N	N
Antimony	DU-02	0.732	5	78	0.27	--	N	N	Y	--	0.64	0.99	N	N
Arsenic		15.1	18	6.8	46	43	N	Y	N	N	13.67	5.33	Y	Y
Beryllium		0.733	2.5	40	21	--	N	N	N	--	0.58	0.44	N	N
Cadmium		0.29	32	140	0.36	0.77	N	N	N	N	0.23	0.17	N	N
Chromium		15	1	0.4	63	23	Y	Y	N	N	15.00	14.66	N	N
Copper		29.5	70	80	49	28	N	N	N	Y	27.00	14.93	Y	Y
Lead		134	120	1700	56	11	Y	N	Y	Y	93.67	55.00	Y	Y
Mercury		0.125	0.3	0.05	1.7	0.013	N	Y	N	Y	0.10	0.23	N	N
Nickel		19.5	38	280	130	210	N	N	N	N	17.00	13.03	N	N
Selenium		0.345	0.52	4.1	0.63	1.2	N	N	N	N	0.32	0.96	N	N
Silver		ND	560	--	14	4.2	Y	--	Y	Y	0.10	0.27	N	N
Thallium		0.13	0.05	--	0.42	4.5	Y	--	N	N	0.13	0.13	N	N
Zinc		85.8	160	120	79	46	N	N	Y	Y	75.33	42.38	Y	Y
HMW PAH		44.3	18	18	1.1	0.73	Y	Y	Y	Y	20.10	4.05	Y	Y
LMW PAH		10.7	20	29	100	3.4	N	N	N	Y	5.03	0.67	Y	Y
Antimony	DU-03	0.751	5	78	0.27	--	N	N	Y	--	0.66	0.99	N	N
Arsenic		17.2	18	6.8	46	43	N	Y	N	N	13.33	5.33	Y	Y
Beryllium		0.595	2.5	40	21	--	N	N	N	--	0.56	0.44	N	N
Cadmium		0.282	32	140	0.36	0.77	N	N	N	N	0.25	0.17	N	N
Chromium		16.8	1	0.4	63	23	Y	Y	N	N	15.33	14.66	N	N
Copper		30.5	70	80	49	28	N	N	N	Y	26.67	14.93	Y	Y
Lead		174	120	1700	56	11	Y	N	Y	Y	130.00	55.00	Y	Y
Mercury		0.165	0.3	0.05	1.7	0.013	N	Y	N	Y	0.13	0.23	N	N
Nickel		19.6	38	280	130	210	N	N	N	N	16.67	13.03	N	N
Selenium		0.494	0.52	4.1	0.63	1.2	N	N	N	N	0.42	0.96	N	N
Silver		0.104	560	--	14	4.2	N	--	N	N	0.10	0.27	N	N
Thallium		0.148	0.05	--	0.42	4.5	Y	--	N	N	0.13	0.13	N	N
Zinc		155	160	120	79	46	N	Y	Y	Y	109.00	42.38	Y	Y
HMW PAH		9.39	18	18	1.1	0.73	N	N	Y	Y	4.35	4.05	N	N
LMW PAH		2.09	20	29	100	3.4	N	N	N	N	0.97	0.67	N	N
Antimony	DU-04	2.57	5	78	0.27	--	N	N	Y	--	1.70	0.99	Y	Y
Arsenic		54.2	18	6.8	46	43	Y	Y	Y	Y	31.33	5.33	Y	Y
Beryllium		0.61	2.5	40	21	--	N	N	N	--	0.48	0.44	N	N
Cadmium		1.29	32	140	0.36	0.77	N	N	Y	Y	0.99	0.17	Y	Y
Chromium		23.7	1	0.4	63	23	Y	Y	N	Y	17.00	14.66	N	N
Copper		71.7	70	80	49	28	Y	N	Y	Y	56.00	14.93	Y	Y
Lead		440	120	1700	56	11	Y	N	Y	Y	296.67	55.00	Y	Y
Mercury		0.425	0.3	0.05	1.7	0.013	Y	Y	N	Y	0.29	0.23	N	N
Nickel		19.5	38	280	130	210	N	N	N	N	15.67	13.03	N	N
Selenium		0.74	0.52	4.1	0.63	1.2	Y	N	Y	N	0.49	0.96	N	N
Silver		0.119	560	--	14	4.2	N	--	N	N	0.10	0.27	N	N
Thallium		0.236	0.05	--	0.42	4.5	Y	--	N	N	0.18	0.13	N	N
Zinc		374	160	120	79	46	Y	Y	Y	Y	206.67	42.38	Y	Y
HMW PAH		35.6	18	18	1.1	0.73	Y	Y	Y	Y	18.02	4.05	Y	Y
LMW PAH		9.44	20	29	100	3.4	N	N	N	Y	3.93	0.67	Y	Y
Antimony	DU-05	0.678	5	78	0.27	--	N	N	Y	--	0.52	0.99	N	N
Arsenic		12.8	18	6.8	46	43	N	Y	N	N	11.33	5.33	Y	Y
Beryllium		0.706	2.5	40	21	--	N	N	N	--	0.58	0.44	N	N
Cadmium		0.254	32	140	0.36	0.77	N	N	N	N	0.21	0.17	N	N
Chromium		15	1	0.4	63	23	Y	Y	N	N	15.00	14.66	N	N
Copper		26.1	70	80	49	28	N	N	N	N	24.67	14.93	N	N
Lead		117	120	1700	56	11	N	N	Y	Y	86.00	55.00	Y	Y
Mercury		0.321	0.3	0.05	1.7	0.013	Y	Y	N	Y	0.15	0.23	N	N
Nickel		20.5	38	280	130	210	N	N	N	N	18.00	13.03	N	N
Selenium		0.339	0.52	4.1	0.63	1.2	N	N	N	N	0.29	0.96	N	N
Silver		ND	560	--	14	4.2	Y	--	Y	Y	0.10	0.27	N	N
Thallium		0.118	0.05	--	0.42	4.5	Y	--	N	N	0.10	0.13	N	N
Zinc		82.9	160	120	79	46	N	N	Y	Y	75.67	42.38	Y	Y
HMW PAH		4.55	18	18	1.1	0.73	N	N	Y	Y	3.14	4.05	N	N
LMW PAH		0.917	20	29	100	3.4	N	N	N	N	0.70	0.67	N	N

Table 4-4. Constituents of Potential Ecological Concern in Soil

Analyte	Location	95UCL (mg/kg)	Ecological Soil Screening Levels (mg/kg)				COPECs				Background Comparison			Included in RSLERA?
			Plants	Soil Invertebrates	Mammals	Birds	Plants	Soil Invertebrates	Mammals	Birds	Site Mean (mg/kg)	Background Mean (mg/kg)	Exceeds Background	
Surface Soil														
Antimony	DU-06	2.03	5	78	0.27	--	N	N	Y	--	0.87	0.99	N	N
Arsenic		13.5	18	6.8	46	43	N	Y	N	N	9.67	5.33	Y	Y
Beryllium		0.687	2.5	40	21	--	N	N	N	--	0.53	0.44	N	N
Cadmium		0.397	32	140	0.36	0.77	N	N	Y	N	1.70	0.17	Y	Y
Chromium		17.4	1	0.4	63	23	Y	Y	N	N	13.00	14.66	N	N
Copper		52	70	80	49	28	N	N	Y	Y	36.67	14.93	Y	Y
Lead		172	120	1700	56	11	Y	N	Y	Y	98.33	55.00	Y	Y
Nickel		19.4	38	280	130	210	N	N	N	N	15.00	13.03	N	N
Selenium		0.49	0.52	4.1	0.63	1.2	N	N	N	N	0.35	0.96	N	N
Silver		0.127	560	--	14	4.2	N	--	N	N	0.08	0.27	N	N
Thallium		0.175	0.05	--	0.42	4.5	Y	--	N	N	0.14	0.13	N	N
Zinc		96.6	160	120	79	46	N	N	Y	Y	67.67	42.38	Y	Y
Antimony	DU-07	3.82	5	78	0.27	--	N	N	Y	--	1.62	0.99	N	N
Arsenic		18.8	18	6.8	46	43	Y	Y	N	N	17.33	5.33	Y	Y
Beryllium		0.666	2.5	40	21	--	N	N	N	--	0.54	0.44	N	N
Cadmium		0.749	32	140	0.36	0.77	N	N	Y	N	0.56	0.17	Y	Y
Chromium		18.5	1	0.4	63	23	Y	Y	N	N	16.00	14.66	N	N
Copper		73	70	80	49	28	Y	N	Y	Y	49.00	14.93	Y	Y
Lead		3080	120	1700	56	11	Y	Y	Y	Y	1086.67	55.00	Y	Y
Nickel		16.5	38	280	130	210	N	N	N	N	14.00	13.03	N	N
Selenium		0.488	0.52	4.1	0.63	1.2	N	N	N	N	0.39	0.96	N	N
Silver		0.125	560	--	14	4.2	N	--	N	N	0.10	0.27	N	N
Thallium		0.232	0.05	--	0.42	4.5	Y	--	N	N	0.20	0.13	Y	Y
Zinc		221	160	120	79	46	Y	Y	Y	Y	206.67	42.38	Y	Y
Antimony	DU-09	0.462	5	78	0.27	--	N	N	Y	--	0.43	0.99	N	N
Arsenic		7.59	18	6.8	46	43	N	Y	N	N	7.07	5.33	N	N
Beryllium		0.535	2.5	40	21	--	N	N	N	--	0.50	0.44	N	N
Cadmium		0.289	32	140	0.36	0.77	N	N	N	N	0.24	0.17	N	N
Chromium		13	1	0.4	63	23	Y	Y	N	N	13.00	14.66	N	N
Copper		32.2	70	80	49	28	N	N	N	Y	28.33	14.93	Y	Y
Lead		69.7	120	1700	56	11	N	N	Y	Y	58.33	55.00	N	N
Mercury		0.087	0.3	0.05	1.7	0.013	N	Y	N	Y	0.08	0.23	N	N
Nickel		17.6	38	280	130	210	N	N	N	N	14.67	13.03	N	N
Selenium		0.334	0.52	4.1	0.63	1.2	N	N	N	N	0.29	0.96	N	N
Silver		ND	560	--	14	4.2	Y	--	Y	Y	0.10	0.27	N	N
Thallium		0.162	0.05	--	0.42	4.5	Y	--	N	N	0.12	0.13	N	N
Zinc		72.5	160	120	79	46	N	N	N	Y	68.67	42.38	Y	Y
HMW PAH		2.96	18	18	1.1	0.73	N	N	Y	Y	1.93	4.05	N	N
LMW PAH		0.61	20	29	100	3.4	N	N	N	N	0.40	0.67	N	N
Antimony	DU-10	0.477	5	78	0.27	--	N	N	Y	--	0.39	0.99	N	N
Arsenic		8.36	18	6.8	46	43	N	Y	N	N	7.07	5.33	N	N
Beryllium		0.68	2.5	40	21	--	N	N	N	--	0.55	0.44	N	N
Cadmium		0.212	32	140	0.36	0.77	N	N	N	N	0.18	0.17	N	N
Chromium		15.1	1	0.4	63	23	Y	Y	N	N	13.67	14.66	N	N
Copper		23	70	80	49	28	N	N	N	N	23.00	14.93	N	N
Lead		42	120	1700	56	11	N	N	N	Y	34.33	55.00	N	N
Nickel		17.1	38	280	130	210	N	N	N	N	15.67	13.03	N	N
Selenium		0.329	0.52	4.1	0.63	1.2	N	N	N	N	0.28	0.96	N	N
Silver		0.133	560	--	14	4.2	N	--	N	N	0.06	0.27	N	N
Thallium		0.15	0.05	--	0.42	4.5	Y	--	N	N	0.15	0.13	N	N
Zinc		64.7	160	120	79	46	N	N	N	Y	58.00	42.38	N	N
Antimony	DU-11	1.03	5	78	0.27	--	N	N	Y	--	0.82	0.99	N	N
Arsenic		47.4	18	6.8	46	43	Y	Y	Y	Y	39.67	5.33	Y	Y
Beryllium		0.651	2.5	40	21	--	N	N	N	--	0.55	0.44	N	N
Cadmium		0.381	32	140	0.36	0.77	N	N	Y	N	0.37	0.17	Y	Y
Chromium		15	1	0.4	63	23	Y	Y	N	N	15.00	14.66	N	N
Copper		42.2	70	80	49	28	N	N	N	Y	33.33	14.93	Y	Y
Lead		152	120	1700	56	11	Y	N	Y	Y	123.33	55.00	Y	Y
Mercury		0.329	0.3	0.05	1.7	0.013	Y	Y	N	Y	0.18	0.23	N	N
Nickel		16	38	280	130	210	N	N	N	N	16.00	13.03	N	N
Selenium		0.731	0.52	4.1	0.63	1.2	Y	N	Y	N	0.55	0.96	N	N
Silver		0.0944	560	--	14	4.2	N	--	N	N	0.08	0.27	N	N
Thallium		0.254	0.05	--	0.42	4.5	Y	--	N	N	0.21	0.13	Y	Y
Zinc		128	160	120	79	46	N	Y	Y	Y	99.00	42.38	Y	Y
HMW PAH		14.7	18	18	1.1	0.73	N	N	Y	Y	9.05	4.05	Y	Y
LMW PAH		2.68	20	29	100	3.4	N	N	N	N	1.60	0.67	Y	N
Antimony	DU-12	0.788	5	78	0.27	--	N	N	Y	--	0.64	0.99	N	N
Arsenic		15.1	18	6.8	46	43	N	Y	N	N	13.67	5.33	Y	Y
Beryllium		0.742	2.5	40	21	--	N	N	N	--	0.65	0.44	N	N
Cadmium		0.417	32	140	0.36	0.77	N	N	Y	N	0.35	0.17	Y	Y
Chromium		15	1	0.4	63	23	Y	Y	N	N	15.00	14.66	N	N
Copper		53.9	70	80	49	28	N	N	Y	Y	48.67	14.93	Y	Y
Lead		94.2	120	1700	56	11	N	N	Y	Y	84.67	55.00	Y	Y
Mercury		0.316	0.3	0.05	1.7	0.013	Y	Y	N	Y	0.24	0.23	N	N
Nickel		15	38	280	130	210	N	N	N	N	15.00	13.03	N	N
Selenium		0.846	0.52	4.1	0.63	1.2	Y	N	Y	N	0.43	0.96	N	N
Silver		0.0797	560	--	14	4.2	N	--	N	N	0.07	0.27	N	N
Thallium		0.161	0.05	--	0.42	4.5	Y	--	N	N	0.15	0.13	N	N
Zinc		105	160	120	79	46	N	N	Y	Y	96.00	42.38	Y	Y
HMW PAH		33.9	18	18	1.1	0.73	Y	Y	Y	Y	21.84	4.05	Y	Y
LMW PAH		9.62	20	29	100	3.4	N	N	N	Y	6.51	0.67	Y	Y

Table 4-4. Constituents of Potential Ecological Concern in Soil

Analyte	Location	95UCL (mg/kg)	Ecological Soil Screening Levels (mg/kg)				COPECs				Background Comparison			Included in RSLERA?
			Plants	Soil Invertebrates	Mammals	Birds	Plants	Soil Invertebrates	Mammals	Birds	Site Mean (mg/kg)	Background Mean (mg/kg)	Exceeds Background	
Surface Soil														
Antimony	DU-13	3.46	5	78	0.27	--	N	N	Y	--	1.70	0.99	Y	Y
Arsenic		12.5	18	6.8	46	43	N	Y	N	N	10.57	5.33	Y	Y
Beryllium		0.715	2.5	40	21	--	N	N	N	--	0.60	0.44	N	N
Cadmium		0.792	32	140	0.36	0.77	N	N	Y	Y	0.75	0.17	Y	Y
Chromium		16.1	1	0.4	63	23	Y	Y	N	N	14.67	14.66	N	N
Copper		885	70	80	49	28	Y	Y	Y	Y	360.00	14.93	Y	Y
Lead		219	120	1700	56	11	Y	N	Y	Y	166.67	55.00	Y	Y
Mercury		0.418	0.3	0.05	1.7	0.013	Y	Y	N	Y	0.32	0.23	N	N
Nickel		17.8	38	280	130	210	N	N	N	N	16.33	13.03	N	N
Selenium		0.775	0.52	4.1	0.63	1.2	Y	N	Y	N	0.61	0.96	N	N
Silver		0.0998	560	--	14	4.2	N	--	N	N	0.09	0.27	N	N
Thallium		0.196	0.05	--	0.42	4.5	Y	--	N	N	0.17	0.13	N	N
Zinc		192	160	120	79	46	Y	Y	Y	Y	153.33	42.38	Y	Y
HMW PAH		275	18	18	1.1	0.73	Y	Y	Y	Y	157.84	4.05	Y	Y
LMW PAH		91.7	20	29	100	3.4	Y	Y	N	Y	52.08	0.67	Y	Y
Antimony	DU-14	0.636	5	78	0.27	--	N	N	Y	--	0.58	0.99	N	N
Arsenic		19.5	18	6.8	46	43	Y	Y	N	N	17.00	5.33	Y	Y
Beryllium		0.6	2.5	40	21	--	N	N	N	--	0.55	0.44	N	N
Cadmium		0.291	32	140	0.36	0.77	N	N	N	N	0.28	0.17	Y	N
Chromium		15.1	1	0.4	63	23	Y	Y	N	N	13.67	14.66	N	N
Copper		28.5	70	80	49	28	N	N	N	Y	24.67	14.93	N	N
Lead		139	120	1700	56	11	Y	N	Y	Y	108.67	55.00	Y	Y
Mercury		0.215	0.3	0.05	1.7	0.013	N	Y	N	Y	0.18	0.23	N	N
Nickel		17.1	38	280	130	210	N	N	N	N	15.67	13.03	N	N
Selenium		0.416	0.52	4.1	0.63	1.2	N	N	N	N	0.39	0.96	N	N
Silver		0.108	560	--	14	4.2	N	--	N	N	0.08	0.27	N	N
Thallium		0.145	0.05	--	0.42	4.5	Y	--	N	N	0.12	0.13	N	N
Zinc		81.1	160	120	79	46	N	N	Y	Y	75.33	42.38	Y	Y
Antimony	DU-15	1.41	5	78	0.27	--	N	N	Y	--	0.83	0.99	N	N
Arsenic		7.68	18	6.8	46	43	N	Y	N	N	6.87	5.33	N	N
Beryllium		0.524	2.5	40	21	--	N	N	N	--	0.48	0.44	N	N
Cadmium		0.804	32	140	0.36	0.77	N	N	Y	Y	0.51	0.17	Y	Y
Chromium		15	1	0.4	63	23	Y	Y	N	N	15.00	14.66	N	N
Copper		35.2	70	80	49	28	N	N	N	Y	31.33	14.93	Y	Y
Lead		141	120	1700	56	11	Y	N	Y	Y	126.67	55.00	Y	Y
Mercury		0.402	0.3	0.05	1.7	0.013	Y	Y	N	Y	0.21	0.23	N	N
Nickel		15.8	38	280	130	210	N	N	N	N	14.33	13.03	N	N
Selenium		0.729	0.52	4.1	0.63	1.2	Y	N	Y	N	0.54	0.96	N	N
Silver		0.101	560	--	14	4.2	N	--	N	N	0.08	0.27	N	N
Thallium		0.171	0.05	--	0.42	4.5	Y	--	N	N	0.16	0.13	N	N
Zinc		352	160	120	79	46	Y	Y	Y	Y	163.33	42.38	Y	Y
Antimony	DU-16		5	78	0.27	--	N	N	N	--	0.42	0.99	N	N
Arsenic		7.56	18	6.8	46	43	N	Y	N	N	7.03	5.33	N	N
Beryllium		0.678	2.5	40	21	--	N	N	N	--	0.58	0.44	N	N
Cadmium		0.388	32	140	0.36	0.77	N	N	Y	N	0.28	0.17	Y	Y
Chromium		16.1	1	0.4	63	23	Y	Y	N	N	14.67	14.66	N	N
Copper		44.8	70	80	49	28	N	N	N	Y	36.67	14.93	Y	Y
Lead		52.1	120	1700	56	11	N	N	N	Y	42.00	55.00	N	N
Mercury		0.0978	0.3	0.05	1.7	0.013	N	Y	N	Y	0.10	0.23	N	N
Nickel		16	38	280	130	210	N	N	N	N	16.00	13.03	N	N
Selenium		0.456	0.52	4.1	0.63	1.2	N	N	N	N	0.38	0.96	N	N
Silver		0.0688	560	--	14	4.2	N	--	N	N	0.06	0.27	N	N
Thallium		0.138	0.05	--	0.42	4.5	Y	--	N	N	0.12	0.13	N	N
Zinc		75.7	160	120	79	46	N	N	N	Y	69.00	42.38	Y	Y
HMW PAH		9.55	18	18	1.1	0.73	N	N	Y	Y	4.70	4.05	N	N
LMW PAH		3.07	20	29	100	3.4	N	N	N	N	1.37	0.67	N	N
Antimony	DU-17	12.4	5	78	0.27	--	Y	N	Y	--	7.90	0.99	Y	Y
Arsenic		15	18	6.8	46	43	N	Y	N	N	6.57	5.33	N	N
Beryllium		0.835	2.5	40	21	--	N	N	N	--	0.35	0.44	N	N
Cadmium		33.2	32	140	0.36	0.77	Y	N	Y	Y	13.67	0.17	Y	Y
Chromium		40.2	1	0.4	63	23	Y	Y	N	Y	16.97	14.66	N	N
Copper		442	70	80	49	28	Y	Y	Y	Y	191.00	14.93	Y	Y
Lead		4150	120	1700	56	11	Y	Y	Y	Y	1866.67	55.00	Y	Y
Mercury		1.25	0.3	0.05	1.7	0.013	Y	Y	N	Y	0.79	0.23	Y	Y
Nickel		32.3	38	280	130	210	N	N	N	N	13.97	13.03	N	N
Selenium		1.08	0.52	4.1	0.63	1.2	Y	N	Y	N	0.47	0.96	N	N
Silver		0.837	560	--	14	4.2	N	--	N	N	0.62	0.27	Y	N
Thallium		0.187	0.05	--	0.42	4.5	Y	--	N	N	0.12	0.13	N	N
Zinc		10200	160	120	79	46	Y	Y	Y	Y	7033.33	42.38	Y	Y
HMW PAH		11.3	18	18	1.1	0.73	N	N	Y	Y	6.50	4.05	N	N
LMW PAH		1.88	20	29	100	3.4	N	N	N	N	1.11	0.67	N	N
Total PCBs		0.151	40	0.33	0.371	0.041	N	N	N	Y	Background comparison not performed.			Y

Table 4-4. Constituents of Potential Ecological Concern in Soil

Analyte	Location	95UCL (mg/kg)	Ecological Soil Screening Levels (mg/kg)				COPECs				Background Comparison			Included in RSLERA?
			Plants	Soil Invertebrates	Mammals	Birds	Plants	Soil Invertebrates	Mammals	Birds	Site Mean (mg/kg)	Background Mean (mg/kg)	Exceeds Background	
Surface Soil														
Antimony	DU-18	7.42	5	78	0.27	--	Y	N	Y	--	6.53	0.99	Y	Y
Arsenic		23.1	18	6.8	46	43	Y	Y	N	N	12.60	5.33	Y	Y
Beryllium		0.743	2.5	40	21	--	N	N	N	--	0.59	0.44	N	N
Cadmium		5.92	32	140	0.36	0.77	N	N	Y	Y	4.63	0.17	Y	Y
Chromium		411	1	0.4	63	23	Y	Y	Y	Y	95.67	14.66	Y	Y
Copper		3010	70	80	49	28	Y	Y	Y	Y	913.33	14.93	Y	Y
Lead		1580	120	1700	56	11	Y	N	Y	Y	1433.33	55.00	Y	Y
Mercury		6.33	0.3	0.05	1.7	0.013	Y	Y	Y	Y	2.70	0.23	Y	Y
Nickel		44.7	38	280	130	210	Y	N	N	N	25.00	13.03	N	N
Selenium		1.04	0.52	4.1	0.63	1.2	Y	N	Y	N	0.56	0.96	N	N
Silver		1.18	560	--	14	4.2	N	--	N	N	0.80	0.27	Y	N
Thallium		0.29	0.05	--	0.42	4.5	Y	--	N	N	0.18	0.13	N	N
Zinc		3520	160	120	79	46	Y	Y	Y	Y	1161.00	42.38	Y	Y
HMW PAH		14	18	18	1.1	0.73	N	N	Y	Y	7.62	4.05	N	N
LMW PAH		2.03	20	29	100	3.4	N	N	N	N	1.47	0.67	Y	N
Total PCBs		0.576	40	0.33	0.371	0.041	N	Y	Y	Y	Background comparison not performed.			Y
Antimony	DU-19	0.746	5	78	0.27	--	N	N	Y	--	0.43	0.99	N	N
Arsenic		16	18	6.8	46	43	N	Y	N	N	9.47	5.33	Y	Y
Beryllium		0.536	2.5	40	21	--	N	N	N	--	0.41	0.44	N	N
Cadmium		0.395	32	140	0.36	0.77	N	N	Y	N	0.29	0.17	Y	Y
Chromium		11.8	1	0.4	63	23	Y	Y	N	N	10.33	14.66	N	N
Copper		217	70	80	49	28	Y	Y	Y	Y	150.00	14.93	Y	Y
Lead		93.9	120	1700	56	11	N	N	Y	Y	55.33	55.00	N	N
Mercury		0.822	0.3	0.05	1.7	0.013	Y	Y	N	Y	0.33	0.23	N	N
Nickel		18.1	38	280	130	210	N	N	N	N	16.67	13.03	N	N
Selenium		0.522	0.52	4.1	0.63	1.2	Y	N	N	N	0.40	0.96	N	N
Silver		0.138	560	--	14	4.2	N	--	N	N	0.12	0.27	N	N
Thallium		0.156	0.05	--	0.42	4.5	Y	--	N	N	0.13	0.13	N	N
Zinc		145	160	120	79	46	N	Y	Y	Y	106.67	42.38	Y	Y
HMW PAH		30.6	18	18	1.1	0.73	Y	Y	Y	Y	13.85	4.05	Y	Y
LMW PAH		3.59	20	29	100	3.4	N	N	N	Y	1.55	0.67	Y	Y
Total PCBs		0.021	40	0.33	0.371	0.041	N	N	N	N	Background comparison not performed.			N
HMW PAH	DU-20	2.01	18	18	1.1	0.73	N	N	Y	Y	1.67	4.05	N	N
LMW PAH		0.384	20	29	100	3.4	N	N	N	N	0.26	0.67	N	N
HMW PAH	DU-21	3.64	18	18	1.1	0.73	N	N	Y	Y	1.50	4.05	N	N
LMW PAH		0.812	20	29	100	3.4	N	N	N	N	0.26	0.67	N	N
HMW PAH	DU-22	26.1	18	18	1.1	0.73	Y	Y	Y	Y	14.82	4.05	Y	Y
LMW PAH		3.3	20	29	100	3.4	N	N	N	N	1.96	0.67	Y	N
Total PCBs	DU-23	0.045	40	0.33	0.371	0.041	N	N	N	Y	Background comparison not performed.			Y
Total PCBs	DU-25	0.02	40	0.33	0.371	0.041	N	N	N	N	Background comparison not performed.			N
1,3-Dinitrobenzen	EXDU-1	0.0609	--	0.034	0.072	0.079	--	Y	N	N	Background comparison not performed.			Y
Subsurface Soil														
Antimony	DU-17	5.09	5	78	0.27	--	Y	N	Y	--	4.57	0.99	Y	Y
Arsenic		27.2	18	6.8	46	43	Y	Y	N	N	23.33	5.33	Y	Y
Beryllium		1.72	2.5	40	21	--	N	N	N	--	1.33	0.44	Y	N
Cadmium		4.41	32	140	0.36	0.77	N	N	Y	Y	3.50	0.17	Y	Y
Chromium		14.1	1	0.4	63	23	Y	Y	N	N	12.67	14.66	N	N
Copper		219	70	80	49	28	Y	Y	Y	Y	146.67	14.93	Y	Y
Lead		4070	120	1700	56	11	Y	Y	Y	Y	1573.33	55.00	Y	Y
Mercury		0.995	0.3	0.05	1.7	0.013	Y	Y	N	Y	0.82	0.23	Y	Y
Nickel		22.6	38	280	130	210	N	N	N	N	19.67	13.03	N	N
Selenium		1.86	0.52	4.1	0.63	1.2	Y	N	Y	Y	1.33	0.96	Y	Y
Silver		0.344	560	--	14	4.2	N	--	N	N	0.26	0.27	N	N
Thallium		0.96	0.05	--	0.42	4.5	Y	--	Y	N	0.71	0.13	Y	Y
Zinc		3850	160	120	79	46	Y	Y	Y	Y	2133.33	42.38	Y	Y
HMW PAH		10.4	18	18	1.1	0.73	N	N	Y	Y	4.68	4.05	N	N
LMW PAH		2.61	20	29	100	3.4	N	N	N	N	1.64	0.67	Y	N
Antimony	DU-18	19.6	5	78	0.27	--	Y	N	Y	--	9.83	0.99	Y	Y
Arsenic		21.2	18	6.8	46	43	Y	Y	N	N	17.33	5.33	Y	Y
Beryllium		0.734	2.5	40	21	--	N	N	N	--	0.65	0.44	N	N
Cadmium		38.3	32	140	0.36	0.77	Y	N	Y	Y	12.10	0.17	Y	Y
Chromium		36.6	1	0.4	63	23	Y	Y	N	Y	31.33	14.66	Y	Y
Copper		6070	70	80	49	28	Y	Y	Y	Y	5400.00	14.93	Y	Y
Lead		3570	120	1700	56	11	Y	Y	Y	Y	2433.33	55.00	Y	Y
Mercury		3.19	0.3	0.05	1.7	0.013	Y	Y	Y	Y	1.17	0.23	Y	Y
Nickel		99	38	280	130	210	Y	N	N	N	65.00	13.03	Y	Y
Selenium		1.07	0.52	4.1	0.63	1.2	Y	N	Y	N	0.87	0.96	N	N
Silver		3.08	560	--	14	4.2	N	--	N	N	1.48	0.27	Y	N
Thallium		0.411	0.05	--	0.42	4.5	Y	--	N	N	0.31	0.13	Y	Y
Zinc		7850	160	120	79	46	Y	Y	Y	Y	4566.67	42.38	Y	Y
HMW PAH		12.4	18	18	1.1	0.73	N	N	Y	Y	5.64	4.05	N	N
LMW PAH		3.25	20	29	100	3.4	N	N	N	N	2.30	0.67	Y	N
Total PCBs		0.219	40	0.33	0.371	0.041	N	N	N	Y	Background comparison not performed.			Y

Table 4-4. Constituents of Potential Ecological Concern in Soil

Analyte	Location	95UCL (mg/kg)	Ecological Soil Screening Levels (mg/kg)				COPECs				Background Comparison			Included in RSLERA?
			Plants	Soil Invertebrates	Mammals	Birds	Plants	Soil Invertebrates	Mammals	Birds	Site Mean (mg/kg)	Background Mean (mg/kg)	Exceeds Background	
Subsurface Soil														
Antimony	DU-19	0.128	5	78	0.27	--	N	N	N	--	0.11	0.99	N	N
Arsenic		3.15	18	6.8	46	43	N	N	N	N	2.77	5.33	N	N
Beryllium		0.212	2.5	40	21	--	N	N	N	--	0.18	0.44	N	N
Cadmium		0.105	32	140	0.36	0.77	N	N	N	N	0.09	0.17	N	N
Chromium		7.91	1	0.4	63	23	Y	Y	N	N	7.77	14.66	N	N
Copper		210	70	80	49	28	Y	Y	Y	Y	210.00	14.93	Y	Y
Lead		16.2	120	1700	56	11	N	N	N	Y	12.33	55.00	N	N
Mercury		0.402	0.3	0.05	1.7	0.013	Y	Y	N	Y	0.21	0.23	N	N
Nickel		14	38	280	130	210	N	N	N	N	14.00	13.03	N	N
Selenium		0.23	0.52	4.1	0.63	1.2	N	N	N	N	0.23	0.96	N	N
Silver		0.119	560	--	14	4.2	N	--	N	N	0.10	0.27	N	N
Thallium		0.0804	0.05	--	0.42	4.5	Y	--	N	N	0.07	0.13	N	N
Zinc		63.5	160	120	79	46	N	N	N	Y	61.00	42.38	Y	Y
HMW PAH		0.482	18	18	1.1	0.73	N	N	N	N	0.25	4.05	N	N
LMW PAH		0.0738	20	29	100	3.4	N	N	N	N	0.04	0.67	N	N
Total PCBs		0.0577	40	0.33	0.371	0.041	N	N	N	Y	Background comparison not performed.			Y
HMW PAH	DU-20	0.802	18	18	1.1	0.73	N	N	N	Y	0.76	4.05	N	N
LMW PAH		0.182	20	29	100	3.4	N	N	N	N	0.15	0.67	N	N
HMW PAH	DU-21	0.941	18	18	1.1	0.73	N	N	N	Y	0.73	4.05	N	N
LMW PAH		0.185	20	29	100	3.4	N	N	N	N	0.12	0.67	N	N

Notes:
1. Calcium, magnesium, iron, potassium, and sodium eliminated as essential nutrients.
2. Aluminum, barium, cobalt, manganese, and vanadium eliminated as non-CERCLA metals.
3. DUs 17, 18, and 19 contain both surface (SS) and subsurface (SB) soil. Intervals screened separately.
4. Methods for the comparison to background described in the text (Section 4.3.1 and results presented in Attachment F).
Y = Yes, when exceeds screening level or background, cell is highlighted orange. When exceeds screening level and background, highlighted blue.
N = No, not a COPEC
95UCL = 95th upper confidence limit of the mean
mg/kg = Milligram(s) per kilogram
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
COPEC = Constituent of potential ecological concern
Bold type indicates where a constituent exceeded background and screening level and was carried through to the RSLERA

Table 4-5. Constituents of Potential Ecological Concern in Sediment

Analyte	EPC (mg/kg)	Ecological Sediment Screening Value (mg/kg)	HQ	Exceeds Background	COPEC
Iona Island Hudson River Shoreline					
Antimony	**123**	**2**	**62**	**Y**	**Y**
Arsenic	**36.2**	**9.8**	**4**	**Y**	**Y**
Beryllium	1.01	NS	NA	N	N
Cadmium	**9.86**	**1**	**10**	**Y**	**Y**
Chromium	**159**	**43.4**	**4**	**Y**	**Y**
Copper	**10,100**	**31.6**	**320**	**Y**	**Y**
Lead	**18,800**	**35.8**	**525**	**Y**	**Y**
Mercury	0.0881	0.18	0.5	N	N
Nickel	**140**	**22.7**	**6**	**Y**	**Y**
Selenium	0.944	0.72	1	N	N
Silver	**2.73**	**1**	**3**	**Y**	**Y**
Thallium	0.083	NS	NA	N	N
Zinc	**3,930**	**121**	**32**	**Y**	**Y**
Tidal Wetland Swale					
Antimony	0.782	2	0.4	N	N
Arsenic	9.82	9.8	1	Y	N
Beryllium	1.02	NS	NA	N	N
Cadmium	0.979	1	1	Y	N
Chromium	43.9	43.4	1	Y	N
Copper	**60.1**	**31.6**	**2**	**Y**	**Y**
Lead	**70.4**	**35.8**	**2**	**Y**	**Y**
Mercury	0.196	0.18	1	N	N
Nickel	34	22.7	1	Y	N
Selenium	0.789	0.72	1	N	N
Silver	0.336	1	0.3	N	N
Thallium	0.207	NS	NA	N	N
Zinc	**203**	**121**	**2**	**Y**	**Y**
Rip Rap Drainage Swale					
Antimony	1.08	2	0.5	N	N
Arsenic	9.69	9.8	1	Y	N
Beryllium	1.01	NS	NA	N	N
Cadmium	**3.19**	**1**	**3**	**Y**	**Y**
Chromium	44.3	43.4	1	Y	N
Copper	**77**	**31.6**	**2**	**Y**	**Y**
Lead	**121**	**35.8**	**3**	**Y**	**Y**
Mercury	0.219	0.18	1	N	N
Nickel	**36.4**	**22.7**	**2**	**Y**	**Y**
Selenium	0.778	0.72	1	N	N
Silver	0.391	1	0.4	N	N
Thallium	0.18	NS	NA	N	N
Zinc	**1,550**	**121**	**13**	**Y**	**Y**

Notes:
COPEC = Constituent of potential ecological concern
HQ = Hazard Quotient
NA = Not available
Bold type indicates analytes identified as COPECs where HQ>1 and concentrations exceed background, based on statistical comparisons

Table 4-6. Constituents of Potential Ecological Concern in Surface Water

Analyte	EPC (µg/L)	Surface Water Screening Value (µg/L)	HQ	Exceeds Background	COPEC
Former Dump Area					
Antimony	1.093	190	0.006	N	N
Arsenic	0.447	150	0.003	N	N
Beryllium	0.088	11	0.01	N	N
Cadmium	NA	0.6	NA	N	N
Chromium	0.5	56	0.01	N	N
Copper	3.16	4.95	0.6	Y	N
Lead	0.522	1.73	0.3	N	N
Mercury	NA	0.77	NA	N	N
Nickel	0.467	38.9	0.01	N	N
Selenium	0.37	5	0.07	N	N
Silver	NA	1.6	NA	N	N
Thallium	0.17	6	0.03	N	N
Zinc	16.5	88.4	0.2	N	N
Iona Island Hudson River Shoreline					
Antimony	0.774	190	0.004	N	N
Arsenic	0.516	150	0.003	Y	N
Beryllium	NA	11	NA	N	N
Cadmium	NA	0.6	NA	N	N
Chromium	0.56	56	0.01	N	N
Copper	6.995	4.95	1	Y	N
Lead	0.359	1.73	0.2	N	N
Mercury	NA	0.77	NA	N	N
Nickel	0.465	38.9	0.01	N	N
Selenium	NA	5	NA	N	N
Silver	0.46	1.6	0.3	N	N
Thallium	NA	6	NA	N	N
Zinc	12.24	88.4	0.1	N	N
Tidal Wetland Swale					
Antimony	0.7	190	0.004	N	N
Arsenic	1.082	150	0.007	N	N
Beryllium	0.216	11	0.02	N	N
Cadmium	NA	0.6	NA	N	N
Chromium	0.69	56	0.01	Y	N
Copper	1.353	4.95	0.3	Y	N
Lead	NA	1.73	NA	N	N
Mercury	NA	0.77	NA	N	N
Nickel	0.503	38.9	0.01	N	N
Selenium	NA	5	NA	N	N
Silver	NA	1.6	NA	N	N
Thallium	0.11	6	0.02	N	N
Zinc	3.9	88.4	0.04	N	N
Rip Rap Drainage Swale					
Antimony	0.72	190	0.004	N	N
Arsenic	0.692	150	0.005	N	N
Beryllium	NA	11	NA	N	N
Cadmium	NA	0.6	NA	N	N
Chromium	NA	56	NA	Y	N
Copper	1.326	4.95	0.3	Y	N
Lead	NA	1.73	NA	N	N
Mercury	NA	0.77	NA	N	N
Nickel	0.481	38.9	0.01	N	N
Selenium	NA	5	NA	N	N
Silver	NA	1.6	NA	N	N
Thallium	NA	6	NA	N	N
Zinc	NA	88.4	NA	Y	N

Notes:

µg/L = Microgram(s) per liter

COPEC = Constituents of potential ecological concern

EPC = Exposure point concentration

HQ = Hazard Quotient; rounded to one significant digit.

NA = Not available

Bold type indicates analytes identified as COPECs where HQ>1 and concentrations exceed background, based on statistical comparisons

Table 5-1. Wildlife Exposure Parameters – Terrestrial Receptors

Exposure Parameter	Value	Units	Notes
MEADOW VOLE (*Microtus pennsylvanicus*) Surrogate for Small Herbivorous Mammals			
Body Weight	0.033	Kg	Average of common range of weights (EPA 1993)
Food Ingestion Rate	0.023	kg dry wt./kg-day	Converted assuming 85% plant moisture (EPA 2007)
Food Ingestion Rate	0.15	kg wet wt./kg-day	Green and Millar 1987
Diet Proportion	100	% plant	EPA 1993
Incidental Soil Ingestion Rate	2	% of total mass of diet	Beyer et al. 1994
Habitat Range	1	Acre	Assumed (EPA 1993)
AMERICAN ROBIN (*Turdus migratorius*) Surrogate for Insectivorous Birds			
Body Weight	0.077	Kg	EPA 1993 (mean in Pennsylvania)
Food Ingestion Rate	0.14	kg dry wt./kg-day	Converted assuming 84% prey moisture (EPA 2007)
Food Ingestion Rate	0.89	kg wet wt./kg-day	EPA 1993 (mean in California)
Diet Proportion	93/7	% invert/veg	EPA 1993 (eastern US). Spring diet proportions used for most sensitive life stage and use as surrogate for protected species.
Incidental Soil Ingestion Rate	10.5	% of total mass of diet	Value base on woodcock (Sample and Suter 1994)
Site Use Factor	0.67	Unitless	Assumed to be migratory 8 of 12 months
Habitat Range	1	Acre	Assumed (EPA 1993)
SHORT-TAILED SHREW (*Blarina brevicauda*) Surrogate for Small Carnivorous Mammals			
Body Weight	0.017	Kg	EPA 1993, average of reported range
Food Ingestion Rate	0.099	kg dry wt./kg-day	Converted assuming 84% prey moisture (EPA 2007)
Food Ingestion Rate	0.62	kg wet wt./kg-day	EPA 1993 (Ohio lab)
Diet Proportion	78/17/5	% invert/plant/mammal	EPA 1993 (proportions for insects, vegetable matter, and small mammals from Hamilton 1941)
Incidental Soil Ingestion Rate	3	% of total mass of diet	EPA 2007 (90^{th} percentile)
Habitat Range	1	Acre	Assumed (EPA 1993)
RED-TAILED HAWK (*Buteo jamaicensis*) Surrogate for Predatory Birds			
Body Weight	1.2	Kg	EPA 1993 (Ohio)
Food Ingestion Rate	0.032	kg dry wt./kg-day	Converted assuming 68% prey moisture (EPA 2007)
Food Ingestion Rate	0.1	kg wet wt./kg-day	Average of ingestion rates (EPA 1993)
Diet Proportion	100	% small mammal	EPA 1993
Incidental Soil Ingestion Rate	5.7	% of total mass of diet	EPA 2007 (90^{th} percentile)
Habitat Range	500 to >2,000	Acre	EPA 1993 (range presented)
RED FOX (*Vulpes vulpes*) Surrogate for Predatory Mammals			
Body Weight	4.5	Kg	Average of common range of weights (EPA 1993)
Food Ingestion Rate	0.045	kg dry wt./kg-day	Converted assuming 68% prey moisture (EPA 2007)
Food Ingestion Rate	0.14	kg wet wt./kg-day	Sample and Suter 1994
Diet Proportion	100	% small mammal	EPA 1993
Incidental Soil Ingestion Rate	2.8%	% of total mass of diet	Value from Beyer et al. 1994
Habitat Range	125 - 740	Acre	EPA 1993 (range presented)

Notes: % = Percent
EPA = U.S. Environmental Protection Agency
kg = Kilogram(s)
wt. = Weight

Table 5-2. Wildlife Exposure Parameters - Aquatic Receptors

RIVER OTTER (PISCIVOROUS MAMMAL)	Value	Unit	Notes
Body Weight	7.43	kg	EPA, 1993 average of adult male and female body weights for eastern US.
Food Ingestion Rate	0.0481	kg dry wt/kg-day	EPA, 1993 allometric equation for all mammals [Equation 3-7]
Incidental Sediment Ingestion Rate	2.00%	% of total mass of diet	Assumed, conservative estimate
Habitat Range	859	acres	EPA, 1993 average of adult male and female ranges for Texas, converted to acres
Water Ingestion Rate	0.081	L/kg-day	EPA 1993, average of male and female rates
GREAT BLUE HERON (PISCIVOROUS BIRD)			
Body Weight	2.229	kg	EPA, 1993, value for eastern North America
Food Ingestion Rate	0.0360	kg dry wt./kg-day	Converted assuming 80% fish moisture (Holcombe 1976)
Food Ingestion Rate	0.18	kg wet wt./kg-day	EPA, 1993
Incidental Sediment Ingestion Rate	2.00%	% of total mass of diet	Assumed, conservative estimate
Habitat Range	11	acres	EPA, 1993, average of values provided
Water Ingestion Rate	0.045	L/kg-day	EPA, 1993
MUSKRAT (HERBIVOROUS MAMMAL)			
Body Weight	1.17	kg	EPA 1993, average of adult male and female weights given throughout year
Food Ingestion Rate	0.045	kg dry wt./kg-day	EPA 1993, converted assuming 85% plant moisture (EPA 2007)
Food Ingestion Rate	0.3	kg wet wt./kg-day	EPA 1993, average of greens and green and corn ingestion rates
Incidental Soil Ingestion Rate	2.00%	% of total mass of diet	Beyer et al. 1994, value for woodchuck
Habitat Range	0.33	acres	EPA, 1993, average of values provided
Water Ingestion Rate	0.975	L/kg-day	EPA 1993, average of male and female rates
MALLARD DUCK (HERBIVOROUS BIRD)			
Body Weight	1.134	kg	EPA 1993, average of adult male and female weights given throughout year
Food Ingestion Rate	0.049	kg dry wt./kg-day	Calculated using allometric equation for all birds from Nagy 2001
Incidental Soil Ingestion Rate	3.30%	% of total mass of diet	Beyer et al. 1994
Habitat Range	1075	acres	EPA 1993, average of values provided
Water Ingestion Rate	0.0565	L/kg-day	EPA 1993, average of adult male and female rates
LESSER SCAUP (INSECTIVOROUS BIRD)			
Body Weight	0.815	kg	EPA, 1993 average of male and female body weights in US
Food Ingestion Rate	0.0625	kg dry wt/kg-day	EPA, 1993 allometric equation for all birds [Equation 3-3]
Incidental Sediment Ingestion Rate	2.00%	% of total mass of diet	Assumed, conservative estimate
Habitat Range	219	acres	EPA, 1993 converted to acres
Water Ingestion Rate	0.0630	L/kg-day	EPA, 1993 average of adult male and female rates

Notes:

% = Percent

EPA = U.S. Environmental Protection Agency

kg = Kilogram(s)

kg dry wt./kg-day = kilograms dry weight/kilograms body weight per day

L = Liter(s)

References:

Beyer, W.N., E. Conner, and S. Gerould. 1994. Estimates of soil ingestion by wildlife. J. Wildl. Manage. 58:75−382.

U.S. Environmental Protection Agency (EPA). 1993. Wildlife Exposure Factors Handbook. 2 Volumes. EPA/630/R-93/187a. EPA Office of Research and Development, Washington, DC.

Nagy, KA. 2001. Food requirements of wild animals: predictive equations for free-living mammals, reptiles, and birds. Nutrition Abstracts and Reviews Series B 71, 21R-31F

Table 5-3. Bioaccumulation Factors

COPEC	Plant BAF	Source	Soil Invertebrate BAF	Source	Mammal BAF	Source
Antimony	ln(Cp) = 0.938*ln(Cs)-3.233	EPA 2007a	1.00E+00	Default	Cm = 0.001*50*Cd	Baes et al. 1984
Arsenic	Cp = 0.03752*Cs	Bechtel Jacobs 1998	ln(Cw) = (-1.421+0.706*ln(Cs))	Sample et al. 1999	ln(Cm) = (-4.8471+0.8188*ln(Cs))	Sample et al. 1998b
Beryllium	ln(Cp)=0.7345*ln(Cs)-0.5361	EPA 2007a	4.50E-02	Sample et al. 1998a	Cm = 0.001*50*Cd	Baes et al. 1984
Cadmium	ln(Cp) = (-0.475+0.546*ln(Cs))	Bechtel Jacobs 1998	ln(Cw) = (2.114+0.795*ln(Cs))	Sample et al. 1999	ln(Cm) = 0.4723*ln(Cs)-1.2571	Sample et al. 1998b
Chromium	4.10E-02	Bechtel Jacobs 1998	3.06E-01	Sample et al. 1999	ln(Cm) = (-1.4599+0.7338*ln(Cs))	Sample et al. 1998b
Copper	ln(Cp) = (0.668+0.394*ln(Cs))	Bechtel Jacobs 1998	5.15E-01	Sample et al. 1999	ln(Cm) = (2.042+0.1444*ln(Cs))	Sample et al. 1998b
Lead	ln(Cp) = (-1.328+0.561*ln(Cs))	Bechtel Jacobs 1998	ln(Cw) = (-0.218+0.807*ln(Cs))	Sample et al. 1999	ln(Cm) = (0.0761+0.4422*ln(Cs))	Sample et al. 1998b
Manganese	Cp = 0.079 * Cs	Bechtel Jacobs 1998	ln(Ce) = 0.682 * ln(Cs) - 0.809	Sample et al. 1999	Cm = 0.0205 * Cs	Sample et al. 1998b
Mercury	ln(Cp) = (-0.996+0.544*ln(Cs))	Bechtel Jacobs 1998	ln(Cw) = (-0.684+0.118*ln(Cs))	Sample et al. 1998a	1.92E-01	Sample et al 1998b
Nickel	ln(Cp) = (-2.223+0.748*ln(Cs))	Bechtel Jacobs 1998	ln(Cw) = (3.677-0.26*ln(Cs))	Sample et al. 1998a	ln(Cm) = (-0.2462+0.4658*ln(Cs))	Sample et al. 1998b
Selenium	ln(Cp) = (-0.677+1.104*ln(Cs))	Bechtel Jacobs 1998	ln(Cw) = (-0.075+0.733*ln(Cs))	Sample et al. 1999	ln(Cm) = (-0.4158+0.3764*ln(Cs))	Sample et al. 1998b
Silver	1.40E-02	Bechtel Jacobs 1998	2.05E+00	Sample et al 1998a	4.00E-03	Sample et al 1998b
Thallium	4.00E-03	Baes et al. 1984	1.00E+00	Default	1.23E-01	Sample et al. 1998b
Zinc	ln(Cp) = (1.575+0.554*ln(Cs))	Bechtel Jacobs 1998	ln(Cw) = (4.449+0.328*ln(Cs))	Sample et al. 1999	ln(Cm) = 0.0706*ln(Cs)+4.3632	Sample et al. 1998b
LMW PAH	ln(Cp) = 0.4544*ln(Cs)-1.3205	EPA 2007a	3.04	EPA 2007a	0	EPA 2007a
HMW PAH	ln(Cp) = 0.9469*ln(Cs)-1.7026	EPA 2007a	2.6	EPA 2007a	0	EPA 2007a
Total PCBs	log(Cp)=1.588-0.578*LogKow	Travis and Arms 1988	ln(Cw) = (1.410+1.361*ln(Cs))	Sample et al 1998a	log(Cm)=-7.6+LogKow	Travis and Arms 1988

Notes:

1. Sources are original sources as presented in EPA (2007a)
2. For PCBs: values are based on average Kow of several Aroclors:

PCB	LogKow
Aroclor 1242	6.335
Aroclor 1254	6.9795
Aroclor 1268	6.8
Average	6.7

Cm = concentration in mammal
Cp = concentration in plant
Cw = concentration in worm
BAF = bioaccumulation factor
COPEC = Constituent of potential ecological concern
EPA = U.S. Environmental Protection Agency
HMW = High molecular weight
LMW = Low molecular weight
ln = Natural log
mg/kg = Milligram(s) per kilogram
PAH = Polycyclic aromatic hydrocarbon
PCB = Polychlorinated biphenyl

Table 5-4. Aquatic Uptake Factors

COPEC	Plant BAFs	Plant BAFs Source	Benthic Invertebrate BCFs ([mg COPC/Kg tissue wet wt]/[mg COPC/kg sediment])[c]	Benthic Invertebrate Uptake ([mg COPC/kg tissue dry wt]/[mg COPC/kg sediment])[d]	Fish BCFs ([mg COPC/Kg tissue wet wt]/[mg COPC/L])[c]	Fish Uptake ([mg COPC/kg tissue dry wt]/[mg COPC/L])[e]
Antimony	ln(Cp) = 0.938 * ln(Cs) - 3.233	a	0.9	5.39	40	200
Arsenic	Cp = 0.03752 * Cs	b	0.9	5.39	114	570
Beryllium	ln(Cp) = 0.7345 * ln(Cs) - 0.5361	a	0.9	5.39	62	310
Cadmium	ln(Cp) = 0.546 * ln(Cs) - 0.475	b	3.4	20.36	907	4535
Chromium	Cp = 0.041 * Cs	b	0.39	2.34	19	95
Copper	ln(Cp) = 0.394 * ln(Cs) + 0.668	b	0.3	1.80	710	3550
Lead	ln(Cp) = 0.561 * ln(Cs) - 1.328	b	0.63	3.77	0.09	0.45
Nickel	ln(Cp) = 0.748 * ln(Cs) - 2.223	b	0.9	5.39	78	390
Selenium	ln(Cp) = 1.104 * ln(Cs) - 0.677	b	0.9	5.39	129	645
Silver	Cp = 0.014 * Cs	b	0.9	5.39	87.71	438.55
Zinc	ln(Cp) = 0.554 * ln(Cs) + 1.575	b	0.57	3.41	2059	10295

Notes:

a - Regression derived from measured data by EPA (2007)

b - Bechtel-Jacobs 1998a

c - Invertebrate and Fish BCF (US EPA 1999)

d - Invertebrate BCFs converted to mg/kg dry weight assuming a moisture content of 83.3% (Pietz et al. 1984)

e - Fish BCFs converted to mg/kg dry weight assuming a moisture content of 80% (Holcombe 1976)

COPEC = Contaminant of potential ecological concern

mg/L= Milligram(s) per liter

mg/kg dry wt = Milligram(s) per kilogram dry weight

Table 5-5. Summary of Physical Parameters in Soil

	Location	DU-4	DU-7	DU-9	DU-11	DU-13	DU-17	DU-18	DU-19
	Unit	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
General Chemistry									
pH (from Phase I)	NA	6.97	7.43	7.0	7.07	6.90	7.17	7.77	7.53
Oxidation Reduction Potential (ORP) by Field Screening	mV	276	340	242	239	309	293	296	288
Standard hydrogen electrode corrected ORP	mV	481	545	447	444	514	498	501	493
Total Organic Carbon (TOC)	mg/kg	28,667	33,000	31,333	30,000	43,667	40,000	233,333	33,000
CEC Analytical[1]	MEQ/100g	NA	NA	NA	NA	NA	NA	NA	NA
CEC Calculation[2]	MEQ/100g	106.38	174.71	90.79	286.05	94.57	588	135	133
CEC Re-analysis[3]	MEQ/100g	33	24	28	27	36	38	53	33
Grain Size									
Gravel	%	9.2	9.66	6.84	2.01	6.17	9.97	3.97	1.86
Sand Coarse	%	1.8	5.25	0.70	1.72	5.48	11.8	10.5	1.73
Sand Medium	%	18.1	25.8	15.4	28.2	29.7	36.1	61.3	32.1
Sand Fine	%	23.9	20.1	26.2	19.8	19.9	14.4	7.7	23
Silt	%	39.7	30.0	46.9	45.4	36.7	26.2	14.6	39.5
Clay	%	7.32	9.12	4.01	2.89	1.98	1.5	1.97	1.73

Notes:

1. Initial laboratory CEC results were deemed abnormally high by several orders of magnitude. Analytical results were rejected during data validation.
2. CEC for onsite soil was calculated using Phase I metals analytical results (calcium, magnesium, potassium, sodium).
3. The laboratory re-analyzed CEC samples after correcting an error with reagents. Analytical results are from re-analysis. However, laboratory holding times and conditions are unknown.

% = Percent

CEC = cation exchange capacity

g = Gram(s)

MEQ = milliequivalents

mg/kg = Milligram(s) per kilogram

mV = Millivolt(s)

NA = Not available

Table 5-6. Summary of Physical Parameters in Sediment

		Iona Island Hudson River Shoreline	Rip Rap Drainage Swale	Tidal Wetland Swale
	Unit	**Average**	**Average**	**Average**
General Chemistry				
pH	NA	6.77	7.17	7.2
ORP by Field Screening	mV	586	325	314
Standard hydrogen electrode corrected ORP	mV	791	530	519
TOC	mg/kg	3,530	78,300	62,300
Grain Size				
Gravel	%	9.07	1.24	7.75
Sand Coarse	%	22.2	0.653	1.77
Sand Medium	%	50.3	5.58	7.15
Sand Fine	%	12.9	6.63	8.55
Silt	%	-0.437	52.2	44.4
Clay	%	5.92	33.7	30.4

Notes:

% =Percent
mg/kg = Milligram(s) per kilogram
mV = Millivolt(s)
NA = Not applicable
ORP = Oxidation reduction potential
TOC = Total organic carbon

Table 5-7. AVS/SEM Analytical Results

		Location	Iona Island Hudson River Shoreline						Rip Rap Drainage Swale						Tidal Wetland Swale					
		Sample ID	IINY-IHRS-SED-01-		IINY-IHRS-SED-02-		IINY-IHRS-SED-03-		IINY-RRDS-SED-01-		IINY-RRDS-SED-02-		IINY-RRDS-SED-03-		IINY-TWS-SED-01-		IINY-TWS-SED-02-		IINY-TWS-SED-03-	
		Depth (in.)	0-6		0-6		0-6		0-6		0-6		0-6		0-6		0-6		0-6	
		Matrix	Sediment		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment	
		Sample Date	4/19/2022 10:50		4/19/2022 10:55		4/19/2022 10:45		4/19/2022 11:30		4/19/2022 11:35		4/19/2022 11:40		4/19/2022 12:10		4/19/2022 12:15		4/19/2022 12:20	
Analyte	**CAS No.**	**Unit**																		
Acid Volatile Sulfide																				
AVS	NA	µmoles/g	0.43	UJ	0.44	UJ	0.49	UJ	0.95	UJ	1.1	UJ	1.2	UJ	0.86	UJ	0.55	UJ	0.93	UJ
Metals																				
Cadmium	7440-43-9	µmoles/g	0.042		0.043		0.04		0.0014	J	0.002	J	0.0023	J	0.0023	J	0.0071		0.0024	J
Copper	7440-50-8	µmoles/g	35		190		130		0.12	J	0.14		0.24		0.17	J	0.23		0.18	
Lead	7439-92-1	µmoles/g	14		27		25		0.061	J	0.063		0.24		0.1		0.25		0.083	
Nickel	7440-02-0	µmoles/g	0.33		0.4		0.55		0.03	J	0.074		0.8	J	0.049	J	0.16		0.045	
Zinc	7440-66-6	µmoles/g	18		34		18		0.28	J	0.4		0.71		0.64	J	0.62		0.59	
Organic Carbon																				
TOC	NA	mg/kg	2,600		4,500		3,500		74,000		73,000		88,000		63,000		60,000		64,000	
TOC	NA	%	0.26		0.45		0.35		7.4		7.3		8.8		6.3		6		6.4	
f_{OC}	NA	NA	0.0026		0.0045		0.0035		0.074		0.073		0.088		0.063		0.06		0.064	
AVS/SEM																				
SEM/AVS	NA	NA	156.68		571.46		354.27		0.52		0.62		1.66		1.12		2.30		0.97	
∑SEM	NA	µmoles/g	67.372		251.443		173.59		0.4924		0.679		1.9923		0.9613		1.2671		0.9004	
∑SEM - AVS	NA	µmoles/g	66.942		251.003		173.1		-0.4576		-0.421		0.7923		0.1013		0.7171		-0.0296	
$(\sum SEM\text{-}AVS)/f_{OC}$	NA	µmoles/g	25747		55778		49457		-6		-6		9		2		12		-0.5	

Notes:

µmoles/g = Micromole(s) per gram
AVS = Acid volatile sulfide
CAS = Chemical Abstracts Service
EPA = U.S. Environmental Protection Agency
f_{OC} = Fraction organic carbon
ID = Identification
in. = Inch(es)
J = Estimated: The analyte was positively identified; the quantitation is an estimation
NA = Not applicable
No. = Number
SEM = Simultaneously extracted metals
TOC =Total organic carbon
UJ = Analyte not detected, and associated numerical value (Limit of Detection or Limit of Quantitation) is approximate
Red font indicates SEM:AVS ratio > 1
Highlighted cells indicate $(\sum SEM\text{-}AVS)/f_{OC}$ > 3000 µmoles/g and metals are bioavailable/toxic (EPA 2005)

Table 5-8. Toxicity Reference Values for Plants and Soil Invertebrates

COPEC	Plant TRV (mg/kg dry wt)	Reference	Earthworm TRV (mg/kg dry wt)	Reference
Metals				
Antimony	5	Efroymson et al. 1997a	78	EPA 2005a
Arsenic	18	EPA 2005b	60	Efroymson et al. 1997b
Beryllium	10	Efroymson et al. 1997a	40	EPA 2005d
Cadmium	32	EPA 2005e	140	EPA 2005e
Chromium	1	Efroymson et al. 1997a	0.4	Efroymson et al. 1997b
Copper	70	EPA 2007c	80	EPA 2007c
Lead	120	EPA 2005g	1700	EPA 2005g
Mercury	0.3	Efroymson et al. 1997a	0.1	Efroymson et al. 1997b
Nickel	38	EPA 2007e	280	EPA 2007e
Selenium	0.5	EPA 2007g	4	EPA 2007g
Silver	560	EPA 2006	NA	---
Thallium	1	Efroymson et al. 1997a	NA	---
Zinc	160	EPA 2007h	120	EPA 2007h
PAHs				
LMW PAH	20	Efroymson et al. 1997a	29	EPA 2007f
HMW PAH	18	Efroymson et al. 1997a	18	EPA 2007f

Notes:

EPA = U.S. Environmental Protection Agency

HMW = High molecular weight

LMW = Low molecular weight

mg/kg dry wt = Milligram(s) per kilogram of body weight per day

NA = TRV not available

PAH = Polycyclic aromatic hydrocarbon

TRV = Toxicity Reference Value

Table 5-9. Toxicity Reference Values for Mammals

Analyte	Mammalian NOAEL (mg/kg-bw day)	Reference	Mammalian LOAEL (mg/kg-bw day)	Reference
Metals				
Antimony	5.90E-02	EPA 2005a	5.90E-01	Corresponding LOAEL from EPA 2005a
Arsenic	1.04E+00	EPA 2005b	1.66E+00	Corresponding LOAEL from EPA 2005b
Beryllium	5.32E-01	EPA 2005d	6.73E-01	Geometric mean of LOAELs for growth and reproduction in EPA 2005d
Cadmium	7.70E-01	EPA 2005e	7.70E+00	Corresponding LOAEL from EPA 2005e
Chromium	2.40E+00	EPA 2008 value for trivalent chromium	5.82E+01	Geometric mean of LOAELs for growth and reproduction for trivalent chromium in EPA 2008
Copper	5.60E+00	EPA 2007c	9.34E+00	Corresponding LOAEL from EPA 2007c
Lead	4.70E+00	EPA 2005g	8.90E+00	Corresponding LOAEL from EPA 2005g
Mercury	1.32E+01	Sample et al. 1996	1.32E+02	NOAEL plus uncertainty factor
Nickel	1.70E+00	EPA 2007e	3.40E+00	Corresponding LOAEL from EPA 2007e
Selenium	1.43E-01	EPA 2007g	2.15E-01	Corresponding LOAEL from EPA 2007g
Silver	6.02E+00	EPA 2006	6.02E+01	Corresponding LOAEL from EPA 2006
Thallium	7.40E-03	Sample et al. 1996	7.40E-02	Sample et al. 1996
Zinc	7.54E+01	EPA 2007h	2.98E+02	Geometric mean of LOAELs for growth and reproduction in EPA 2007h
PAHs				
LMW PAH	6.56E+01	EPA 2007f	3.67E+02	Geometric mean of LOAELs for survival, growth, and reproduction in EPA 2007f
HMW PAH	6.15E-01	EPA 2007f	3.16E+01	Geometric mean of LOAELs for survival, growth, and reproduction in EPA 2007f
PCBs				
Total PCBs	6.80E-02	Sample et al. 1996	6.80E-01	Sample et al. 1996, based on Aroclor 1254

Notes:
EPA = U.S. Environmental Protection Agency
HMW = High molecular weight
LMW = Low molecular weight
LOAEL = Lowest Observed Adverse Effect Level
mg/kg dry wt = Milligram(s) per kilogram of body weight per day
NA = TRV not available
NOAEL = No Observed Adverse Effect Level
PAH = Polycyclic aromatic hydrocarbon
PCB = Polychlorinated biphenyl
TRV = Toxicity Reference Value

Table 5-10. Toxicity Reference Values for Birds

Analyte	Avian NOAEL (mg/kg-bw day)	Reference	Avian LOAEL (mg/kg-bw day)	Reference
Metals				
Antimony	NA	---	NA	---
Arsenic	2.24E+00	EPA 2005b	4.51E+00	Geometric mean of LOAELs for growth and reproduction in EPA 2005b
Cadmium	1.47E+00	EPA 2005e	6.35E+00	Geometric mean of LOAELs for growth and reproduction in EPA 2005e
Chromium	2.66E+00	EPA 2008	1.56E+01	Geometric mean of LOAELs for growth and reproduction in EPA 2008
Copper	4.05E+00	EPA 2007a	1.21E+01	Corresponding LOAEL from EPA 2007a
Lead	1.63E+00	EPA 2005g	3.26E+00	Corresponding LOAEL from EPA 2005g
Mercury	4.50E-01	Sample et al. 1996	9.00E-01	Sample et al. 1996
Nickel	6.71E+00	EPA 2007c	1.86E+01	Geometric mean of LOAELs for growth and reproduction in EPA 2007c
Selenium	2.90E-01	EPA 2007e	5.79E-01	Corresponding LOAEL from EPA 2007e
Silver	2.02E+00	EPA 2006	2.02E+01	Corresponding LOAEL from EPA 2006
Zinc	6.61E+01	EPA 2007f	1.71E+02	Geometric mean of LOAELs for growth and reproduction in EPA 2007f
PAHs				
LMW PAH	5.62E+03	EPA 2007d did not derive value due to too few studies, value is from the only study not rejected for use (Landis Associates Inc. 1985)	5.62E+04	NOAEL plus uncertainty factor
HMW PAH	2.00E+00	EPA 2007d did not derive value due to too few studies, value is from the only study not rejected for use (Trust et al. 1994)	2.00E+01	NOAEL plus uncertainty factor
PCBs				
Total PCBs	1.80E-01	Sample et al. 1996	1.80E+00	Sample et al. 1996

Notes:
EPA = U.S. Environmental Protection Agency
HMW = High molecular weight
LMW = Low molecular weight
LOAEL = Lowest Observed Adverse Effect Level
mg/kg dry wt = Milligram(s) per kilogram of body weight per day
NA = TRV not available
NOAEL = No Observed Adverse Effect Level
TRV = Toxicity Reference Value

Table 7-1. Hazard Quotients for Terrestrial Plants

COPEC	EPC (mg/kg)	TRV (mg/kg)	HQ
Iona Island			
Arsenic	16.1	18	<1
Copper	90.3	70	1
Lead	307.1	120	**3**
Thallium	0.15	0.05	**3**
Zinc	124.5	160	<1
LMW PAH	8.9	20	<1
HMW PAH	29.4	18	**2**
1,3-Dinitrobenzene (DNB)	0.044	--	**--**
Former Dump Area (DU 17, DU 18, DU19)			
Antimony	6.7	5	1
Arsenic	14.7	18	<1
Cadmium	11.2	32	<1
Chromium	81.9	1	**82**
Copper	1538	70	**22**
Lead	1825	120	**15**
Mercury	1.7	0.3	**6**
Nickel	33	38	<1
Selenium	0.81	0.52	**2**
Thallium	0.3	0.05	**6**
Zinc	3413	160	**21**
HMW PAH	9.85	18	<1

Notes:
1. HQs > 1 are **bold**
-- = TRV not available
COPEC = Constituent of potential ecological concern
EPC = Exposure point concentration
HMW = High molecular weight
HQ = Hazard quotient; EPC/TRV
mg/kg = Milligram(s) per kilogram
NYS = New York State
PCBs = Polychlorinated biphenyls
TRV = Toxicity reference value

Table 7-2. Hazard Quotients for Soil Invertebrates

COPEC	EPC (mg/kg)	TRV (mg/kg)	HQ
Iona Island			
Arsenic	16.1	6.8	**2**
Copper	90.3	80	1
Lead	307.1	1700	<1
Thallium	0.15	--	**--**
Zinc	124.5	120	1
LMW PAH	8.9	29	<1
HMW PAH	29.4	18	**2**
1,3-Dinitrobenzene (DNB)	0.044	0.034	1
Former Dump Area (DU 17, DU 18, DU19)			
Arsenic	14.7	6.8	**2**
Chromium	81.9	0.4	**205**
Copper	1538	80	**19**
Lead	1825	1700	1
Mercury	1.7	0.05	**34**
Thallium	0.3	--	**--**
Zinc	3413	120	**28**
HMW PAH	9.85	18	<1
Total PCBs	0.15	0.33	<1

Notes:

1. HQs > 1 are **bold**

-- = TRV not available

COPEC = Constituent of potential ecological concern

EPC = Exposure point concentration

HQ = Hazard quotient

mg/kg = Milligram(s) per kilogram

NA = Not available

NYS = New York State

TRV = Toxicity reference value

Table 7-3. Refined Hazard Quotients for Benthos

COPEC	EPC (mg/kg)	Refinement Sediment Screening Value (mg/kg)	Refined HQ	Refined COPEC
Iona Island Hudson River Shoreline				
Antimony	**123**	**25**	**5**	**Y**
Arsenic	36.2	33	1	N
Cadmium	**9.86**	**5**	**2**	**Y**
Chromium	159	111	1	N
Copper	**10,100**	**149**	**68**	**Y**
Lead	**18,800**	**128**	**147**	**Y**
Nickel	**140**	**48.6**	**3**	**Y**
Silver	2.73	2.2	1	N
Zinc	**3,930**	**459**	**9**	**Y**
Tidal Wetland Swale				
Copper	60.1	149	0.4	N
Lead	70.4	128	0.6	N
Zinc	203	459	0.4	N
Rip Rap Drainage Swale				
Cadmium	3.19	5	0.6	N
Copper	77	149	0.5	N
Lead	121	128	0.9	N
Nickel	36.4	48.6	0.7	N
Zinc	**1,550**	**459**	**3**	**Y**

Notes:
COPEC = Constituents of potential ecological concern
EPC = Exposure point concentration
HQ = Hazard Quotient
mg/kg = Milligram(s) per kilogram

Attachment A

USACE New England District Ecological Risk Assessment Flowcharts

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Figure 1: Screening Level Ecological Risk Assessment (SLERA) Flow Chart

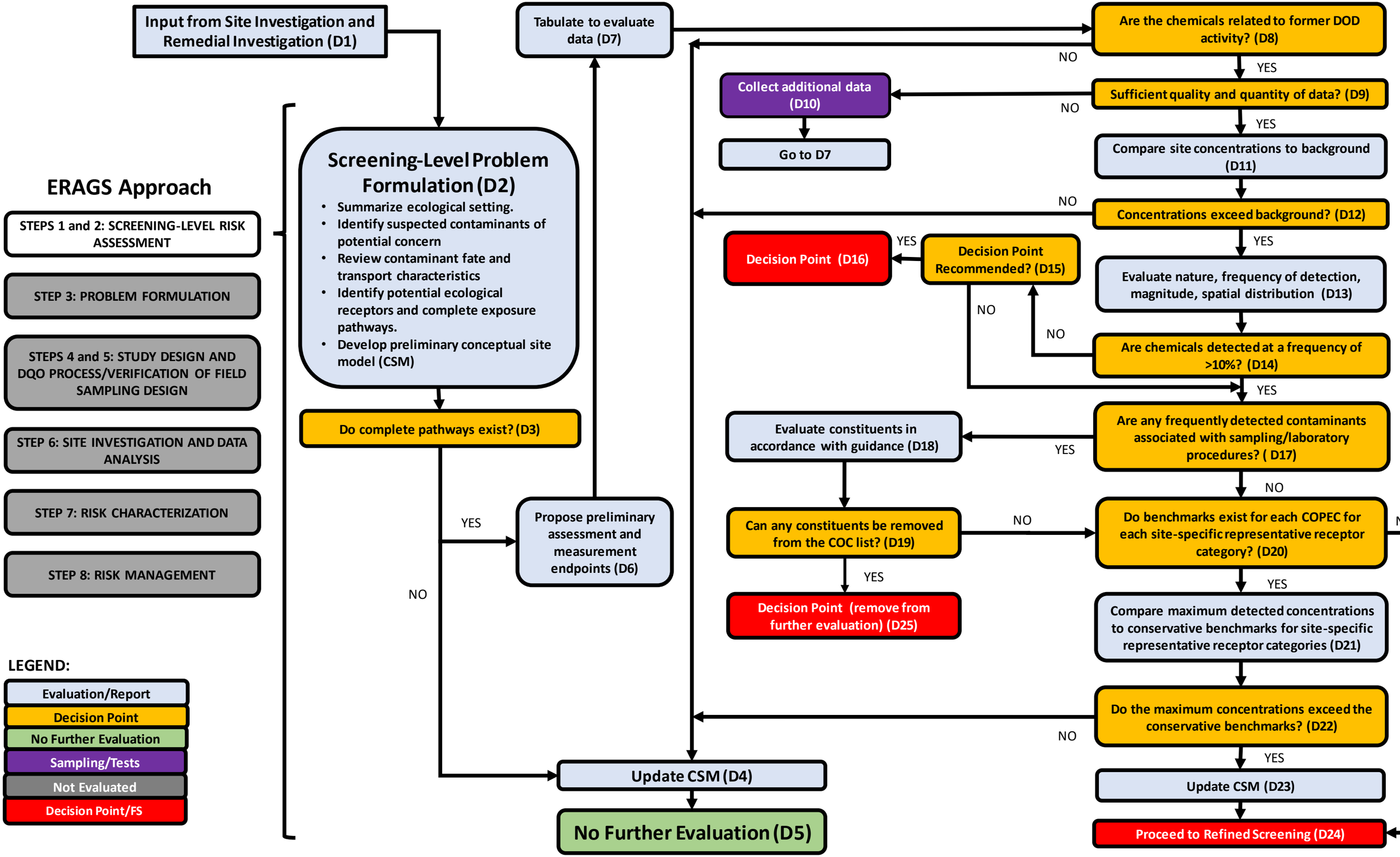

Figure 2: Refined Screening Level Ecological Risk Assessment (RSLERA) Flow Chart

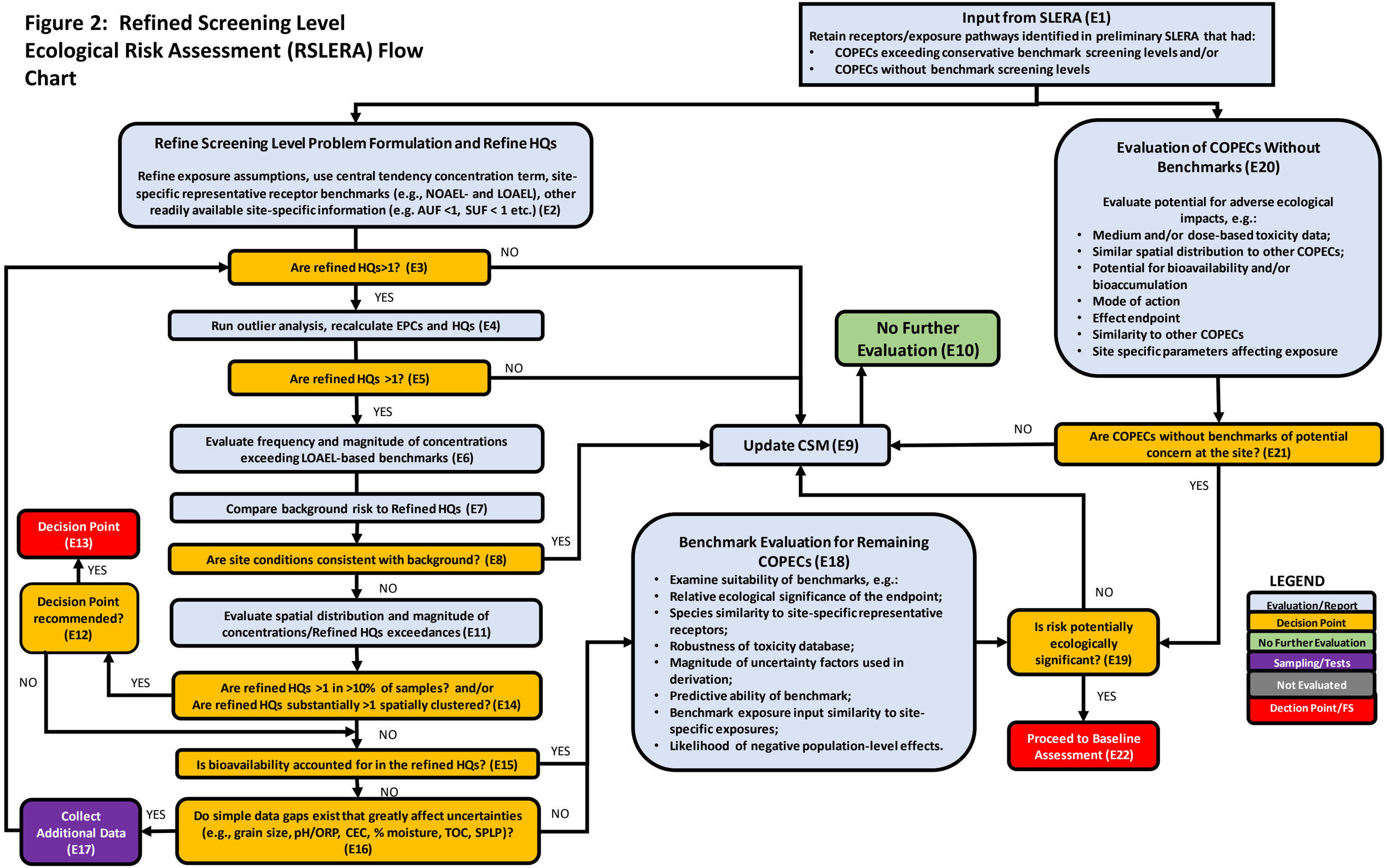

Figure 3: Baseline Ecological Risk Assessment (BERA) Flow Chart

ERAGS Approach

- STEPS 1 and 2: SCREENING-LEVEL RISK ASSESSMENT
- STEP 3: PROBLEM FORMULATION
- STEPS 4 and 5: STUDY DESIGN AND DQO PROCESS/VERIFICATION OF FIELD SAMPLING DESIGN
- STEP 6: SITE INVESTIGATION AND DATA ANALYSIS
- STEP 7: RISK CHARACTERIZATION
- STEP 8: RISK MANAGEMENT

Input from RSLERA (F1)
Evaluate receptors and pathways for COPECs that indicate the potential for ecologically significant risk.

Perform a Baseline Problem Formulation, e.g.: evaluate toxicity and bioaccumulation; determine final assessment and measurement endpoints; complete exposure pathways; refine conceptual site model; and ask questions/form hypotheses to direct data collection, analyses, and risk evaluation (F2)

Develop sampling and analysis plan based upon completed exposure pathways (F3)

Surface Water (F4)

Data Collection Options
e.g.,
- Toxicity testing (survival, growth, reproduction)
- Bioaccumulation evaluation
- Tissue analysis (epibenthic, fish)
- Community assessment (epibenthic, fish)
- Fish health profile
- Fish growth and age metrics evaluation
- Biomarker assessment

Sediment (F5)

Data Collection Options
e.g.,
- Toxicity testing (survival, growth, reproduction)
- Bioaccumulation evaluation
- Tissue analysis (benthic, fish)
- Community assessment (benthic, fish)
- Toxicity Identification Evaluation (TIE)

Soil (F6)

Data Collection Options
e.g.,
- Toxicity testing (survival, growth, reproduction)
- Bioaccumulation evaluation
- Tissue analysis (plant, invertebrate, bird, mammal)
- Vegetative community analysis
- Assess populations (numbers, biomass)
- Dietary tissue analysis

Using the various lines of evidence, evaluate if a risk exists for each Assessment and/or Measurement Endpoint (F7)

Is risk potentially ecologically significant? (F8)

NO

YES

Update CSM (F9)

No Further Evaluation (F10)

Develop Preliminary Remediation Goals (PRGs)/Perform Feasibility Study for Retained Receptors (F11)

LEGEND:

- Evaluation/Report
- Decision Point
- No Further Evaluation
- Sampling/Tests
- Not Evaluated
- Decision Point/FS

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Attachment B

Shoreline Reconnaissance Memorandum

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15 April 2020

TECHNICAL MEMORANDUM

TO: Cheryl Montgomery, USACE ERDC
Erin Kirby, USACE NAE

FROM: Tom King, PWS, EA
Melissa Beauchemin, EA
Tim Reese, EA

CC: Todd Beckwith, USACE NAB
Dan Hinckley, EA
Amanda Kohn, EA

SUBJECT: Iona Island Shoreline Reconnaissance Survey

On 6-7 April 2020, two scientists from EA Engineering, Science, and Technology, Inc., PBC (EA) conducted a Shoreline Reconnaissance Survey at the Iona Island Naval Ammunition Depot, Formerly Used Defense Site. The project site is located in Stony Point, Rockland County, New York (Figure 1). Prior to conducting the survey, four "Recon Areas" were established (Figure 2) in the Hazardous Toxic and Radioactive Waste (HTRW) Remedial Investigation (RI) Uniform Federal Policy (UFP) - Quality Assurance Project Plan (QAPP) for the project site (EA, 2020). These areas include:

- Area 1 – Hudson River Shoreline
- Area 2 – Iona Marsh Shoreline
- Area 3 – Western Shoreline between Iona and Round Island
- Area 4 – CSX Railroad Tracks (West and East side)

In addition to surveying the four identified shoreline Recon Areas, EA personnel also generally characterized the upland conditions throughout Iona and Round Islands and conducted a reconnaissance of potential background sediment sampling locations.

The purpose of the Shoreline Reconnaissance Survey was to identify potential areas of sediment accumulation that could be suitable for sampling along the shoreline, identify and document habitat areas for potential ecological receptors, and identify potential preferential pathways to the shoreline from the upland portion of the island.

Should the results of the Phase I soil sampling investigation on the uplands portion of Iona Island indicate source-pathway-receptor interaction, including a pathway from Iona Island to the shoreline, potential habitat and/or receptors, and if physical parameters indicate a sink of contaminants, then sediments samples will be collected for chemical parameters as part of the Phase II investigation to evaluate potential site impacts to the Iona Island shoreline that are representative of significant habitat, could present a potential exposure pathway to human or ecological receptors, and could potentially be impacted by site-related contaminants.

During the survey, EA personnel traversed the shoreline areas on foot to identify potential areas of interest. EA marked areas of interest with orange and white survey flagging which were also recorded with a sub-meter accurate GPS unit. The areas of interest were geo-referenced on an aerial photograph provided in Appendix A (Figure 3). Photographs of key features are presented in Appendix B and the location of each photograph was mapped on Figure 4.

Area 1 – Hudson River Shoreline

Recon Area 1 consists of the shoreline along the Hudson River, which is located on the east side of Iona Island. The majority of the shoreline in this Recon Area consists of a stone river wall which was measured as approximately 6 feet in height (Photo 5). EA identified approximately 1,100 feet of river wall, although the wall is not contiguous along the shoreline—three large breaks in the wall were identified where the wall has partially collapsed (Photo 6). Additionally, small gaps between the stones were also observed along the length of the wall where the Hudson River passes through the wall at high tide and forms pockets of water behind the wall. EA observed large areas of cobble and boulder-sized stone at the northern and southern ends of the river wall as well as at the identified wall breaks. The large stones were mostly submerged during high tide but exposed during low tide (Photos 1 and 2). EA identified amphipods and aquatic snails on the underside of many of the large stones when flipped over (Photos 3 and 4). However, there was little silty or fine sediment in this area, with the majority of the substrate consisting of cobble and course-grained sand.

The majority of the area along the river wall consists of exposed bedrock (Photo 11) and gravel with the exception of some small pockets of sediment deposition. EA identified three small distinct areas of sediment deposition along the shoreline of Recon Area 1 (Photos 14 and 17). Each of these areas was identified for sediment sampling for grain size and total organic carbon (TOC). Sediment sampling was conducted on 7 April 2020.

EA also identified 6 potential outfall pipes along the river wall area of Recon Area 1. Pipe 1 was identified as an 18-inch concrete pipe located on the northern end of the river wall (Photo 6). This outfall pipe extends approximately 8 feet into the Hudson River during high tide. Pipe 2 was identified as a 12-inch steel pipe located in the central portion of Recon Area 1, near the historic causeway/pier (Photo 8). Additional steel piping and cables were observed in this area. It was unclear during the survey if this 12-inch pipe was part of the causeway road infrastructure (conduit piping) or an outfall discharge pipe. Approximately 30 feet south of Pipe 2, three additional discharge pipes were observed—two 8-inch steel pipes were identified in the wall and one 10-inch terracotta pipe was identified partially exposed in the ground above the wall (Photos 9 and 10). Lastly, Pipe 3 is a 14-inch concrete pipe identified at the southern end of the wall (Photo 12).

The pipes were identified as potential preferential pathways leading to the shoreline although their origins could not be identified at the time of the field survey. Based on the locations of mapped former buildings/structures identified on Figure 2, Pipes 1 and 3 appear to be in the areas of former buildings/structures. Pipe 2 does not appear to be in an area with former buildings/structures.

Area 2 – Iona Marsh Shoreline

Recon Area 2 consists of the shoreline area along the west side of Iona Island. This area is divided by a railroad embankment which supports an active CSX rail line. The western side of the railroad tracks and south of the entrance road consists of a tidal marsh (Photo 23) dominated by cattails (*Typha spp.*); the area east of the railroad tracks (Photo 18) is dominated by an extremely dense monotypic stand of common reed (*Phragmites australis*). The western side of the railroad tracks and north of the entrance road is dominated by phragmites as well. Recon Area 2 consists of typical tidal marsh areas common along the Hudson River. A fine-grained sediment bottom is present throughout the marsh (Photo 30). Three sediment sample locations were selected in this area to document sediment characteristics.

Although no outfall pipes were identified during the recon survey along the shoreline of Recon Area 2, a potential preferential pathway was identified. One groundwater seep was observed on the northwestern portion of Recon Area 2, in the vicinity of the entrance road to Iona Island (Photo 23). This groundwater seep was identified along the upland slope between the marsh and the existing railroad tracks. EA staff observed groundwater discharge along the upland slope into the marsh and a sediment sample was taken at this location. An outfall pipe was not observed in this location.

Area 3 – Western Shoreline Between Iona and Round Island

Recon Area 3 consists of the shoreline area on the southwest side of Iona Island and western portion of Round Island. This area includes the low portion of land between the two islands. Unlike Recon Areas 1 and 2, this area is not a true shoreline, as historic fill and disturbance has significantly altered this area. Recon Area 3 consists of a mix of *Phragmites* tidal wetland on the southern and western end of the area, a tidal wetland swale consisting of various plant species, and a rip-rap filled drainage swale.

Although no outfall pipes were identified during the survey along the shoreline of Recon Area 3, two potential preferential pathways were identified. The southern end of Iona Island appears to drain down towards the *Phragmites* dominated low point between Iona Island and Round Island. This area slopes slightly to the south east to a rip-rap filled drainage swale (Photo 20) that directs flow to the south, towards the tidal marsh associated with Recon Area 2. A tidal wetland swale also identified along Recon Area 3 appears to convey flow to the west toward the tidal marsh associated with Recon Area 2.

Just north of Recon Area 3, EA identified a *Phragmites* filled wetland depression on the north side of the Iona Island perimeter road. This depression appears to collect surface runoff from Iona Island, but EA staff were unable to identify a culvert beneath the road connecting this depression to the tidal wetland swale within Recon Area 3.

Area 4 – CSX Railroad Tracks (West and East Side)

Recon Area 4 includes the areas along the east and west side of the railroad track embankment and primarily consists of rip-rap along an upland embankment. The northern portion of Recon Area 4 includes a scrub-shrub upland along the edge of the rip-rap (Photo 24); the southern end of the recon area includes a transition from rip-rap to existing marsh areas associated with Recon Area 2 (Photo 19).

EA did not identify any discharge outfall pipes along Recon Area 4. No culverts were identified beneath the railroad embankment that could connect drainage from Iona Island on the east of the railroad embankment to the marsh on the western side of the railroad embankment. EA identified only one hydrological connection through the railroad embankment, connecting the cattail marsh to the west with the *Phragmites* marsh on the east. This connection is located outside the project area at an embankment opening (i.e., shallow bridge) approximately 1,500 feet away, across the marsh from Round Island.

Flora and Fauna Observations

In addition to identifying potential pathways and characterizing the shoreline conditions of the site, EA's environmental scientists also documented wildlife to determine potential ecological receptors at the site. Wildlife observations included incidental observations and did not include a formal survey for specific species. In general, the observations made are consistent of what would be expected for the habitat areas described above. A list of wildlife observations along with the general recon area depicting where each species was identified is provided in Table 1.

Table 1. Wildlife Observations

Common Name	Scientific Name	Recon Area Observed				
		Area 1	Area 2	Area 3	Area 4	Upland
White tailed deer	*Odocoileus virginianus*		X	X		X
Grey squirrel	*Sciurus carolinensis*				X	X
Northern water snake	*Nerodia sipedon*			X		
Black rat snake	*Panthrophis obsoletus*		X	X		
Painted turtle	*Chrysemys picta*		X			
Terrestrial snail	--	X				
Aquatic snail	--	X				
Amphipod	--	X				
Turkey vulture	*Cathartes aura*	X	X	X	X	X
Osprey	*Pandion haliaethus*	X	X	X		X
American crow	*Corvus brachyrhynchos*	X			X	X
Red-winged blackbird	*Agelaius phoeniceus*		X	X		
Mourning dove	*Agelaius phoeniceus*					X
Northern cardinal	*Cardinalis cardinalis*					X
Northern bluejay	*Cyanocitta cristata*			X		X
Great scaup	*Aythya marila*	X				
Pileated woodpecker	*Dryocopus pileatus*					X
Ring-billed gull	*Larus delawarensis*	X				X

As previously mentioned, *Phragmites* and cattail were the dominant aquatic vegetation. The upland habitat consists primarily of invasive species including Japanese barberry (*Berberis thunbergii*), multiflora rose (*Rosa multiflora*), wineberry (*Rubus phoenicolasius*), and Japanese honeysuckle (*Lonicera japonica*). Other dominant species located within the upland areas included maples (*Acer spp.*), *Forsythia spp*., devil's walkingstick (*Aralia spinosa*), and red cedar (*Juniperus virginiana*). Milkweed (*Asclepias syriaca*) was also identified.

Sediment Sampling

EA collected sediment samples on 7 April 2020 from areas identified as depositional. EA identified seven sediment sampling locations, including three locations in Recon Area 1 (SD 04, SD 05, and SD 06), three locations in Recon Area 2 (SD 01, SD 02, SD 03), and one location in Recon Area 3 (SD 07). The seven sediment locations are depicted on Figure 3. Sediment samples were collected for analysis of grain size and TOC. Grain size appears to vary from coarse sand and cobbles in Recon Area 1 to fine silts and clays in Recon Areas 2 and 3.

Potential Sediment Background Locations

EA identified two potential upstream background sediment sampling locations (Figure 5). The first potential background sampling location was identified as Constitution Island, which is located approximately 7 miles upstream of Iona Island on the eastern bank of the Hudson River. The island consists of approximately 175 acres of upland habitat and another 240 acres of marsh, similar to that of Iona Island. A gate prevented access to the island and signs indicated it is government property with restricted access and is believed to be part of West Point Military Academy.

The second potential background location was identified as Con Hook, which is a peninsula located approximately 3 miles upstream of Iona Island on the western side of the Hudson River. It consists of approximately 7 acres of upland

habitat and another 12 acres of a *Phragmites*-dominated marsh land, similar to that of Iona Island. Access appears only possible via boat. A boat ramp is located approximately 2 miles south of Con Hook in Mine Dock Park.

Reference

EA Engineering, Science, and Technology Inc., PBC (EA). 2020. *Uniform Federal Policy -Quality Assurance Project Plan, Hazardous Toxic and Radioactive Waste Remedial Investigation, Iona Island Naval Ammunition Depot* - Formerly Used Defense Site. January 2020.

Appendix

A Figures

B Site Photographs

APPENDIX A
FIGURES

Former Iona Island
Naval Ammunition Depot

Round Island

VICINITY MAP

Legend

- FUDS Boundary
- Bear Mountain State Park Boundary

0 0.5 1
Miles
1 in = 1 miles

N

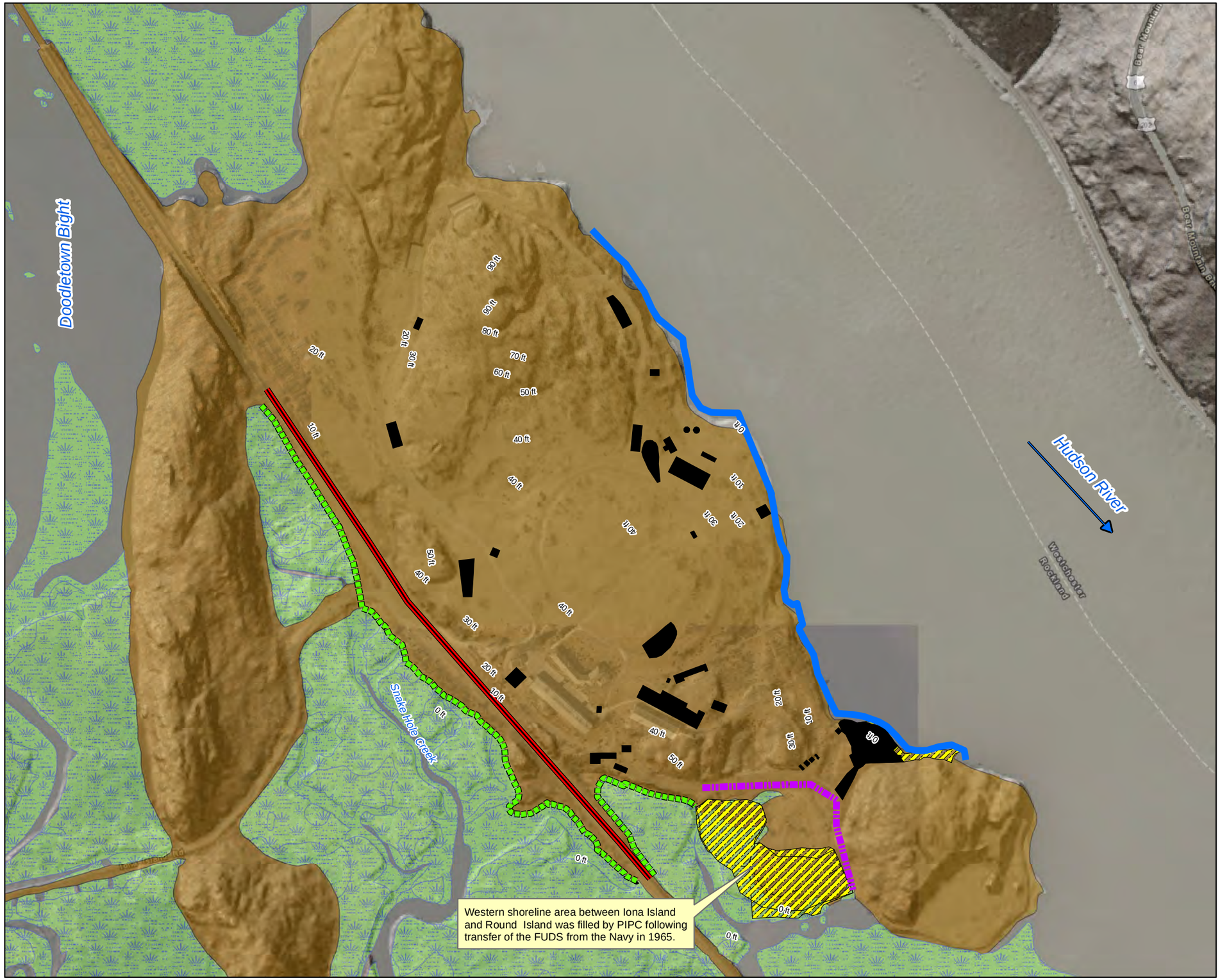
FIGURE 1
Vicinity Map

IONA ISLAND NAVAL AMMUNITION DEPOT FUDS
ROCKLAND COUNTY, NY

Aerial: ESRI ArcGIS Online Map Service

Map Date: 4/11/2020

\\lovetongis\GIS\data\Federal\Northeast\NewYork\IonaIsland\MXD\ShorelineRecon_TechMemo\Figure 1 Vicinity Map.mxd



VICINITY MAP

Legend

- HTRW RI Footprints of Former Buildings/Structures
- Disturbed Ground/Fill Area
- Upland
- Marsh/Wetland

Phase I Shoreline Reconnaissance Areas

- Recon Area 1 Hudson River Shoreline
- Recon Area 2 Iona Marsh Shoreline
- Recon Area 3 Western Shoreline Between Iona and Round Island
- Recon Area 4 CSX Railroad Tracks (East and West Sides)

0 400 800
Feet
1 in = 400 ft

N

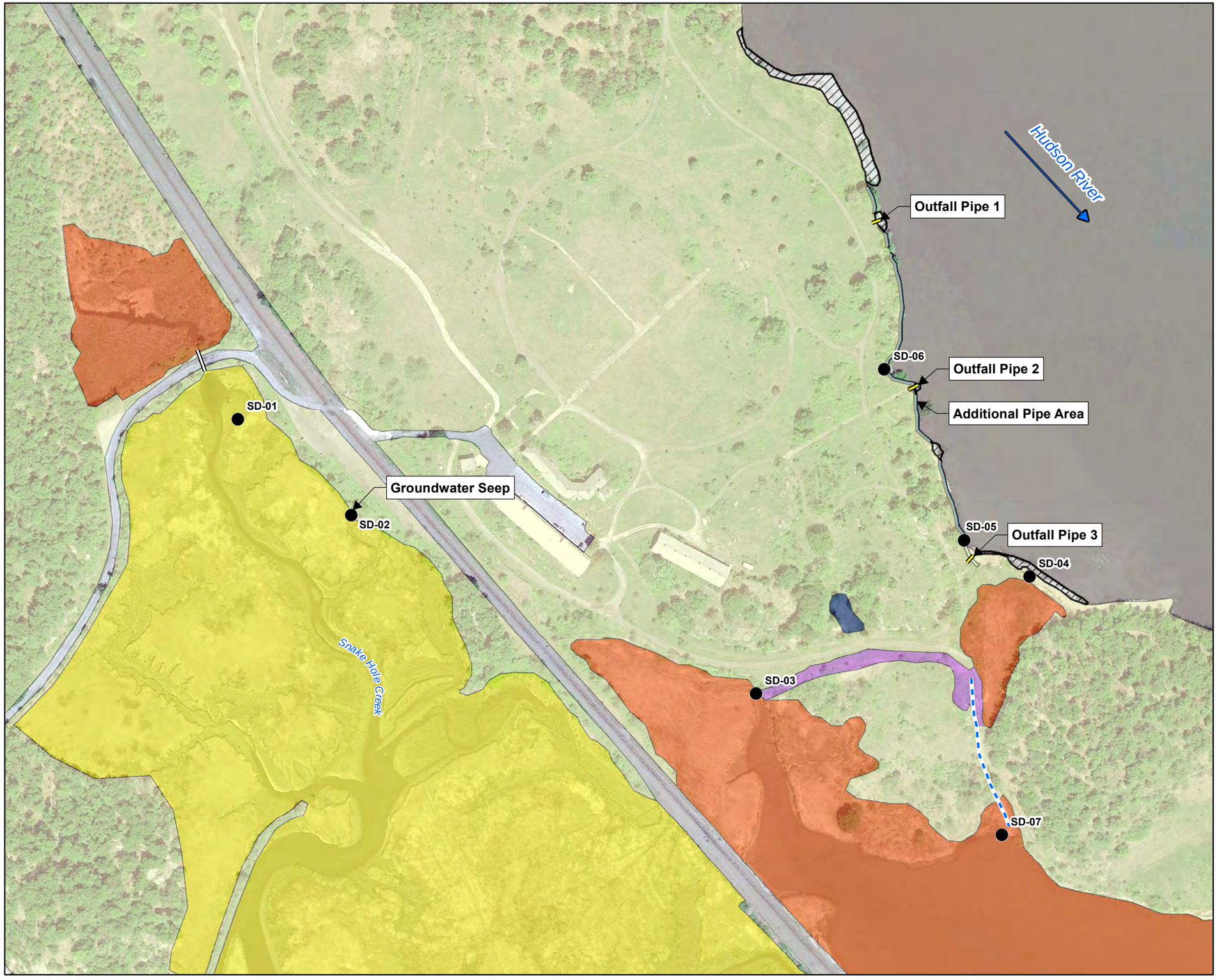
FIGURE 2
Phase I Shoreline Reconnaissance Survey Areas

IONA ISLAND NAVAL AMMUNITION DEPOT FUDS
ROCKLAND COUNTY, NY

Aerial: ESRI ArcGIS Online Map Service

Map Date: 4/11/2020

\\lovetongis\GISdata\Federal\Northeast\NewYork\IonaIsland\MXD\ShorelineRecon_TechMemo\Figure 2 Shoreline Recon Survey Areas.mxd



VICINITY MAP

Legend

- Sediment Sample Location
- Potential Preferential Pathway
- Culvert
- Outfall Pipe
- River Wall
- Upland
- Phragmites Wetland (Nontidal)
- Phragmites Tidal Wetland
- Cattail Tidal Wetland
- Tidal Wetland Swale
- Macroinvertebrate Observation Areas (Cobble and large gravel)

0 250 500
Feet
1 in = 250 ft

N

FIGURE 3
Phase I Shoreline Reconnaissance Observations

IONA ISLAND NAVAL AMMUNITION DEPOT FUDS
ROCKLAND COUNTY, NY

Aerial: Google Earth Aerial 2018

Map Date: 4/13/2020

\\lovetongis\GIS\data\Federal\Northeast\NewYork\IonaIsland\MXD\ShorelineRecon_TechMemo\Figure 3 Shoreline Recon Observations.mxd

VICINITY MAP

Legend

- Photo Location
- Photo Location Direction

0 250 500
Feet
1 in = 250 ft

N

FIGURE 4
Photo Location Map

IONA ISLAND NAVAL AMMUNITION DEPOT FUDS
ROCKLAND COUNTY, NY

Aerial: Google Earth Aerial 2018

Map Date: 4/13/2020

\\lovetongis\GIS\data\Federal\Northeast\New York\IonaIsland\MXD\ShorelineRecon_TechMemo\Figure 4 Photograph Location Map.mxd

\\lovetongis\GISdata\Federal\Northeast\NewYork\IonaIsland\MXD\ShorelineRecon_TechMemo\Figure 5 Possible Sediment Background Sample Locs.mxd eyan

VICINITY MAP

Legend

- Possible Sediment Background Sample Location
- FUDS Boundary

FIGURE 5
Possible Sediment Background Sample Locations

IONA ISLAND NAVAL AMMUNITION DEPOT FUDS
ROCKLAND COUNTY, NY

Map Date: 4/13/2020
Source: ESRI Aerial 2018
Projection: NAD 1983 State Plane New York East US Foot

APPENDIX B
SITE PHOTOGRAPHS

EA Engineering, Science, and Technology, Inc., PBC

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

1. Northernmost portion of Recon Area 1 at high tide, before start of river wall.

2. Northernmost portion of Recon Area 1 at low tide.

EA Engineering, Science, and Technology, Inc., PBC

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

3. Amphipod observed under shoreline rocks during low tide.

4. Snail observed under shoreline rocks during low tide.

EA Engineering, Science, and Technology, Inc., PBC

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

5. River wall located along the majority of Recon Area 1.

6. Pipe #1 identified along the northern portion of Recon Area 1.

EA Engineering, Science, and Technology, Inc., PBC

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

7. Sediment area observed at low tide at sample area SD-06.

8. Pipe #2 observed along Recon Area 1.

EA Engineering, Science, and Technology, Inc., PBC

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

9. Terracotta pipe identified partially buried near the historic causeway in Recon Area 1.

10. Two additional metal pipes identified along the river wall, near the historic causeway in Recon Area 1.

EA Engineering, Science, and Technology, Inc., PBC

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

11. Sample location SD-05 located between the exposed bedrock and beach area in Recon Area 1.

12. Pipe #3 located along the river wall in Recon Area 1.

EA Engineering, Science, and Technology, Inc., PBC

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

13. Coarse sand, beach glass and pebble material along the beach area on the southern portion of Recon Area 1.

14. Southernmost portion of Recon Area 1 at high tide at sediment location SD-04.

EA Engineering, Science, and Technology, Inc., PBC

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

15. Southernmost portion of Recon Area 1 at low tide.

16. Water depth of approximately 5 feet along the river wall in Recon Area 1 at high tide.

EA Engineering, Science, and Technology, Inc., PBC

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

17. Northern shoreline of Round Island.

18. *Phragmites* dominated marsh in Recon Area 2, on the eastern side of railroad tracks.

EA Engineering, Science, and Technology, Inc., PBC

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

19. Rip-rap slope and water depth of three feet along the eastern side of railroad tracks, across from Round Island.

20. Potential pathway located between Round Island and the existing fill area.

EA Engineering, Science, and Technology, Inc., PBC

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

21. View of Recon Area 3 from Round Island.

22. View of *Phragmites* dominated marsh between Iona Island and Round Island.

EA Engineering, Science, and Technology, Inc., PBC

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

23. Potential groundwater seep area along Recon Area 2 (Location of SD 02).

24. Typical view of railroad tracks in Recon Area 4.

EA Engineering, Science, and Technology, Inc., PBC

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

25. Top of river wall with evidence of historic railing or fence posts.

26. Typical metal piping observed in Recon Areas 1 and 3 which appear to be from historic railing or fence structure.

EA Engineering, Science, and Technology, Inc., PBC

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

27. Observed fence and wall drainpipe identified on Round Island.

28. Sediment sample location SD-01.

EA Engineering, Science, and Technology, Inc., PBC

Photographic Record

Shoreline Reconnaissance Photographs – Iona Island
6-7 April 2020

29. Sediment Sample Location SD-03 at hightide.

30. Sediment sample location SD-07 at low tide.

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Attachment C

Phase I Analytical Dataset

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Table C-1a. Phase I Incremental Soil Sampling Analytical Results

Location				DU-1								DU-2								DU-3							
Sample ID				IINY-DU-1A-SSIS-20200318		IINY-DU-1B-SSIS-20200318		IINY-DU-1C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-2A-SSIS-20200319		IINY-DU-2B-SSIS-20200319		IINY-DU-2C-SSIS-20200319		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-3A-SSIS-20200318		IINY-DU-3B-SSIS-20200318		IINY-DU-3C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in.)				0-6		0-6		0-6				0-6		0-6		0-6				0-6		0-6		0-6			
Matrix				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date				3/18/2020 15:00		3/18/2020 15:00		3/18/2020 15:00				3/19/2020 8:15		3/19/2020 8:15		3/19/2020 8:15				3/18/2020 15:45		3/18/2020 15:45		3/18/2020 15:45			
Analyte	CAS No.	Ecological Soil Screening Levels (mg/kg)[1]	Unit																								
Soil pH																											
pH	N/A	N/A	N/A	5.6		6.5		6.8		9.91	7.87	5.6		6.6		6.8		10.2	7.95	7.0		7.0		7.1		0.821	7.18
Mercury																											
Mercury	7439-97-6	0.013	mg/kg	0.084		0.08		0.078		4	0.0884	0.091		0.092		0.11		11	0.125	0.14		0.13		0.11		12	0.165
Target Analyte List Metals																											
Aluminum	7429-90-5	NS	mg/kg	11,000		11,000		11,000		0	11,000	13,000		13,000		13,000		0	13,000	13,000		13,000		13,000		0	13,000
Antimony	7440-36-0	0.27	mg/kg	0.52		0.51		0.47		5.29	0.567	0.61		0.62		0.68		5.95	0.732	0.7		0.63		0.65		5.46	0.751
Arsenic	7440-38-2	6.8	mg/kg	11		12		8.9	J/TR	14.9	14.6	14		13		14		4.22	15.1	15		13		12		11.5	17.2
Barium	7440-39-3	110	mg/kg	71		66		65		4.77	75.4	68		74		79		7.48	87.5	85		75		79		6.32	92.3
Beryllium	7440-41-7	2.5	mg/kg	0.52		0.5		0.55		4.81	0.587	0.54		0.55		0.65		10.5	0.733	0.57		0.56		0.54		2.74	0.595
Cadmium	7440-43-9	0.36	mg/kg	0.35		0.26		0.24		20.7	0.431	0.2		0.23		0.25		11.1	0.29	0.26		0.24		0.26		4.56	0.282
Calcium	7440-70-2	NS	mg/kg	3,700		5,100		4,800		16.3	6,390	13,000		11,000		7,800		24.7	17,200	3,100		8,200		7,400		44	13,100
Total Chromium, Total	7440-47-3	23	mg/kg	14		13		13		4.33	14.8	15		15		15		0	15	16		15		15		3.77	16.8
Cobalt	7440-48-4	13	mg/kg	7		6.8		7.5		5.08	8.01	7.6		7.4		7.7		2.02	7.95	8		7.3		7.6		4.6	8.52
Copper	7440-50-8	28	mg/kg	21		22		21		2.71	22.8	27		26		28		3.7	29.5	28		25		27		5.73	30.5
Iron	7439-89-6	NS	mg/kg	16,000		16,000		15,000		3.69	17,100	19,000		18,000		19,000		3.09	20,100	19,000		18,000		19,000		3.09	20,100
Lead	7439-92-1	11	mg/kg	84		57		52		26.8	108	78		93		110		17.1	134	150		120		120		13.3	174
Magnesium	7439-95-4	NS	mg/kg	3,800		4,700		4,300		10.6	5,400	10,000		9,000		7,300		15.6	12,200	4,400		7,200		6,600		24.3	9,780
Manganese	7439-96-5	220	mg/kg	470		470		480		1.22	488	620		660		640		3.12	690	670		580		630		7.2	740
Nickel	7440-02-0	38	mg/kg	14		14		14		0	14	17		16		18		5.88	19.5	18		16		16		6.93	19.6
Potassium	2023695	NS	mg/kg	1,200		1,200		1,200		0	1,200	1,400		1,300		1,200		7.69	1,550	1,200		1,300		1,400		7.69	1,550
Selenium	7782-49-2	0.52	mg/kg	0.44	J/TR	0.32	J/TR	0.31	J/TR	20.3	0.539	0.31	J/TR	0.33	J/TR	0.32	J/TR	3.13	0.345	0.45	J/TR	0.41	J/TR	0.39	J/TR	7.33	0.494
Silver	7440-22-4	4.2	mg/kg	0.093	U (LOQ)/L	0.099	U (LOQ)/L	0.099	U (LOQ)/L	ND	ND	0.097	U (LOQ)/L	0.097	U (LOQ)/L	0.1	U (LOQ)/L	ND	ND	0.098		0.094	U (LOQ)/L	0.099	U (LOQ)/L	2.73	0.104
Sodium	7440-23-5	NS	mg/kg	95	J/TR	100	J/TR	110	J/TR	7.51	121	75	J/TR	75	J/TR	71	J/TR	3.13	79.5	68	J/TR	88	J/TR	110	J/TR	23.7	142
Thallium	7440-28-0	0.05	mg/kg	0.14		0.12		0.12		9.12	0.156	0.13		0.13		0.13		0	0.13	0.13		0.14		0.13		4.33	0.148
Vanadium	7440-62-2	7.8	mg/kg	23		21		22		4.55	24.5	21		21		23		5.33	24.6	25		23		24		4.17	26.5
Zinc	7440-66-6	46	mg/kg	92	J/TR	76	J/TR	67	J/TR	16.2	110	72		74		80		5.53	85.8	98	J/TR	130		99	J/TR	16.7	155
Polycyclic Aromatic Hydrocarbons																											
1-Methylnaphthalene	90-12-0	29	mg/kg	0.0058	J-/H2/TR	0.0044	J-/H2/TR	0.0036	J-/H2/TR	24.2	0.0074	0.075		0.036		0.046		38.7	0.103	0.015	J-/H2/TR	0.01	J-/H2/TR	0.0071	J-/H2/TR	37.3	0.0208
2-Methylnaphthalene	91-57-6	29	mg/kg	0.0098	J-/H2	0.0062	J-/H2/TR	0.0053	J-/H2/TR	33.500	0.0131	0.055		0.031		0.04		28.9	0.0725	0.017	J-/H2/TR	0.011	J-/H2/TR	0.0088	J-/H2/TR	34.600	0.0229
Acenaphthene	83-32-9	29	mg/kg	0.007	J-/H2/TR	0.0068	J-/H2/TR	0.0054	J-/H2/TR	13.600	0.00859	0.26		0.12		0.15		41.7	0.362	0.036	J-/H2/TR	0.028	J-/H2/TR	0.015	J-/H2/TR	40.200	0.053
Acenaphthylene	208-96-8	29	mg/kg	0.041	J-/H2	0.027	J-/H2	0.026	J-/H2	26.800	0.0524	0.14		0.1		0.09		24.1	0.177	0.06	J-/H2/TR	0.031	J-/H2/TR	0.028	J-/H2/TR	44.600	0.0841
Anthracene	120-12-7	29	mg/kg	0.032	J-/H2	0.028	J-/H2	0.025	J-/H2	12.400	0.0372	0.73		0.34	J/TR	0.36	J/TR	46.1	1.03	0.14	J-/H2/TR	0.082	J-/H2/TR	0.052	J-/H2/TR	49.000	0.204
Benzo(a)anthracene	56-55-3	1.1	mg/kg	0.15	J-/H2	0.13	J-/H2	0.11	J-/H2	15.400	0.18	3.3		1.5		1.4		51.7	4.76	0.59	J-/H2	0.35	J-/H2	0.23	J-/H2	47.000	0.851
Benzo(a)pyrene	50-32-8	1.1	mg/kg	0.17	J-/H2	0.15	J-/H2	0.13	J-/H2	13.300	0.2	2.7		1.3		1.2		48.4	3.84	0.61	J-/H2	0.35	J-/H2	0.25	J-/H2	46.100	0.871
Benzo(b)fluoranthene	205-99-2	1.1	mg/kg	0.27	J-/H2	0.23	J-/H2	0.2	J-/H2	15.100	0.322	3.9		1.8		1.7		50.4	5.59	0.93	J-/H2	0.48	J-/H2	0.37	J-/H2	50.000	1.34
Benzo(g,h,i)perylene	191-24-2	1.1	mg/kg	0.13	J-/H2	0.12	J-/H2	0.1	J-/H2	13.100	0.155	1.5		0.75		0.68		46.5	2.12	0.43	J-/H2	0.26	J-/H2	0.18	J-/H2	44.000	0.611
Benzo(k)fluoranthene	207-08-9	1.1	mg/kg	0.092	J-/H2	0.076	J-/H2	0.065	J-/H2	17.500	0.112	1.2		0.61		0.48		50.3	1.73	0.27	J-/H2	0.16	J-/H2	0.13	J-/H2	39.500	0.372
Chrysene	218-01-9	1.1	mg/kg	0.17	J-/H2	0.14	J-/H2	0.12	J-/H2	17.600	0.207	3.1		1.5		1.3		50.2	4.45	0.61	J-/H2	0.35	J-/H2	0.25	J-/H2	46.100	0.871
Dibenz(a,h)anthracene	53-70-3	1.1	mg/kg	0.035	J-/H2	0.03	J-/H2	0.026	J-/H2	14.900	0.0417	0.45		0.26		0.24		36.6	0.608	0.11	J-/H2/TR	0.064	J-/H2/TR	0.055	J-/H2/TR	38.600	0.151
Fluoranthene	206-44-0	1.1	mg/kg	0.26	J-/H2	0.24	J-/H2	0.2	J-/H2	13.100	0.31	5.6		2.7		2.6		46.9	7.92	1.1	J-/H2	0.65	J-/H2	0.43	J-/H2	47.000	1.59
Fluorene	86-73-7	29	mg/kg	0.009	J-/H2	0.0077	J-/H2/TR	0.008	J-/H2/TR	8.270	0.00995	0.22		0.1		0.13		41.6	0.307	0.044	J-/H2/TR	0.025	J-/H2/TR	0.015	J-/H2/TR	52.600	0.0651
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	mg/kg	0.15	J-/H2	0.14	J-/H2	0.12	J-/H2	11.200	0.175	1.8		0.83		0.81		49.4	2.57	0.46	J-/H2	0.27	J-/H2	0.19	J-/H2	45.200	0.656
Naphthalene	91-20-3	29	mg/kg	0.011	J-/H2	0.0075	J-/H2/TR	0.0063	J-/H2/TR	29.500	0.0144	0.067		0.044		0.056		20.7	0.0846	0.023	J-/H2/TR	0.013	J-/H2/TR	0.012	J-/H2/TR	38.000	0.0313
Phenanthrene	85-01-8	29	mg/kg	0.084	J-/H2	0.09	J-/H2	0.074	J-/H2	9.780	0.103	2.8		1.4		1.5		41.1	3.87	0.53	J-/H2	0.34	J-/H2	0.21	J-/H2	44.700	0.765
Pyrene	129-00-0	1.1	mg/kg	0.26	J-/H2	0.24	J-/H2	0.2	J-/H2	13.100	0.31	5.5		2.7		2.5		47	7.79	1.1	J-/H2	0.65	J-/H2	0.44	J-/H2	46.200	1.58
Total LMW PAHs	N/A	29	mg/kg	0.3496		0.3076		0.2636		14	0.415	7.647		3.671		3.772		45.1	10.7	1.455		0.89		0.5779		45.600	2.09
Total HMW PAHs	N/A	1.1	mg/kg	1.7766		1.5636		1.3346		14.2	2.11	31.197		14.921		14.182		47.8	44.3	6.565		3.824		2.6629		46.100	9.39

Notes:
See footnotes on last page of table.

Table C-1a. Phase I Incremental Soil Sampling Analytical Results

Location				DU-4								DU-5								DU-6							
Sample ID				IINY-DU-4A-SSIS-20200318		IINY-DU-4B-SSIS-20200318		IINY-DU-4C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-5A-SSIS-20200319		IINY-DU-5B-SSIS-20200319		IINY-DU-5C-SSIS-20200319		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-6A-SSIS-20200319		IINY-DU-6B-SSIS-20200319		IINY-DU-6C-SSIS-20200319		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in.)				0-6		0-6		0-6				0-6		0-6		0-6				0-6		0-6		0-6			
Matrix				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date				3/18/2020 14:30		3/18/2020 14:30		3/18/2020 14:30				3/19/2020 9:00		3/19/2020 9:00		3/19/2020 9:00				3/19/2020 15:00		3/19/2020 15:00		3/19/2020 15:00			
Analyte	CAS No.	Ecological Soil Screening Levels (mg/kg)[1]	Unit																								
Soil pH																											
pH	NA	NA	NA	6.9		7.0		7.1		1.43	7.25	7.1		7.1		7.1		1.53E-14	7.1	7.5		7.5		7.5		0	7.5
Mercury																											
Mercury	7439-97-6	0.013	mg/kg	0.29		0.34		0.23		19	0.425	0.23		0.11		0.12		43	0.321	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Target Analyte List Metals																											
Aluminum	7429-90-5	NS	mg/kg	10,000		10,000		10,000		0	10,000	13,000		13,000		13,000		0	13,000	10,000		12,000		10,000		11	13,600
Antimony	7440-36-0	0.27	mg/kg	1.5		2.1		1.5		20.4	2.57	0.49		0.47		0.59		12.4	0.678	1.4		0.62		0.58		53.3	2.03
Arsenic	7440-38-2	6.8	mg/kg	23		30		41		29	54.2	11		11		12		5.09	12.8	10		11		8		15.8	13.5
Barium	7440-39-3	110	mg/kg	74		100		81		15.8	119	75		65		78		9.37	89.8	70		72		55		14.1	89
Beryllium	7440-41-7	2.5	mg/kg	0.43		0.49		0.53		10.4	0.61	0.53		0.58		0.63		8.62	0.706	0.58		0.55		0.46		11.8	0.687
Cadmium	7440-43-9	0.36	mg/kg	1.1		1		0.86		12.2	1.29	0.23		0.2		0.2		8.25	0.254	0.22		0.31		0.19		26	0.397
Calcium	7440-70-2	NS	mg/kg	12,000		9,800		7,200		24.9	15,700	3,000	J/M2	3,800		2,900		15.3	4,470	14,000		14,000		15,000		4.03	15,800
Total Chromium, Total	7440-47-3	23	mg/kg	14		19		18		15.6	23.7	15		15		15		0	15	14		14		11		13.3	17.4
Cobalt	7440-48-4	13	mg/kg	6.8		7.8		7.3		6.85	8.56	7.9		7.8		7.7		1.28	8.05	7.9		7.5		6.3		11.5	9.33
Copper	7440-50-8	28	mg/kg	49		61		58		11.2	71.7	25		25		24		2.34	26.1	38		42		30		16.7	52
Iron	7439-89-6	NS	mg/kg	19,000		20,000		19,000		2.99	20,800	20,000		20,000		19,000		2.94	21,100	16,000		19000		17000		8.81	21200
Lead	7439-92-1	11	mg/kg	250		360		280		19.2	440	82		76		100		14.5	117	93		130		72		29.9	172
Magnesium	7439-95-4	NS	mg/kg	8,100		6,200		5,100		23.5	10,300	4,800		5,500		4,600		9.52	6,160	10,000		10,000		11,000		5.59	11,800
Manganese	7439-96-5	220	mg/kg	430		480		510		8.54	575	800		690		700		8.33	883	870		680		520		25.4	1,130
Nickel	7440-02-0	38	mg/kg	14		17		16		9.75	19.5	18		19		17		5.56	20.5	16		16		13		11.5	19.4
Potassium	2023695	NS	mg/kg	1,200		1,300		1,300		4.56	1,410	1,300		1,200		1,200		4.68	1,380	1,200		1,200		1,200		0	1,200
Selenium	7782-49-2	0.52	mg/kg	0.38	J/TR	0.5		0.58		20.7	0.74	0.27	J/TR	0.28	J/TR	0.31	J/TR	7.26	0.339	0.4	J/TR	0.36	J/TR	0.29	J/TR	15.9	0.49
Silver	7440-22-4	4.2	mg/kg	0.1		0.11		0.098		6.26	0.119	0.099	U (LOQ)/L	0.095	U (LOQ)/L	0.098	U (LOQ)/L	ND	ND	0.1		0.065	J/TR	0.066	J/TR	25.9	0.127
Sodium	7440-23-5	NS	mg/kg	230	J/TR	230	J/TR	170	J/TR	16.5	297	64	J/TR	57	J/TR	64	J/TR	6.55	71.8	89	J/TR	86	J/TR	79	J/TR	6.06	97.6
Thallium	7440-28-0	0.05	mg/kg	0.16		0.19		0.2		11.4	0.236	0.11		0.1		0.1		5.59	0.118	0.14		0.15		0.12		11.2	0.175
Vanadium	7440-62-2	7.8	mg/kg	20		23		23		7.87	26.4	20		19		20		2.94	21.1	23		21		17		15	28
Zinc	7440-66-6	46	mg/kg	280		190		150		32.2	374	74		74		79		3.82	82.9	68		79		56		17	96.6
Polycyclic Aromatic Hydrocarbons																											
1-Methylnaphthalene	90-12-0	29	mg/kg	0.061	J-/H2/TR	0.19	UJ (LOD)/H2	0.021	J-/H2/TR	97.4	0.313	0.0056	J/TR	0.011		0.0069	J/TR	36	0.0149	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
2-Methylnaphthalene	91-57-6	29	mg/kg	0.069	J-/H2/TR	0.19	UJ (LOD)/H2	0.039	J-/H2/TR	80.5	0.301	0.0082	J/TR	0.013		0.0092	J/TR	25.000	0.0165	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Acenaphthene	83-32-9	29	mg/kg	0.2	J-/H2/TR	0.079	J-/H2/TR	0.026	J-/H2/TR	87.7	0.326	0.016		0.019		0.014		15.400	0.0227	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Acenaphthylene	208-96-8	29	mg/kg	0.23	J-/H2/TR	0.25	J-/H2/TR	0.15	J-/H2/TR	25.2	0.343	0.016		0.019		0.024		20.500	0.0298	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Anthracene	120-12-7	29	mg/kg	0.39	J-/H2/TR	0.37	J-/H2/TR	0.18	J-/H2/TR	37	0.605	0.068		0.052		0.062		13.300	0.081	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Benzo(a)anthracene	56-55-3	1.1	mg/kg	1.2	J-/H2	1.3	J-/H2	0.89	J-/H2	18.9	1.67	0.4		0.25		0.3		24.100	0.509	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Benzo(a)pyrene	50-32-8	1.1	mg/kg	1.1	J-/H2	1.1	J-/H2	1.1	J-/H2	0	1.1	0.35		0.23		0.26		22.300	0.437	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Benzo(b)fluoranthene	205-99-2	1.1	mg/kg	2.9	J-/H2	2.7	J-/H2	2.1	J-/H2	16.2	3.61	0.48		0.34		0.41		17.100	0.586	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Benzo(g,h,i)perylene	191-24-2	1.1	mg/kg	0.91	J-/H2	0.86	J-/H2/TR	0.87	J-/H2	3.01	0.947	0.22		0.15		0.17		20.000	0.271	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Benzo(k)fluoranthene	207-08-9	1.1	mg/kg	0.92	J-/H2	0.83	J-/H2/TR	0.66	J-/H2	16.4	1.14	0.16		0.11		0.13		18.900	0.197	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Chrysene	218-01-9	1.1	mg/kg	2.6	J-/H2	1.9	J-/H2	1	J-/H2	43.7	3.85	0.39		0.25		0.3		22.600	0.492	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Dibenz(a,h)anthracene	53-70-3	1.1	mg/kg	0.28	J-/H2/TR	0.3	J-/H2/TR	0.26	J-/H2	7.14	0.33	0.069		0.043		0.05		24.900	0.0879	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Fluoranthene	206-44-0	1.1	mg/kg	7.9	J-/H2	4.2	J-/H2	1.3	J-/H2	74.1	12.8	0.62		0.45		0.55		15.800	0.755	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Fluorene	86-73-7	29	mg/kg	0.27	J-/H2/TR	0.11	J-/H2/TR	0.043	J-/H2/TR	82.7	0.435	0.018		0.021		0.016		13.700	0.0247	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	mg/kg	1	J-/H2	1.1	J-/H2	1	J-/H2	5.59	1.18	0.25		0.17		0.21		19.000	0.311	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Naphthalene	91-20-3	29	mg/kg	0.18	UJ (LOD)	0.19	UJ (LOD)	0.051	J-/H2/TR	55.2	0.335	0.01		0.018		0.014		28.600	0.0241	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Phenanthrene	85-01-8	29	mg/kg	3.8	J-/H2	1.6	J-/H2	0.46	J-/H2	86.9	6.23	0.25		0.22		0.25		7.220	0.284	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Pyrene	129-00-0	1.1	mg/kg	5.7	J-/H2	3.3	J-/H2	1.3	J-/H2	64.2	8.98	0.68		0.48		0.57		17.400	0.829	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Total LMW PAHs	NA	29	mg/kg	6.22		3.709		1.86		55.700	9.44	0.7918		0.623		0.6961		12.000	0.917	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A
Total HMW PAHs	NA	1.1	mg/kg	25.03		17.999		11.04		38.800	35.6	3.7308		2.616		3.0761		17.800	4.55	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A

Table C-1a. Phase I Incremental Soil Sampling Analytical Results

Location				DU-7								DU-9							DU-10						
Sample ID				IINY-DU-7A-SSIS-20200319		IINY-DU-7B-SSIS-20200319		IINY-DU-7C-SSIS-20200319		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-9A-SSIS-20200319		IINY-DU-9B-SSIS-20200319		IINY-DU-9C-SSIS-20200319		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-10A-SSIS-20200319		IINY-DU-10B-SSIS-20200319		IINY-DU-10C-SSIS-20200319		95% Upper Confidence Limit Chebychev Test
Depth (in.)				0-6		0-6		0-6				0-6		0-6		0-6				0-6		0-6		0-6		
Matrix				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil		
Sample Date				3/19/2020 13:45		3/19/2020 13:45		3/19/2020 13:45				3/19/2020 10:40		3/19/2020 10:40		3/19/2020 10:40				3/19/2020 11:20		3/19/2020 11:20		3/19/2020 11:20		
Analyte	CAS No.	Ecological Soil Screening Levels (mg/kg)[1]	Unit																						
Soil pH																									
pH	N/A	N/A	N/A	7.4		7.4		7.5		0.777	7.58	7.1		6.9		7.0		1.43	7.25	7.1		7.1		7.2		7.28
Mercury																									
Mercury	7439-97-6	0.013	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.073		0.081		0.074		5.74	0.087	Not analyzed		Not analyzed		Not analyzed		N/A
Target Analyte List Metals																									
Aluminum	7429-90-5	NS	mg/kg	11,000		10,000		11,000		5	12,100	10,000		11,000		11,000		5	12,100	11,000		11,000		9,300		12,900
Antimony	7440-36-0	0.27	mg/kg	0.75		1.6		2.5		54.1	3.82	0.44		0.42		0.44		2.66	0.462	0.41		0.41		0.35		0.477
Arsenic	7440-38-2	6.8	mg/kg	18		17		17		3.33	18.8	7		7.3		6.9		2.95	7.59	7.5		7.2		6.5		8.36
Barium	7440-39-3	110	mg/kg	110		93		110		9.41	129	61		65		59		4.95	69.4	57		58		56		59.5
Beryllium	7440-41-7	2.5	mg/kg	0.55		0.48		0.58		9.56	0.666	0.48		0.51		0.5		3.08	0.535	0.6		0.56		0.5		0.68
Cadmium	7440-43-9	0.36	mg/kg	0.59	J/TR	0.48	J/TR	0.62	J/TR	13.1	0.749	0.23		0.22		0.26		8.8	0.289	0.17		0.19		0.19		0.212
Calcium	7440-70-2	NS	mg/kg	17,000		15,000		16,000		6.25	18,500	7,600	J-/M	5,800	J-/M	8,700	J-/MA	19.9	11,100	14,000		14,000		17,000		19,400
Total Chromium, Total	7440-47-3	23	mg/kg	17		15		16		6.25	18.5	13		13		13		0	13	14		14		13		15.1
Cobalt	7440-48-4	13	mg/kg	6.2		5.6		6.5		7.51	7.25	7.6		7.4		7.3		2.05	7.82	7.9		8		7.5		8.47
Copper	7440-50-8	28	mg/kg	43		60		44		19.5	73	30		28		27		5.39	32.2	23		23		23		23
Iron	7439-89-6	NS	mg/kg	19,000		18,000		19,000		3.09	20,100	16,000		16,000		17,000	J/A	3.53	17,800	18,000		18,000		16,000		20,200
Lead	7439-92-1	11	mg/kg	690		2,000		570		73	3,080	63		58		54		7.73	69.7	31		35		37		42
Magnesium	7439-95-4	NS	mg/kg	12,000		10,000		11,000		9.09	13,500	6,100	J-/M	5,100	J-/M	6,800	J-/M/A	14.2	8,150	10,000	J/A	9,900		11,000		11,800
Manganese	7439-96-5	220	mg/kg	480		460		630		17.8	757	510		500		470		4.22	546	570		550		520		610
Nickel	7440-02-0	38	mg/kg	14		13		15		7.14	16.5	16		14		14		7.87	17.6	16		16		15		17.1
Potassium	2023695	NS	mg/kg	1,100		1,000		1,000		5.59	1,180	1,200	J-/M	1,300	J-/M	1,300	J-/M	4.56	1,410	1,400	J/TR	1,400		1,200		1,620
Selenium	7782-49-2	0.52	mg/kg	0.38	J/TR	0.35	J/TR	0.43	J/TR	10.5	0.488	0.28	J/TR	0.28	J/TR	0.31	J/TR	5.97	0.334	0.27	J/TR	0.26	J/TR	0.3	J/TR	0.329
Silver	7440-22-4	4.2	mg/kg	0.09	J/TR	0.11		0.1		10	0.125	0.095	U (LOQ)/L	0.095	U (LOQ)/L	0.094	U (LOQ)/L	ND	ND	0.094	U (LOQ)/L	0.094	U (LOQ)/L	0.059	J/TR	0.133
Sodium	7440-23-5	NS	mg/kg	95	J/TR	85	J/TR	92	J/TR	5.66	104	170	J-/M/TR	160	J/M/TR	160	J-/M/TR	3.53	178	500	UJ (LOD)/M2	83	J/TR	88	J/TR	826
Thallium	7440-28-0	0.05	mg/kg	0.21		0.19		0.21		5.68	0.232	0.11		0.12		0.14		12.4	0.162	0.15		0.15		0.15		0.15
Vanadium	7440-62-2	7.8	mg/kg	21		18		22		10.2	25.6	25	J+/M	25	J+/M	25	J+/M	0	25	23		24		21		26.5
Zinc	7440-66-6	46	mg/kg	200		210		210		2.79	221	69		67		70		2.22	72.5	59		60		55		64.7
Polycyclic Aromatic Hydrocarbons																									
1-Methylnaphthalene	90-12-0	29	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.0075	J/TR	0.0057	J/TR	0.0057	J-/I/TR	16.5	0.00892	Not Analyzed		Not Analyzed		Not Analyzed		N/A
2-Methylnaphthalene	91-57-6	29	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.01		0.0082	J/TR	0.0078	J-/I/TR	13.5	0.0116	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Acenaphthene	83-32-9	29	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.013		0.0078	J/TR	0.011	J-/I	24.7	0.0172	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Acenaphthylene	208-96-8	29	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.036		0.03		0.026	J-/I	16.4	0.0433	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Anthracene	120-12-7	29	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.045		0.03		0.035	J-/I	20.8	0.0559	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Benzo(a)anthracene	56-55-3	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.19	J+/M	0.13	J+/M	0.15	J-/M/I	19.5	0.234	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Benzo(a)pyrene	50-32-8	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.21		0.15		0.17	J-/I	17.3	0.254	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Benzo(b)fluoranthene	205-99-2	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.35		0.23		0.26	J-/I	22.3	0.437	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Benzo(g,h,i)perylene	191-24-2	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.15	J+/M	0.1	J+/M	0.11	J-/M/I	22	0.187	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Benzo(k)fluoranthene	207-08-9	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.12		0.078		0.086	J-/I	23.6	0.151	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Chrysene	218-01-9	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.21	J+/M	0.15	J+/M	0.17	J/M/I	17.3	0.254	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Dibenz(a,h)anthracene	53-70-3	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.038		0.027		0.028	J-/I	19.6	0.0463	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Fluoranthene	206-44-0	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.44		0.27		0.34	J-/I	24.4	0.565	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Fluorene	86-73-7	29	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.017		0.0099		0.013	J-/I	26.8	0.0223	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.18	J/M	0.12	J/M	0.14	J-/M/I	20.8	0.224	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Naphthalene	91-20-3	29	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.013		0.011		0.0097	J-/I	14.8	0.0154	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Phenanthrene	85-01-8	29	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.16	J+/M	0.095	J+/M	0.12	J/M/I	26.2	0.208	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Pyrene	129-00-0	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.41		0.27		0.3	J-/I	22.6	0.512	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Total LMW PAHs	N/A	29	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.4915		0.3276		0.3782		21	0.61	Not Analyzed		Not Analyzed		Not Analyzed		N/A
Total HMW PAHs	N/A	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	2.3795		1.5826		1.8322		21.1	2.96	Not Analyzed		Not Analyzed		Not Analyzed		N/A

Table C-1a. Phase I Incremental Soil Sampling Analytical Results

Location				DU-11								DU-12							DU-13							
Sample ID				IINY-DU-11A-SSIS-20200330		IINY-DU-11B-SSIS-20200330		IINY-DU-11C-SSIS-20200330		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-12A-SSIS-20200330		IINY-DU-12B-SSIS-20200330		IINY-DU-12C-SSIS-20200330		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-13A-SSIS-20200330		IINY-DU-13B-SSIS-20200330		IINY-DU-13C-SSIS-20200330		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in.)				0-6		0-6		0-6				0-6		0-6		0-6				0-6		0-6		0-6			
Matrix				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date				3/30/2020 11:15		3/30/2020 11:15		3/30/2020 11:15				3/30/2020 12:15		3/30/2020 12:15		3/30/2020 12:15				3/30/2020 13:40		3/30/2020 13:40		3/30/2020 13:40			
Analyte	CAS No.	Ecological Soil Screening Levels (mg/kg)[1]	Unit																								
Soil pH																											
pH	N/A	N/A	N/A	7.0		7.0		7.2		1.63	7.36	5.5		6.1		6.3		6.98	7.01	6.8		7.0		6.9		1.45	7.15
Mercury																											
Mercury	7439-97-6	0.013	mg/kg	0.25	J-/M	0.15	J-/M	0.15	J-/M	31.5	0.329	0.26		0.26		0.21		11.9	0.316	0.28		0.31		0.36		12.8	0.418
Target Analyte List Metals																											
Aluminum	7429-90-5	NS	mg/kg	9,700		11,000		10,000		7	11,900	11,000		11,000		11,000		0	11,000	11,000		11,000		12,000		5	12,800
Antimony	7440-36-0	0.27	mg/kg	0.74		0.83		0.9		9.74	1.03	0.7		0.63		0.58		9.47	0.788	1.2		1.4		2.5		41.2	3.46
Arsenic	7440-38-2	6.8	mg/kg	37		43		39		7.7	47.4	13		14		14		4.22	15.1	9.7		11		11		7.1	12.5
Barium	7440-39-3	110	mg/kg	76		79		78		1.97	81.5	84		79		79		3.58	87.9	88		86		96		5.88	103
Beryllium	7440-41-7	2.5	mg/kg	0.55		0.59		0.51		7.27	0.651	0.69		0.62		0.63		5.85	0.742	0.61		0.55		0.64		7.64	0.715
Cadmium	7440-43-9	0.36	mg/kg	0.37		0.36		0.37		1.57	0.381	0.38		0.33		0.35		7.12	0.417	0.74		0.77		0.75		2.03	0.792
Calcium	7440-70-2	NS	mg/kg	28,000		25,000		27,000		5.73	30,500	10,000		11,000		13,000		13.5	15,200	9,200		8,500		8,900		3.96	9,750
Total Chromium, Total	7440-47-3	23	mg/kg	15	J+/M	15	J+/M	15	J+/M	0	15	15		15		15		0	15	15		14		15		3.94	16.1
Cobalt	7440-48-4	13	mg/kg	6.7		7		6.7		2.55	7.24	7.6		7.9		7.5		2.72	8.19	8.6		8.2		8.5		2.47	8.96
Copper	7440-50-8	28	mg/kg	30		37		33		10.5	42.2	51		48		47		4.28	53.9	220		600		260		58	985
Iron	7439-89-6	NS	mg/kg	17,000	J/A	19,000		19,000		6.3	21,200	17,000		17,000		17,000		0	17,000	18,000		18,000		19,000		3.15	19,800
Lead	7439-92-1	11	mg/kg	150		110		150		9.36	152	92		83		89		4.47	94.2	190		150		160		12.5	219
Magnesium	7439-95-4	NS	mg/kg	19,000		17,000		18,000		5.56	20,500	7,100		7,200		8,600		11	9,740	5,700		5,500		5,400		2.76	5,920
Manganese	7439-96-5	220	mg/kg	600		600		600		0	600	940		820		790		9.34	1,050	1,000		830		1,100		14	1,320
Nickel	7440-02-0	38	mg/kg	16		16		16		0	16	15		15		15		0	15	16		16		17		3.53	17.8
Potassium	2023695	NS	mg/kg	910		960		1,000		4.71	1,070	1,100		1,100		1,100		0	1,100	1,400		1,400		1,400		0	1,400
Selenium	7782-49-2	0.52	mg/kg	0.47	J/TR	0.61		0.57		13.1	0.731	0.51		0.54		0.24	J/TR	38.4	0.846	0.55		0.6		0.68		10.7	0.775
Silver	7440-22-4	4.2	mg/kg	0.073	J/TR	0.082	J/TR	0.084	J/TR	7.35	0.0944	0.069	J/TR	0.069	J/TR	0.075	J/TR	4.88	0.0797	0.086	J/TR	0.094	J/TR	0.089	J/TR	4.51	0.0998
Sodium	7440-23-5	NS	mg/kg	61	J/TR	56	J/TR	64	J/TR	6.7	70.5	73	J/TR	67	J/TR	68	J/TR	4.64	77.4	120	J/TR	120	J/TR	130	J/TR	4.68	138
Thallium	7440-28-0	0.05	mg/kg	0.19		0.22		0.22		8.25	0.254	0.15		0.14		0.15		3.94	0.161	0.16		0.16		0.18		6.93	0.196
Vanadium	7440-62-2	7.8	mg/kg	22	J+/M	24	J+/M	23	J+/M	4.35	25.5	28		26		27		3.7	29.5	30		30		31		1.9	31.8
Zinc	7440-66-6	46	mg/kg	87		100		110		11.6	128	95		100		93		3.76	105	140		150		170		9.96	192
Polycyclic Aromatic Hydrocarbons																											
1-Methylnaphthalene	90-12-0	29	mg/kg	0.028	J-/H2/TR	0.027	J-/H2/TR	0.023	J-/H2/TR	10.2	0.0327	0.073	J-/H2/TR	0.044	J-/H2/TR	0.053	J-/H2/TR	26.2	0.094	0.38	J-/H2/TR	0.45	J-/H2/TR	0.26	J-/H2/TR	26.4	0.605
2-Methylnaphthalene	91-57-6	29	mg/kg	0.043	J-/H2/TR	0.044	J-/H2/TR	0.036	J-/H2/TR	10.6	0.052	0.098	J-/H2/TR	0.055	J-/H2/TR	0.053	J-/H2/TR	37	0.133	0.43	J-/H2/TR	0.5	J-/H2/TR	0.31	J-/H2/TR	23.2	0.655
Acenaphthene	83-32-9	29	mg/kg	0.02	J-/H2/TR	0.029	J-/H2/TR	0.015	J-/H2/TR	33.3	0.0392	0.54	J-/H2	0.36	J-/H2/TR	0.39	J-/H2	22.4	0.673	4.5	J-/H2	4.7	J-/H2	2.6	J-/H2	29.5	6.85
Acenaphthylene	208-96-8	29	mg/kg	0.17	J-/H2/TR	0.23	J-/H2	0.16	J-/H2/TR	20.3	0.282	0.088	J-/H2/TR	0.029	J-/H2/TR	0.062	J-/H2/TR	49.6	0.134	0.21	UJ (LOD)/H2	1.3	J-/H2/TR	0.2	UJ (LOD)/H2	111	2.16
Anthracene	120-12-7	29	mg/kg	0.13	J-/H2/TR	0.15	J-/H2/TR	0.097	J-/H2	21.3	0.193	0.86	J-/H2	0.59	J-/H2	0.75	J-/H2	18.5	1.08	6.6	J-/H2	8	J-/H2	3.9	J-/H2	33.8	11.4
Benzo(a)anthracene	56-55-3	1.1	mg/kg	0.67	J-/H2	0.97	J-/H2	0.52	J-/H2	31.8	1.3	2.2	J-/H2	1.5	J-/H2	2.1	J-/H2	19.6	2.89	16	J-/H2	17	J-/H2	9.4	J-/H2	29.2	24.5
Benzo(a)pyrene	50-32-8	1.1	mg/kg	0.87	J-/H2	1.2	J-/H2	0.75	J-/H2	24.8	1.53	1.8	J-/H2	1.2	J-/H2	1.8	J-/H2	21.7	2.47	12	J-/H2	13	J-/H2	7.1	J-/H2	29.5	18.6
Benzo(b)fluoranthene	205-99-2	1.1	mg/kg	1.2	J-/H2	1.6	J-/H2	1.1	J-/H2	20.4	1.97	2.8	J-/H2	1.6	J-/H2	2.6	J-/H2	27.6	3.95	17	J-/H2	17	J-/H2	9.7	J-/H2	28.9	25.2
Benzo(g,h,i)perylene	191-24-2	1.1	mg/kg	0.82	J-/H2	1.2	J-/H2	0.78	J-/H2	24.8	1.52	1.4	J-/H2	0.69	J-/H2	1.3	J-/H2	34	2.1	7.2	J-/H2	7.9	J-/H2	4.2	J-/H2	30.6	11.4
Benzo(k)fluoranthene	207-08-9	1.1	mg/kg	0.43	J-/H2	0.57	J-/H2	0.36	J-/H2	23.6	0.722	1.1	J-/H2	0.62	J-/H2	0.97	J-/H2	27.7	1.52	6.4	J-/H2	7.4	J-/H2	3.8	J-/H2	31.7	10.5
Chrysene	218-01-9	1.1	mg/kg	0.96	J-/H2	1.3	J-/H2	0.75	J-/H2	27.7	1.7	2.4	J-/H2	1.5	J-/H2	2.2	J-/H2	23.2	3.22	16	J-/H2	16	J-/H2	9.3	J-/H2	28.1	23.5
Dibenz(a,h)anthracene	53-70-3	1.1	mg/kg	0.18	J-/H2/TR	0.23	J-/H2	0.16	J-/H2	19	0.281	0.38	J-/H2	0.2	J-/H2/TR	0.37	J-/H2	31.9	0.571	2.3	J-/H2	2.4	J-/H2	1.2	J-/H2/TR	33.9	3.64
Fluoranthene	206-44-0	1.1	mg/kg	1.1	J-/H2	1.3	J-/H2	0.71	J-/H2	28.9	1.79	4.2	J-/H2	3.1	J-/H2	4.3	J-/H2	17.2	5.54	34	J-/H2	38	J-/H2	21	J-/H2	28.7	53.4
Fluorene	86-73-7	29	mg/kg	0.043	J-/H2/TR	0.061	J-/H2/TR	0.028	J-/H2	37.6	0.0856	0.44	J-/H2	0.28	J-/H2/TR	0.32	J-/H2/TR	24	0.556	3.2	J-/H2	3.9	J-/H2	2	J-/H2	31.7	5.45
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	mg/kg	0.78	J-/H2	1.1	J-/H2	0.74	J-/H2	22.6	1.37	1.5	J-/H2	0.76	J-/H2	1.4	J-/H2	32.9	2.23	7.9	J-/H2	9.2	J-/H2	4.9	J-/H2	30.1	12.9
Naphthalene	91-20-3	29	mg/kg	0.098	J-/H2/TR	0.092	J-/H2/TR	0.068	J-/H2/TR	18.5	0.126	0.25	J-/H2/TR	0.12	J-/H2/TR	0.086	J-/H2/TR	56.9	0.37	0.95	J-/H2/TR	1.1	J-/H2/TR	0.75	J-/H2/TR	18.8	1.38
Phenanthrene	85-01-8	29	mg/kg	0.42	J-/H2	0.42	J-/H2	0.22	J-/H2	32.7	0.644	3.2	J-/H2	2.3	J-/H2	2.7	J-/H2	16.5	3.87	26	J-/H2	27	J-/H2	15	J-/H2	29.4	39.4
Pyrene	129-00-0	1.1	mg/kg	1.2	J-/H2	1.6	J-/H2	0.87	J-/H2	29.9	2.14	3.5	J-/H2	2.5	J-/H2	3.6	J-/H2	19	4.73	27	J-/H2	30	J-/H2	17	J-/H2	27.6	41.8
Total LMW PAHs	N/A	29	mg/kg	1.622		2.023		1.167		26.7	2.68	7.749		5.278		6.514		19	9.62	58.06		63.95		34.22		30.2	91.7
Total HMW PAHs	N/A	1.1	mg/kg	8.632		11.493		7.037		24.9	14.7	25.529		16.448		23.554		21.9	33.9	176.86		191.85		104.82		29.5	275

Table C-1a. Phase I Incremental Soil Sampling Analytical Results

Location				DU-14							DU-15								DU-16							
Sample ID				IINY-DU-14A-SSIS-20200320		IINY-DU-14B-SSIS-20200320		IINY-DU-14C-SSIS-20200320		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-15A-SSIS-20200401		IINY-DU-15B-SSIS-20200401		IINY-DU-15C-SSIS-20200401		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-16A-SSIS-20200331		IINY-DU-16B-SSIS-20200331		IINY-DU-16C-SSIS-20200331		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in.)				0-6		0-6		0-6				0-6		0-6		0-6				0-6		0-6		0-6			
Matrix				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date				3/20/2020 8:30		3/20/2020 8:30		3/20/2020 8:30				4/1/2020 8:20		4/1/2020 8:20		4/1/2020 8:20				3/31/2020 9:50		3/31/2020 9:50		3/31/2020 9:50			
Analyte	CAS No.	Ecological Soil Screening Levels (mg/kg)[1]	Unit																								
Soil pH																											
pH	N/A	N/A	N/A	6.7		6.9		7.0		2.22	7.25	6.2		6.3		6.6		3.27	6.89	6.9		6.9		7.4		4.09	7.79
Mercury																											
Mercury	7439-97-6	0.013	mg/kg	0.16		0.18		0.19		8.65	0.215	0.14		0.21		0.29		35.2	0.402	0.097		0.096		0.096		0.599	0.0978
Target Analyte List Metals																											
Aluminum	7429-90-5	NS	mg/kg	10,000		11,000		10,000		6	11,800	11,000		11,000		11,000		0	11,000	15,000		14,000		13,000		7	16,500
Antimony	7440-36-0	0.27	mg/kg	0.6		0.56		0.59		3.57	0.636	1.1		0.7		0.7		27.7	1.41	0.44		0.4		0.42		4.76	0.47
Arsenic	7440-38-2	6.8	mg/kg	16		18		17		5.88	19.5	7		6.5		7.1		4.68	7.68	7.1		6.8		7.2		2.96	7.56
Barium	7440-39-3	110	mg/kg	76		81		78		3.21	84.7	58		61		62		3.45	65.6	61		56		59		4.29	65
Beryllium	7440-41-7	2.5	mg/kg	0.53		0.57		0.55		3.64	0.6	0.47		0.5		0.47		3.61	0.524	0.6		0.6		0.53		7.01	0.678
Cadmium	7440-43-9	0.36	mg/kg	0.28		0.27		0.28		2.09	0.291	0.58		0.38		0.58		22.5	0.804	0.25		0.33		0.27		14.7	0.388
Calcium	7440-70-2	NS	mg/kg	9,500	J+/M	8,900	J+/M	6,800	J+/M/A	16.9	12,000	7,100		7,500		9,900		18.5	12,000	8,000		7,600		7,200		5.26	8,610
Total Chromium, Total	7440-47-3	23	mg/kg	13		14		14		4.22	15.1	15		15		15		0	15	15		15		14		3.94	16.1
Cobalt	7440-48-4	13	mg/kg	6.8		6.9		7.3		3.78	7.67	6.8		6.7		6.8		0.853	6.91	8.5		8		8.4		3.19	8.97
Copper	7440-50-8	28	mg/kg	23		26		25		6.19	28.5	30	J/TR	31	J/TR	33	J/TR	4.88	35.2	38		33		39		8.77	44.8
Iron	7439-89-6	NS	mg/kg	16,000		17,000		16,000	J/A	3.53	17,800	19,000		18,000		18,000		3.15	19,800	22,000		20,000		21,000		4.76	23,500
Lead	7439-92-1	11	mg/kg	96		120		110		11.1	139	130		130		120		4.56	141	38		42		46		9.52	52.1
Magnesium	7439-95-4	NS	mg/kg	7,100	J+/M	6,800	J+/M	5,500	J+/M	13.2	8,610	6,000		5,900		7,700		15.5	9,080	6,500		6,200		6,100		3.32	6,790
Manganese	7439-96-5	220	mg/kg	670		720		700		3.61	760	410		480		430		8.19	531	450		430		440		2.27	465
Nickel	7440-02-0	38	mg/kg	15		16		16		3.69	17.1	14		14		15		4.03	15.8	16		16		16		0	16
Potassium	2023695	NS	mg/kg	980		1,000		1,000		1.16	1,020	1,200		1,200		1,200		0	1,200	1,700		1,600		1,400		9.75	1,950
Selenium	7782-49-2	0.52	mg/kg	0.38	J/TR	0.38	J/TR	0.4	J/TR	2.99	0.416	0.52		0.62		0.47	J/TR	14.2	0.729	0.4	J/TR	0.4	J/TR	0.35	J/TR	7.53	0.456
Silver	7440-22-4	4.2	mg/kg	0.08	J/TR	0.063	J/TR	0.087	J/TR	16.1	0.108	0.079	J/TR	0.089		0.073	J/TR	10.1	0.101	0.055	J/TR	0.063	J/TR	0.057	J/TR	7.14	0.0688
Sodium	7440-23-5	NS	mg/kg	72	J-/M/TR	70	J-/M/TR	73	J-/M/TR	2.13	75.5	75	J/TR	81	J/TR	77	J/TR	3.93	85.4	440	J/TR	360	J/TR	330	J/TR	15.1	520
Thallium	7440-28-0	0.05	mg/kg	0.11		0.13		0.12		8.33	0.145	0.16		0.15		0.16		3.69	0.171	0.13		0.12		0.12		4.68	0.138
Vanadium	7440-62-2	7.8	mg/kg	20		20		20		0	20	25		26		25		2.28	26.8	28		30		30		3.94	32.2
Zinc	7440-66-6	46	mg/kg	74		74		78		3.07	81.1	250		120		120		46	352	70		71		66		3.83	75.7
Polycyclic Aromatic Hydrocarbons																											
1-Methylnaphthalene	90-12-0	29	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.026	J-/I	0.028		0.0077	J-/TR	54.4	0.0487
2-Methylnaphthalene	91-57-6	29	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.033	J-/I	0.041		0.0082	J-/TR	62.4	0.0704
Acenaphthene	83-32-9	29	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.15	J-/I	0.14		0.036		58.1	0.268
Acenaphthylene	208-96-8	29	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.032	J-/I	0.034		0.028		9.75	0.039
Anthracene	120-12-7	29	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.18	J-/I	0.16		0.063		46.6	0.292
Benzo(a)anthracene	56-55-3	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.5	J-/I	0.44		0.21		39.9	0.769
Benzo(a)pyrene	50-32-8	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.47	J-/I	0.43		0.24		32.3	0.689
Benzo(b)fluoranthene	205-99-2	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.71	J-/I	0.65		0.33		36.3	1.08
Benzo(g,h,i)perylene	191-24-2	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.31	J-/I	0.29		0.15		34.9	0.469
Benzo(k)fluoranthene	207-08-9	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.26	J-/I	0.23		0.12		36.3	0.389
Chrysene	218-01-9	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.49	J-/I	0.44		0.21		39.3	0.756
Dibenz(a,h)anthracene	53-70-3	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.1	J-/I	0.085		0.042		39.8	0.151
Fluoranthene	206-44-0	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	1	J-/I	0.96		0.41		41.7	1.62
Fluorene	86-73-7	29	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.1	J-/I	0.1		0.027		55.7	0.182
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.38	J-/I	0.35		0.19		33.3	0.564
Naphthalene	91-20-3	29	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.064	J-/I	0.089		0.012		71.4	0.154
Phenanthrene	85-01-8	29	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.74	J-/I	0.66		0.2		54.6	1.27
Pyrene	129-00-0	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	0.86	J-/I	0.8		0.35		41.6	1.37
Total LMW PAHs	N/A	29	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	1.825		1.692		0.5919		49.4	3.07
Total HMW PAHs	N/A	1.1	mg/kg	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	Not Analyzed		Not Analyzed		Not Analyzed		N/A	N/A	6.045		5.567		2.4939		41	9.55

1. EPA Region 4 Ecological Risk Assessment Supplemental Guidance. Scientific Support Section Superfund Division EPA Region 4. March 2018. Screening values are further detailed in Appendix E, Ecological Risk Assessment Work Plan

DU-8 (AOC #5: Former Building 207 – Marine Garage Building) was not sampled because it would not be possible to separate metals and PAH contaminants originating from former Building 207, from contaminants originating from drums and other debris observed in DU-8.

Notes:

% = Percent
CAS = Chemical Abstracts Service
EPA = U.S. Environmental Protection Agency
HMW = High molecular weight
in. = Inch(es)
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LMW = Low molecular weight
LOD = Limit of detection
LOQ = Limit of quantitation
mg/kg = Milligram(s) per kilogram
N/A = Not applicable
ND = Not detected
No. = Number
NS = No standard
PAH = Polycyclic aromatic hydrocarbon
PCB = Polychlorinated biphenyl
RSD = Relative standard deviation
RSL = Regional screening level
U = Analyte not detected Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate
- = Bias low
+ = Bias high

Validation Reason Codes:

A Serial dilution
C LCS Recovery
D MS RPD
H2 Prep Hold Time
I Surrogate recovery outside project limits
L Lab Blank
M MS Recovery
M2 Post Spike
P1 Column RPD
TR Trace Level Detect
V2 CCV

Concentrations highlighted in blue exceed EPA Region 4 Ecological Soil Screening Levels.

Table C-1b. Phase I Incremental Soil Sampling Analytical Results

Location				DU-17																	
Sample ID				IINY-DU-17A-SSIS-20200331		IINY-DU-17B-SSIS-20200331		IINY-DU-17C-SSIS-20200331		%RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-17A-SBIS1-20200331		IINY-DU-17B-SBIS1-20200331		IINY-DU-17C-SBIS1-20200331		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in.)				0-6		0-6		0-6				6-36		6-36		6-36			
Matrix				Surface Soil		Surface Soil		Surface Soil				Subsurface Soil		Subsurface Soil		Subsurface Soil			
Sample Date				3/31/2020 8:15		3/31/2020 8:15		3/31/2020 8:15				3/31/2020 8:45		3/31/2020 8:45		3/31/2020 8:45			
Analyte	**CAS No.**	**Ecological Soil Screening Levels (mg/kg)[1]**	**Unit**																
Soil pH																			
pH	N/A	N/A	N/A	7.2		7.2		7.1		0.806	7.31	7.0		7.4		7.7		4.77	8.25
Mercury																			
Mercury	7439-97-6	0.013	mg/kg	0.98		0.61		0.77		24	1.25	0.9		0.8		0.77		8	0.995
Target Analyte List Metals																			
Aluminum	7429-90-5	NS	mg/kg	5,400		5,300		7,000		16	8,300	6,100		5,900		6,100		2	6,320
Antimony	7440-36-0	0.27	mg/kg	9.9		7.3		6.5		22.5	12.4	4.8		4.5		4.4		4.56	5.09
Arsenic	7440-38-2	6.8	mg/kg	8.2		2.7		8.8		51.2	15	22		25		23		6.55	27.2
Barium	7440-39-3	110	mg/kg	150		120		130		11.5	172	460		330		280		26.1	590
Beryllium	7440-41-7	2.5	mg/kg	0.38		0.15		0.53		54.2	0.835	1.2		1.3		1.5		11.5	1.72
Cadmium	7440-43-9	0.36	mg/kg	5		20		16		56.8	33.2	3.9		3.4		3.2		10.3	4.41
Calcium	7440-70-2	NS	mg/kg	74,000		43,000		58,000		26.6	97300	14,000		19,000		22,000		22	28,500
Total Chromium, Total	7440-47-3	23	mg/kg	19		6.9		25		54.3	40.2	13		13		12		4.56	14.1
Cobalt	7440-48-4	13	mg/kg	7.2		4.9		5.7		19.7	8.87	6.3		6.8		6.6		3.83	7.2
Copper	7440-50-8	28	mg/kg	210		83		280		52.3	442	180		130		150		19.7	219
Iron	7439-89-6	NS	mg/kg	16,000		14,000		19,000		15.4	22,700	26,000		26,000		25,000		2.25	27,100
Lead	7439-92-1	11	mg/kg	2,900		1,500		1,200		48.6	4,150	2,700		1,200		820		63.2	4,070
Magnesium	7439-95-4	NS	mg/kg	45,000		26,000		34,000		27.3	59,000	6,400		8,500		9,800		20.8	12,600
Manganese	7439-96-5	220	mg/kg	400		380		440		7.51	484	170		170		170		0	170
Nickel	7440-02-0	38	mg/kg	16		5.9		20		52	32.3	19		21		19		5.87	22.6
Potassium	2023695	NS	mg/kg	1100		1100		1400		14.4	1640	610		550		560		5.61	654
Selenium	7782-49-2	0.52	mg/kg	0.52		0.2	J/TR	0.68		52.4	1.08	1.1		1.4		1.5		15.6	1.86
Silver	7440-22-4	4.2	mg/kg	0.59		0.56		0.72		13.6	0.837	0.3		0.25		0.24		12.2	0.344
Sodium	7440-23-5	NS	mg/kg	400	J/TR	370	J/TR	490		14.9	577	510		480		510		3.46	544
Thallium	7440-28-0	0.05	mg/kg	0.12		0.1		0.15		20.4	0.187	0.6		0.72		0.8		14.2	0.96
Vanadium	7440-62-2	7.8	mg/kg	17		18		22		13.9	25.7	24		22		21		6.84	26.2
Zinc	7440-66-6	46	mg/kg	8,200		7,200		5,700		17.9	10,200	1,900		2,900		1,600		31.9	3,850
Polycyclic Aromatic Hydrocarbons																			
1-Methylnaphthalene	90-12-0	29	mg/kg	0.03		0.026		0.037		18	0.045	0.087	J-/I	0.098	J-/I	0.11	J-/I	11.7	0.127
2-Methylnaphthalene	91-57-6	29	mg/kg	0.044		0.039		0.056		18.900	0.0683	0.12	J-/I	0.14	J-/I	0.16	J-/I	14.300	0.19
Acenaphthene	83-32-9	29	mg/kg	0.035		0.028		0.044		22.500	0.0559	0.068	J-/I	0.058	J-/I	0.087	J-/I	20.700	0.108
Acenaphthylene	208-96-8	29	mg/kg	0.13		0.11		0.18		25.800	0.231	0.031	J-/I	0.035	J-/I	0.042	J-/I	15.500	0.05
Anthracene	120-12-7	29	mg/kg	0.17		0.15		0.24		25.300	0.306	0.21		0.081	J-/I	0.16	J-/I	43.300	0.314
Benzo(a)anthracene	56-55-3	1.1	mg/kg	0.58		0.48	J-/I	0.89		32.900	1.19	0.7		0.2	J-/I	0.47	J-/I	54.800	1.09
Benzo(a)pyrene	50-32-8	1.1	mg/kg	0.5		0.41	J-/I	0.75		31.800	0.997	0.45		0.11	J-/I	0.31	J-/I	58.900	0.72
Benzo(b)fluoranthene	205-99-2	1.1	mg/kg	0.88		0.71	J-/I	1.3		31.500	1.73	0.97		0.32	J-/I	0.67	J-/I	49.800	1.47
Benzo(g,h,i)perylene	191-24-2	1.1	mg/kg	0.32		0.29		0.45		24.100	0.567	0.34		0.13	J-/I	0.27	J-/I	43.300	0.516
Benzo(k)fluoranthene	207-08-9	1.1	mg/kg	0.28		0.24		0.38		24.000	0.481	0.23	J-/I	0.051	J-/I	0.17	J-/I	60.600	0.38
Chrysene	218-01-9	1.1	mg/kg	0.66		0.57	J-/I	1		30.500	1.31	1		0.48	J-/I	0.8	J-/I	34.500	1.42
Dibenz(a,h)anthracene	53-70-3	1.1	mg/kg	0.12		0.093		0.15		23.600	0.193	0.15	J-/I	0.068	J-/I	0.13	J-/I	36.900	0.224
Fluoranthene	206-44-0	1.1	mg/kg	1.1		0.94	J-/I	1.6		28.400	2.08	1.5		0.44	J-/I	1	J-/I	54.100	2.11
Fluorene	86-73-7	29	mg/kg	0.043		0.035		0.06		27.800	0.0781	0.076	J-/I	0.064	J-/I	0.11	J-/I	28.600	0.143
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	mg/kg	0.38		0.3	J-/I	0.52		27.800	0.68	0.29		0.085	J-/I	0.25	J-/I	52.200	0.482
Naphthalene	91-20-3	29	mg/kg	0.073		0.069		0.094		17.100	0.112	0.2	J-/I	0.24	J-/I	0.28	J-/I	16.700	0.341
Phenanthrene	85-01-8	29	mg/kg	0.49		0.4	J-/I	0.74		32.400	0.987	1.1		0.48	J-/I	0.88	J-/I	38.300	1.61
Pyrene	129-00-0	1.1	mg/kg	1.1		0.92	J-/I	1.6		29.200	2.09	1.5		0.4	J-/I	0.87	J-/I	48.800	1.84
Total LMW PAHs	N/A	29	mg/kg	1.015		0.857		1.451		27.800	1.88	1.892		1.196		1.829		23.500	2.61
Total HMW PAHs	N/A	1.1	mg/kg	5.92		4.953		8.64		29.400	11.3	6.83		2.284		4.94		48.700	10.4
Polychlorinated Biphenyls																			
PCB, Total	1336-36-3	0.041	mg/kg	0.14		0.13		0.14		4.22	0.151	0.016	UJ (LOD)/I	0.015	UJ (LOD)/I	0.015	UJ (LOD)/I	ND	ND
PCB-1016 (Aroclor 1016)	12674-11-2	0.041	mg/kg	0.03	U (LOD)	0.027	U (LOD)	0.027	U (LOD)	ND	ND	0.031	UJ (LOD)/I	0.029	UJ (LOD)/I	0.028	UJ (LOD)/I	ND	ND
PCB-1221 (Aroclor 1221)	11104-28-2	0.041	mg/kg	0.078	U (LOD)	0.071	U (LOD)	0.071	U (LOD)	ND	ND	0.082	UJ (LOD)/I	0.075	UJ (LOD)/I	0.073	UJ (LOD)/I	ND	ND
PCB-1232 (Aroclor 1232)	11141-16-5	0.041	mg/kg	0.03	U (LOD)	0.027	U (LOD)	0.027	U (LOD)	ND	ND	0.031	UJ (LOD)/I	0.029	UJ (LOD)/I	0.028	UJ (LOD)/I	ND	ND
PCB-1242 (Aroclor 1242)	53469-21-9	0.041	mg/kg	0.047	U (LOD)	0.043	U (LOD)	0.043	U (LOD)	ND	ND	0.049	UJ (LOD)/I	0.045	UJ (LOD)/I	0.044	UJ (LOD)/I	ND	ND
PCB-1248 (Aroclor 1248)	12672-29-6	0.041	mg/kg	0.095		0.084		0.087		6.41	0.103	0.015	UJ (LOD)/I	0.014	UJ (LOD)/I	0.014	UJ (LOD)/I	ND	ND
PCB-1254 (Aroclor 1254)	11097-69-1	0.041	mg/kg	0.032	U (LOD)	0.03	U (LOD)	0.03	U (LOD)	ND	ND	0.034	UJ (LOD)/I	0.031	UJ (LOD)/I	0.03	UJ (LOD)/I	ND	ND
PCB-1260 (Aroclor 1260)	11096-82-5	0.041	mg/kg	0.044	J/TR	0.041	J/TR	0.048	J/TR	7.92	0.0532	0.0068	UJ (LOD)/I/V2	0.0063	UJ (LOD)/I/V2	0.0031	J-/I/TR/V2/P1	37.2	0.0105
PCB-1262 (Aroclor 1262)	37324-23-5	0.041	mg/kg	0.016	U (LOD)	0.014	U (LOD)	0.014	U (LOD)	ND	ND	0.016	UJ (LOD)/I	0.015	UJ (LOD)/I	0.015	UJ (LOD)/I	ND	ND
PCB-1268 (Aroclor 1268)	11100-14-4	0.041	mg/kg	0.0065	UJ (LOD)/V2	0.0059	UJ (LOD)/V2	0.0059	UJ (LOD)/V2	ND	ND	0.0068	UJ (LOD)/I	0.0063	UJ (LOD)/I	0.0061	UJ (LOD)/I	ND	ND
Explosives Residues																			
1,3,5-Trinitrobenzene (TNB)	99-35-4	0.3	mg/kg	0.038	U (LOD)	0.037	UJ (LOD)/I	0.037	U (LOD)	ND	ND	0.038	U (LOD)	0.038	U (LOD)	0.038	U (LOD)	ND	ND
1,3-Dinitrobenzene (DNB)	99-65-0	0.034	mg/kg	0.038	UJ (LOD)-/C	0.037	UJ (LOD)-/I/C	0.037	UJ (LOD)-/C	ND	ND	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	ND	ND
2,4,6-Trinitrotoluene (TNT)	118-96-7	7.5	mg/kg	0.096	UJ (LOD)-/C	0.093	UJ (LOQ)-/I/C	0.092	UJ (LOQ)-/C	ND	ND	0.095	UJ (LOQ)-/C	0.095	UJ (LOQ)-/C	0.096	UJ (LOQ)-/C	ND	ND
2,4-Dinitrotoluene (24DNT)	121-14-2	6	mg/kg	0.038	UJ (LOD)-/C	0.037	UJ (LOD)-/I/C	0.037	UJ (LOD)-/C	ND	ND	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	ND	ND
2,6-Dinitrotoluene (26DNT)	606-20-2	4	mg/kg	0.038	UJ (LOD)-/C	0.037	UJ (LOD)-/I/C	0.037	UJ (LOD)-/C	ND	ND	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	ND	ND
2-Amino-4,6-dinitrotoluene (2AMDNT)	35572-78-2	14	mg/kg	0.096	U (LOQ)	0.093	UJ (LOQ)/I	0.092	U (LOQ)	ND	ND	0.095	U (LOQ)	0.095	U (LOQ)	0.096	UJ (LOQ)/I	ND	ND
2-Nitrotoluene (2NT)	88-72-2	0.19	mg/kg	0.096	U (LOD)	0.093	UJ (LOD)/I	0.092	U (LOD)	ND	ND	0.095	U (LOD)	0.095	U (LOD)	0.096	U (LOD)	ND	ND
3,5-Dinitroaniline	618-87-1	NS	mg/kg	0.019	U (LOD)	0.019	UJ (LOD)/I	0.018	U (LOD)	ND	ND	0.019	U (LOD)	0.019	U (LOD)	0.019	U (LOD)	ND	ND
3-Nitrotoluene (3NT)	99-08-1	0.13	mg/kg	0.19	UJ (LOQ)-/C	0.19	UJ (LOQ)-/I/C	0.18	UJ (LOQ)-/C	ND	ND	0.19	UJ (LOQ)-/C	0.19	UJ (LOQ)-/C	0.19	UJ (LOQ)-/C	ND	ND
4-Amino-2,6-dinitrotoluene (4AMDNT)	19406-51-0	12	mg/kg	0.096	U (LOQ)	0.093	UJ (LOQ)/I	0.092	U (LOQ)	ND	ND	0.095	U (LOQ)	0.095	U (LOQ)	0.096	U (LOQ)	ND	ND
4-Nitrotoluene (4NT)	99-99-0	0.14	mg/kg	0.096	UJ (LOD)-/C	0.093	UJ (LOD)-/I/C	0.092	UJ (LOD)-/C	ND	ND	0.095	UJ (LOD)-/C	0.095	UJ (LOD)-/C	0.096	UJ (LOD)-/C	ND	ND
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	2.3	mg/kg	0.096	U (LOD)	0.093	U (LOD)	0.092	U (LOD)	ND	ND	0.095	U (LOD)	0.095	U (LOD)	0.096	U (LOD)	ND	ND
Nitrobenzene (NB)	98-95-3	2.2	mg/kg	0.19	UJ (LOD)-/C	0.19	UJ (LOD)-/I/C	0.18	UJ (LOD)-/C	ND	ND	0.19	UJ (LOD)-/C	0.19	UJ (LOD)-/C	0.19	UJ (LOD)-/C	ND	ND
Nitroglycerin (NG)	55-63-0	13	mg/kg	0.67	U (LOD)	0.65	UJ (LOD)/I	0.64	U (LOD)	ND	ND	0.67	U (LOD)	0.67	U (LOD)	0.67	U (LOD)	ND	ND
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	16	mg/kg	0.067	U (LOD)	0.065	UJ (LOD)/I	0.064	U (LOD)	ND	ND	0.067	U (LOD)	0.067	U (LOD)	0.067	U (LOD)	ND	ND
Pentaerythritol tetranitrate (PETN)	78-11-5	2.2	mg/kg	0.96	U (LOD)	0.93	UJ (LOD)/I	0.92	U (LOD)	ND	ND	0.95	U (LOD)	0.95	U (LOD)	0.96	U (LOD)	ND	ND
Tetryl	479-45-8	0.018	mg/kg	0.096	UJ (LOD)-/C	0.093	UJ (LOD)-/I/C	0.092	UJ (LOD)-/C	ND	ND	0.095	UJ (LOD)-/C	0.095	UJ (LOD)-/C	0.096	UJ (LOD)-/C	ND	ND

Notes:
See footnotes on last page of table.

Table C-1b. Phase I Incremental Soil Sampling Analytical Results

			Location	DU-18																	
			Sample ID	IINY-DU-18A-SSIS-20200331		IINY-DU-18B-SSIS-20200331		IINY-DU-18C-SSIS-20200331		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-18A-SBIS1-20200331		IINY-DU-18B-SBIS1-20200331		IINY-DU-18B-SBIS1-20200331		% RSD	95% Upper Confidence Limit Chebychev Test
			Depth (in.)	0-6		0-6		0-6				6-36		6-36		6-36			
			Matrix	Surface Soil		Surface Soil		Surface Soil				Subsurface Soil		Subsurface Soil		Subsurface Soil			
			Sample Date	3/31/2020 13:45		3/31/2020 13:45		3/31/2020 13:45				3/31/2020 14:20		3/31/2020 14:20		3/31/2020 14:20			
Analyte	**CAS No.**	**Ecological Soil Screening Levels (mg/kg)[1]**	**Unit**																
Soil pH																			
pH	N/A	N/A	N/A	7.5		8.0		7.8		3.24	8.4	8.1		8.1		8		0.716	8
Mercury																			
Mercury	7439-97-6	0.013	mg/kg	4.3		2.3		1.5		53	6.33	0.71		2.1		0.71		68	3.19
Target Analyte List Metals																			
Aluminum	7429-90-5	NS	mg/kg	11,000		11,000		6,500		27	16,000	4,300		4,800		5,900		16	7,060
Antimony	7440-36-0	0.27	mg/kg	6.5		6.2		6.9		5.38	7.42	11		13		5.5		39.5	19.6
Arsenic	7440-38-2	6.8	mg/kg	7.8		15		15		33	23.1	17		19		16		8.81	21.2
Barium	7440-39-3	110	mg/kg	360		230		240		26.1	459	330		310		270		10.1	380
Beryllium	7440-41-7	2.5	mg/kg	0.56		0.55		0.66		10.3	0.743	0.64		0.69		0.63		4.92	0.734
Cadmium	7440-43-9	0.36	mg/kg	5.2		4.2		4.5		11.1	5.92	7.6		24		4.7		86	38.3
Calcium	7440-70-2	NS	mg/kg	12,000		12,000		13,000		4.68	13,800	44,000		32,000		20,000		37.5	62,200
Total Chromium, Total	7440-47-3	23	mg/kg	14		33		240		131	411	33		32		29		6.64	36.6
Cobalt	7440-48-4	13	mg/kg	7.6		7		7.2		4.2	8.04	7.5		5		6.5		19.9	9.5
Copper	7440-50-8	28	mg/kg	40		1,700		1,000		91.2	3,010	5,500		5,600		5,100		4.9	6,070
Iron	7439-89-6	NS	mg/kg	35,000		35,000		27,000		14.3	44,000	43000		36000		33000		13.7	50,200
Lead	7439-92-1	11	mg/kg	1,500		1,400		1,400		4.03	1,580	2,900		2,000		2,400		18.5	3,570
Magnesium	7439-95-4	NS	mg/kg	7900		7800		7,900		0.734	8,010	24,000		17,000		11,000		37.5	33,700
Manganese	7439-96-5	220	mg/kg	540		550		450		10.7	652	480		450		510		6.25	555
Nickel	7440-02-0	38	mg/kg	16		29		30		31.2	44.7	79		64		52		20.8	99
Potassium	2023695	NS	mg/kg	2,300		2,300		920		43.3	3,850	480		590		1,100		45.7	1560
Selenium	7782-49-2	0.52	mg/kg	0.36	J/TR	0.74		0.58		34.1	1.04	0.79		0.95		0.86		9.25	1.07
Silver	7440-22-4	4.2	mg/kg	0.92		0.63		0.85		18.9	1.18	1.5		2.1		0.83		43	3.08
Sodium	7440-23-5	NS	mg/kg	810		590		1,100		17.2	1,060	420	J/TR	430	J/TR	430	J/TR	1.35	441
Thallium	7440-28-0	0.05	mg/kg	0.13		0.21		0.2		24.2	0.29	0.35		0.31		0.27		12.9	0.411
Vanadium	7440-62-2	7.8	mg/kg	29		24		29	J/A	10.6	34.6	17		18		18		3.27	19.1
Zinc	7440-66-6	46	mg/kg	83		1,800		1,600		80.9	3,520	5,600		5,000		3,100		28.6	7,850
Polycyclic Aromatic Hydrocarbons																			
1-Methylnaphthalene	90-12-0	29	mg/kg	0.04		0.04	J-/I	0.041	J-/I	1.43	0.0418	0.1	J-/I	0.08	J-/I	0.086	J-/I	11.6	0.114
2-Methylnaphthalene	91-57-6	29	mg/kg	0.07		0.06	J-/I	0.072	J-/I	9.550	0.0835	0.12	J-/I	0.095	J-/I	0.1	J-/I	12.600	0.138
Acenaphthene	83-32-9	29	mg/kg	0.046		0.055	J-/I	0.052	J-/I	8.990	0.0625	0.23	J-/I	0.18	J-/I	0.18	J-/I	14.700	0.269
Acenaphthylene	208-96-8	29	mg/kg	0.059		0.074	J-/I	0.12	J-/I	37.700	0.164	0.041	J-/I	0.063	J-/I	0.066	J-/I	24.100	0.091
Anthracene	120-12-7	29	mg/kg	0.13		0.17	J-/I	0.21	J-/I	23.500	0.271	0.12	J-/I	0.16	J-/I	0.23	J-/I	32.800	0.31
Benzo(a)anthracene	56-55-3	1.1	mg/kg	0.49	J-/I	0.63	J-/I	1		37.300	1.37	0.28	J-/I	0.44	J-/I	0.79		51.800	1.16
Benzo(a)pyrene	50-32-8	1.1	mg/kg	0.44	J-/I	0.58	J-/I	0.92		38.200	1.27	0.15	J-/I	0.28	J-/I	0.64		71.200	0.995
Benzo(b)fluoranthene	205-99-2	1.1	mg/kg	0.86	J-/I	1.1	J-/I	1.6		31.800	2.14	0.44	J-/I	0.77	J-/I	1.3		51.900	1.93
Benzo(g,h,i)perylene	191-24-2	1.1	mg/kg	0.3		0.41	J-/I	0.64		38.600	0.887	0.14	J-/I	0.24	J-/I	0.51		64.500	0.778
Benzo(k)fluoranthene	207-08-9	1.1	mg/kg	0.21		0.31	J-/I	0.45		37.300	0.627	0.075	J-/I	0.14	J-/I	0.28		63.500	0.429
Chrysene	218-01-9	1.1	mg/kg	0.86	J-/I	1.1	J-/I	1.5		28.000	1.97	0.65	J-/I	1.1	J-/I	1.7		45.800	2.48
Dibenz(a,h)anthracene	53-70-3	1.1	mg/kg	0.11		0.16	J-/I	0.19	J-/I	26.400	0.255	0.064	J-/I	0.1	J-/I	0.2	J-/I	58.100	0.299
Fluoranthene	206-44-0	1.1	mg/kg	0.97	J-/I	1.2	J-/I	1.7		28.900	2.23	0.72	J-/I	0.93	J-/I	1.4		34.200	1.89
Fluorene	86-73-7	29	mg/kg	0.061		0.071	J-/I	0.068	J-/I	7.700	0.0796	0.15	J-/I	0.14	J-/I	0.16	J-/I	6.670	0.175
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	mg/kg	0.31		0.45	J-/I	0.71		41.400	1	0.1	J-/I	0.22	J-/I	0.45		69.300	0.704
Naphthalene	91-20-3	29	mg/kg	0.24		0.2	J-/I	0.24	J-/I	10.200	0.285	0.71	J-/I	0.46	J-/I	0.51		23.600	0.893
Phenanthrene	85-01-8	29	mg/kg	0.62	J-/I	0.78	J-/I	0.9		18.300	1.12	0.66	J-/I	0.86	J-/I	1.4		39.300	1.94
Pyrene	129-00-0	1.1	mg/kg	0.87	J-/I	1.1	J-/I	1.7		35.000	2.3	0.62	J-/I	0.89	J-/I	1.3		36.600	1.8
Total LMW PAHs	N/A	29	mg/kg	1.266		1.45		1.703		14.900	2.03	2.131		2.038		2.732		16.400	3.25
Total HMW PAHs	N/A	1.1	mg/kg	5.42		7.04		10.41		33.400	14	3.239		5.11		8.57		48.000	12.4
Polychlorinated Biphenyls																			
PCB, Total	1336-36-3	0.041	mg/kg	0.29		0.17		0.4	J-/I	40.1	0.576	0.15		0.1		0.057	J	45.5	0.219
PCB-1016 (Aroclor 1016)	12674-11-2	0.041	mg/kg	0.029	U (LOD)	0.028	U (LOD)	0.029	UJ (LOD)/I	ND	ND	0.03	U (LOD)	0.028	U (LOD)	0.029	U (LOD)	ND	ND
PCB-1221 (Aroclor 1221)	11104-28-2	0.041	mg/kg	0.075	U (LOD)	0.074	U (LOD)	0.076	UJ (LOD)/I	ND	ND	0.078	U (LOD)	0.072	U (LOD)	0.075	U (LOD)	ND	ND
PCB-1232 (Aroclor 1232)	11141-16-5	0.041	mg/kg	0.029	U (LOD)	0.028	U (LOD)	0.029	UJ (LOD)/I	ND	ND	0.03	U (LOD)	0.028	U (LOD)	0.029	U (LOD)	ND	ND
PCB-1242 (Aroclor 1242)	53469-21-9	0.041	mg/kg	0.045	U (LOD)	0.044	U (LOD)	0.046	UJ (LOD)/I	ND	ND	0.047	U (LOD)	0.043	U (LOD)	0.045	U (LOD)	ND	ND
PCB-1248 (Aroclor 1248)	12672-29-6	0.041	mg/kg	0.13		0.099		0.14	J-/I	17.4	0.177	0.015	U (LOD)	0.013	U (LOD)	0.014	U (LOD)	ND	ND
PCB-1254 (Aroclor 1254)	11097-69-1	0.041	mg/kg	0.031	U (LOD)	0.031	U (LOD)	0.032	UJ (LOD)/I	ND	ND	0.032	U (LOD)	0.03	U (LOD)	0.031	U (LOD)	ND	ND
PCB-1260 (Aroclor 1260)	11096-82-5	0.041	mg/kg	0.16		0.074		0.25	J-/I	54.6	0.383	0.0065	U (LOD)	0.006	U (LOD)	0.0062	U (LOD)	ND	ND
PCB-1262 (Aroclor 1262)	37324-23-5	0.041	mg/kg	0.015	U (LOD)	0.015	U (LOD)	0.015	UJ (LOD)/I	ND	ND	0.15	J/V2	0.1	J/V2	0.057	J/V2	45.5	0.219
PCB-1268 (Aroclor 1268)	11100-14-4	0.041	mg/kg	0.0063	UJ (LOD)/V2	0.0061	UJ (LOD)/V2	0.0063	UJ (LOD)/I/V2	ND	ND	0.0065	U (LOD)	0.006	U (LOD)	0.0062	U (LOD)	ND	ND
Explosives Residues																			
1,3,5-Trinitrobenzene (TNB)	99-35-4	0.3	mg/kg	0.037	U (LOD)	0.039	U (LOD)	0.038	U (LOD)	ND	ND	0.039	UJ (LOD)/I	0.039	UJ (LOD)/I	0.038	UJ (LOD)/I	ND	ND
1,3-Dinitrobenzene (DNB)	99-65-0	0.034	mg/kg	0.037	UJ (LOD)-/C	0.039	UJ (LOD)-/C	0.038	UJ (LOD)-/C	ND	ND	0.039	UJ (LOD)-/I/C	0.039	UJ (LOD)-/I/C	0.038	UJ (LOD)-/I/C	ND	ND
2,4,6-Trinitrotoluene (TNT)	118-96-7	7.5	mg/kg	0.094	UJ (LOQ)-/C	0.098	UJ (LOQ)-/C	0.096	UJ (LOQ)-/C	ND	ND	0.096	UJ (LOQ)-/I/C	0.096	UJ (LOQ)-/I/C	0.094	UJ (LOQ)-/I/C	ND	ND
2,4-Dinitrotoluene (24DNT)	121-14-2	6	mg/kg	0.037	UJ (LOD)-/C	0.039	UJ (LOD)-/C	0.038	UJ (LOD)-/C	ND	ND	0.039	UJ (LOD)-/I/C	0.039	UJ (LOD)-/I/C	0.038	UJ (LOD)-/I/C	ND	ND
2,6-Dinitrotoluene (26DNT)	606-20-2	4	mg/kg	0.037	UJ (LOD)-/C	0.039	UJ (LOD)-/C	0.038	UJ (LOD)-/C	ND	ND	0.039	UJ (LOD)-/I/C	0.039	UJ (LOD)-/I/C	0.038	UJ (LOD)-/I/C	ND	ND
2-Amino-4,6-dinitrotoluene (2AMDNT)	35572-78-2	14	mg/kg	0.094	U (LOQ)	0.098	U (LOQ)	0.096	U (LOQ)	ND	ND	0.096	UJ (LOQ)/I	0.096	UJ (LOQ)/I	0.094	UJ (LOQ)/I	ND	ND
2-Nitrotoluene (2NT)	88-72-2	0.19	mg/kg	0.094	U (LOD)	0.098	U (LOD)	0.096	U (LOD)	ND	ND	0.096	UJ (LOD)/I	0.096	UJ (LOD)/I	0.094	UJ (LOD)/I	ND	ND
3,5-Dinitroaniline	618-87-1	NS	mg/kg	0.019	U (LOD)	0.02	U (LOD)	0.019	U (LOD)	ND	ND	0.019	UJ (LOD)/I	0.019	UJ (LOD)/I	0.019	UJ (LOD)/I	ND	ND
3-Nitrotoluene (3NT)	99-08-1	0.13	mg/kg	0.19	UJ (LOQ)-/C	0.2	UJ (LOQ)-/C	0.19	UJ (LOQ)-/C	ND	ND	0.19	UJ (LOQ)-/I/C	0.19	UJ (LOQ)-/I/C	0.19	UJ (LOQ)-/I/C	ND	ND
4-Amino-2,6-dinitrotoluene (4AMDNT)	19406-51-0	12	mg/kg	0.094	U (LOQ)	0.098	U (LOQ)	0.096	U (LOQ)	ND	ND	0.096	UJ (LOQ)/I	0.096	UJ (LOQ)/I	0.094	UJ (LOQ)/I	ND	ND
4-Nitrotoluene (4NT)	99-99-0	0.14	mg/kg	0.094	UJ (LOD)-/C	0.098	UJ (LOD)-/C	0.096	UJ (LOD)-/C	ND	ND	0.096	UJ (LOD)-/I/C	0.096	UJ (LOD)-/I/C	0.094	UJ (LOD)-/I/C	ND	ND
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	2.3	mg/kg	0.094	UJ (LOD)/I	0.098	U (LOD)	0.096	UJ (LOD)/I	ND	ND	0.096	UJ (LOD)/I	0.096	UJ (LOD)/I	0.094	UJ (LOD)/I	ND	ND
Nitrobenzene (NB)	98-95-3	2.2	mg/kg	0.19	UJ (LOD)-/C	0.2	UJ (LOD)-/C	0.19	UJ (LOD)-/C	ND	ND	0.19	UJ (LOD)-/I/C	0.19	UJ (LOD)-/I/C	0.19	UJ (LOD)-/I/C	ND	ND
Nitroglycerin (NG)	55-63-0	13	mg/kg	0.65	U (LOD)	0.68	U (LOD)	0.67	U (LOD)	ND	ND	0.68	UJ (LOD)/I	0.67	UJ (LOD)/I	0.66	UJ (LOD)/I	ND	ND
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	16	mg/kg	0.065	U (LOD)	0.068	U (LOD)	0.067	U (LOD)	ND	ND	0.068	UJ (LOD)/I	0.067	UJ (LOD)/I	0.066	UJ (LOD)/I	ND	ND
Pentaerythritol tetranitrate (PETN)	78-11-5	2.2	mg/kg	0.94	U (LOD)	0.98	U (LOD)	0.96	U (LOD)	ND	ND	0.96	UJ (LOD)/I	0.96	UJ (LOD)/I	0.94	UJ (LOD)/I	ND	ND
Tetryl	479-45-8	0.018	mg/kg	0.094	UJ (LOD)-/I/C	0.098	UJ (LOD)-/C	0.096	UJ (LOD)-/C	ND	ND	0.096	UJ (LOD)-/I/C	0.096	UJ (LOD)-/I/C	0.094	UJ (LOD)-/I/C	ND	ND

Table C-1b. Phase I Incremental Soil Sampling Analytical Results

Location				DU-19															
Sample ID				IINY-DU-19A-SSIS-20200331		IINY-DU-19B-SSIS-20200331		IINY-DU-19C-SSIS-20200331		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-19A-SBIS1-20200331		IINY-DU-19B-SBIS1-20200331		IINY-DU-19C-SBIS1-20200331		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in.)				0-6		0-6		0-6				6-36		6-36		6-36			
Matrix				Surface Soil		Surface Soil		Surface Soil				Subsurface Soil		Subsurface Soil		Subsurface Soil			
Sample Date				3/31/2020 10:45		3/31/2020 10:45		3/31/2020 10:45				3/31/2020 11:00		3/31/2020 11:00		3/31/2020 11:00			
Analyte	CAS No.	Ecological Soil Screening Levels (mg/kg)[1]	Unit																
Soil pH																			
pH	N/A	N/A	N/A	7.7		7.5		7.4		2.03	7.92	7		7.4		7.7		5	8.25
Mercury																			
Mercury	7439-97-6	0.013	mg/kg	0.46	J-/M	0.11	J-/M	0.43	J-/M	58	0.822	0.12		0.23		0.27		38	0.402
Target Analyte List Metals																			
Aluminum	7429-90-5	NS	mg/kg	16,000		25,000		20,000		22	31,700	25,000		20,000		21,000		12	28,700
Antimony	7440-36-0	0.27	mg/kg	0.5	J-/M	0.28	J-/M	0.5	J-/M	29.8	0.746	0.12	J/TR	0.11	J/TR	0.11	J/TR	5.09	0.128
Arsenic	7440-38-2	6.8	mg/kg	9.6	J+/M/D	6.8	J+/M/D	12	J+/M/D	27.5	16	2.8		2.9		2.6		5.52	3.15
Barium	7440-39-3	110	mg/kg	81	J/D/M2	63	J/D	83	J/D	14.6	103	34	J/M2	37		35		4.32	39.2
Beryllium	7440-41-7	2.5	mg/kg	0.42	J+/M/D	0.35	J+/M/D	0.45	J+/M/D	12.6	0.536	0.19		0.19		0.17		6.3	0.212
Cadmium	7440-43-9	0.36	mg/kg	0.33		0.25		0.3		13.8	0.395	0.097	J/TR	0.093	J/TR	0.087	J/TR	5.45	0.105
Calcium	7440-70-2	NS	mg/kg	10,000	J/A	15,000		12,000		20	18,700	20,000		17,000		17,000		10	22,400
Total Chromium, Total	7440-47-3	23	mg/kg	10	J+/M	10	J+/M	11	J+/M	5.59	11.8	7.8		7.7		7.8		0.743	7.91
Cobalt	7440-48-4	13	mg/kg	14		19		15		16.5	22.7	18		16		17		5.88	19.5
Copper	7440-50-8	28	mg/kg	130		180		140		17.6	217	210		210		210		0	210
Iron	7439-89-6	NS	mg/kg	23,000	J/A	36,000		29,000		22	45,700	36,000		33,000		35,000		4	38,500
Lead	7439-92-1	11	mg/kg	61		38		67		27.7	93.9	14		12		11		12.4	16.2
Magnesium	7439-95-4	NS	mg/kg	5,700	J+/M	8,300	J+/M/A	6,700	J+/M	19	10,200	7,600		7,200		7,000		4	8,040
Manganese	7439-96-5	220	mg/kg	410	J/D/M2	410	J/D	470	J/D	8.06	517	270	J/M2	280		280		2.09	291
Nickel	7440-02-0	38	mg/kg	16	J-/M/D	17	J-/M/D	17	J-/M/D	3.46	18.1	14		14		14		0	14
Potassium	2023695	NS	mg/kg	1,200		1,500		1,600		15	1,960	1,200		1,100		1,100		5	1,280
Selenium	7782-49-2	0.52	mg/kg	0.42	J/D/TR	0.35	J/D/TR	0.44	J/D/TR	11.7	0.522	0.23	J/TR	0.23	J/TR	0.23	J/TR	0	0.23
Silver	7440-22-4	4.2	mg/kg	0.12		0.12		0.13		4.68	0.138	0.11		0.097	J/TR	0.1		6.65	0.119
Sodium	7440-23-5	NS	mg/kg	3,100		2,700		2,100		31	4,110	3,400		2,400		2,400		21	4,190
Thallium	7440-28-0	0.05	mg/kg	0.12	J+/M/D	0.12	J+/M/D	0.14	J+/M/D	9.12	0.156	0.07	J/TR	0.076	J/TR	0.071	J/TR	4.44	0.0804
Vanadium	7440-62-2	7.8	mg/kg	46		52		44		8.8	57.8	59		55		52		6.35	64.2
Zinc	7440-66-6	46	mg/kg	120	J/D	90	J/D	110	J/D	14.3	145	60		61		62		1.64	63.5
Polycyclic Aromatic Hydrocarbons																			
1-Methylnaphthalene	90-12-0	29	mg/kg	0.023		0.012		0.017		31.8	0.0312	0.0011	J-/TR	0.0012	J-/TR	0.00064	J-/TR	30.5	0.00173
2-Methylnaphthalene	91-57-6	29	mg/kg	0.035	J-/D	0.018	J-/D	0.028	J-/D	31.600	0.0485	0.0017	J-/TR	0.0019	J-/TR	0.00093	J-/TR	33.900	0.0028
Acenaphthene	83-32-9	29	mg/kg	0.06		0.026		0.027		51.400	0.0864	0.0024	J-/TR	0.0015	J-/TR	0.00087	J-/TR	48.400	0.00353
Acenaphthylene	208-96-8	29	mg/kg	0.27	J-/D	0.13	J-/D	0.21	J-/D	34.500	0.38	0.0066	J-/TR	0.0069	J-/TR	0.0034	J-/TR	34.400	0.0105
Anthracene	120-12-7	29	mg/kg	0.43		0.19		0.24		44.200	0.605	0.0067	J-/TR	0.0064	J-/TR	0.0032	J-/TR	35.700	0.0103
Benzo(a)anthracene	56-55-3	1.1	mg/kg	2.5		1.1		1.1		51.600	3.6	0.024		0.029		0.013		37.200	0.0426
Benzo(a)pyrene	50-32-8	1.1	mg/kg	1.9		0.9		0.98		44.100	2.66	0.029		0.031		0.015		34.900	0.0469
Benzo(b)fluoranthene	205-99-2	1.1	mg/kg	3.4		1.6		1.8		43.500	4.75	0.045		0.047		0.023		34.700	0.0718
Benzo(g,h,i)perylene	191-24-2	1.1	mg/kg	1.1		0.55		0.64		38.600	1.51	0.025		0.028		0.015		30.000	0.0398
Benzo(k)fluoranthene	207-08-9	1.1	mg/kg	1.2		0.59		0.59		44.400	1.68	0.013		0.015		0.0072	J-/TR	34.500	0.0219
Chrysene	218-01-9	1.1	mg/kg	2.3		0.98		1.1		50.000	3.3	0.027		0.033		0.014		39.400	0.0491
Dibenz(a,h)anthracene	53-70-3	1.1	mg/kg	0.41		0.26		0.27		26.800	0.524	0.0061	J-/TR	0.0067	J-/TR	0.0039	J-/TR	26.500	0.00928
Fluoranthene	206-44-0	1.1	mg/kg	4		1.6		1.7		55.800	5.85	0.046		0.053		0.023		38.600	0.0802
Fluorene	86-73-7	29	mg/kg	0.077	J-/M	0.028	J-/M	0.039	J-/M	53.600	0.113	0.0037	J-/TR	0.0028	J-/TR	0.0011	J-/TR	52.100	0.00586
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	mg/kg	1.5		0.77		0.82		39.600	2.06	0.027		0.029		0.014		34.900	0.0438
Naphthalene	91-20-3	29	mg/kg	0.083	J-/D	0.046	J-/D	0.068	J-/D	28.300	0.113	0.0019	J-/TR	0.0022	J-/TR	0.0019	U (LOD)	8.660	0.00244
Phenanthrene	85-01-8	29	mg/kg	1.5		0.52		0.58		63.400	2.25	0.022		0.023		0.0091	J-/TR	43.000	0.0375
Pyrene	129-00-0	1.1	mg/kg	3.2		1.3		1.4		54.400	4.66	0.044		0.052		0.023		37.800	0.0774
Total LMW PAHs	N/A	29	mg/kg	2.478		0.97		1.209		52.200	3.59	0.0461		0.0459		0.02114		38.100	0.0738
Total HMW PAHs	N/A	1.1	mg/kg	21.51		9.65		10.4		47.900	30.6	0.2861		0.3237		0.1511		35.800	0.482
Polychlorinated Biphenyls																			
PCB, Total	1336-36-3	0.041	mg/kg	0.011	J/TR	0.0071	J/TR	0.015	UJ (LOD)/I	35.8	0.021	0.05	J/TR	0.049	J/TR	0.054	J/TR	5.19	0.0577
PCB-1016 (Aroclor 1016)	12674-11-2	0.041	mg/kg	0.029	U (LOD)	0.028	U (LOD)	0.029	UJ (LOD)/I	ND	ND	0.03	U (LOD)	0.029	U (LOD)	0.03	U (LOD)	ND	ND
PCB-1221 (Aroclor 1221)	11104-28-2	0.041	mg/kg	0.076	U (LOD)	0.072	U (LOD)	0.075	UJ (LOD)/I	ND	ND	0.077	U (LOD)	0.076	U (LOD)	0.077	U (LOD)	ND	ND
PCB-1232 (Aroclor 1232)	11141-16-5	0.041	mg/kg	0.029	U (LOD)	0.028	U (LOD)	0.029	UJ (LOD)/I	ND	ND	0.03	U (LOD)	0.029	U (LOD)	0.03	U (LOD)	ND	ND
PCB-1242 (Aroclor 1242)	53469-21-9	0.041	mg/kg	0.046	U (LOD)	0.043	U (LOD)	0.045	UJ (LOD)/I	ND	ND	0.046	U (LOD)	0.046	U (LOD)	0.046	U (LOD)	ND	ND
PCB-1248 (Aroclor 1248)	12672-29-6	0.041	mg/kg	0.014	U (LOD)	0.013	U (LOD)	0.014	UJ (LOD)/I	ND	ND	0.015	U (LOD)	0.014	U (LOD)	0.015	U (LOD)	ND	ND
PCB-1254 (Aroclor 1254)	11097-69-1	0.041	mg/kg	0.032	U (LOD)	0.03	U (LOD)	0.031	UJ (LOD)/I	ND	ND	0.032	U (LOD)	0.032	U (LOD)	0.032	U (LOD)	ND	ND
PCB-1260 (Aroclor 1260)	11096-82-5	0.041	mg/kg	0.011	J-/M/TR/P1/V2	0.0071	J-/M/TR/P1/V2	0.0022	J-/M/I/TR/P1/V2	65.2	0.0179	0.05	J/TR/V2	0.049	J/TR/V2/P1	0.054	J/TR/V2	5.19	0.0577
PCB-1262 (Aroclor 1262)	37324-23-5	0.041	mg/kg	0.015	U (LOD)	0.014	U (LOD)	0.015	UJ (LOD)/I	ND	ND	0.015	U (LOD)	0.015	U (LOD)	0.015	U (LOD)	ND	ND
PCB-1268 (Aroclor 1268)	11100-14-4	0.041	mg/kg	0.0063	U (LOD)	0.006	U (LOD)	0.0063	UJ (LOD)/I	ND	ND	0.0065	U (LOD)	0.0064	U (LOD)	0.0065	U (LOD)	ND	ND
Explosives Residues																			
1,3,5-Trinitrobenzene (TNB)	99-35-4	0.3	mg/kg	0.039	U (LOD)	0.04	U (LOD)	0.039	U (LOD)	ND	ND	0.038	U (LOD)	0.038	U (LOD)	0.04	U (LOD)	ND	ND
1,3-Dinitrobenzene (DNB)	99-65-0	0.034	mg/kg	0.039	UJ (LOD)-/C	0.04	UJ (LOD)-/C	0.039	UJ (LOD)-/C	ND	ND	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	0.04	UJ (LOD)-/C	ND	ND
2,4,6-Trinitrotoluene (TNT)	118-96-7	7.5	mg/kg	0.099	UJ (LOQ)-/C	0.1	UJ (LOQ)-/C	0.098	UJ (LOQ)-/C	ND	ND	0.096	UJ (LOQ)-/C	0.096	UJ (LOQ)-/C	0.099	UJ (LOQ)-/C	ND	ND
2,4-Dinitrotoluene (24DNT)	121-14-2	6	mg/kg	0.039	UJ (LOD)-/C	0.04	UJ (LOD)-/C	0.039	UJ (LOD)-/C	ND	ND	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	0.04	UJ (LOD)-/C	ND	ND
2,6-Dinitrotoluene (26DNT)	606-20-2	4	mg/kg	0.039	UJ (LOD)-/C	0.04	UJ (LOD)-/C	0.039	UJ (LOD)-/C	ND	ND	0.038	UJ (LOD)-/C	0.038	UJ (LOD)-/C	0.04	UJ (LOD)-/C	ND	ND
2-Amino-4,6-dinitrotoluene (2AMDNT)	35572-78-2	14	mg/kg	0.099	U (LOQ)	0.1	U (LOQ)	0.098	U (LOQ)	ND	ND	0.096	U (LOQ)	0.096	U (LOQ)	0.099	U (LOQ)	ND	ND
2-Nitrotoluene (2NT)	88-72-2	0.19	mg/kg	0.099	U (LOD)	0.1	U (LOD)	0.098	U (LOD)	ND	ND	0.096	U (LOD)	0.096	U (LOD)	0.099	U (LOD)	ND	ND
3,5-Dinitroaniline	618-87-1	NS	mg/kg	0.02	UJ (LOD)/M	0.02	UJ (LOD)/M	0.02	UJ (LOD)/M	ND	ND	0.019	U (LOD)	0.019	U (LOD)	0.02	U (LOD)	ND	ND
3-Nitrotoluene (3NT)	99-08-1	0.13	mg/kg	0.2	UJ (LOQ)-/C	0.2	UJ (LOQ)-/C	0.2	UJ (LOQ)-/C	ND	ND	0.19	UJ (LOQ)-/C	0.19	UJ (LOQ)-/C	0.2	UJ (LOQ)-/C	ND	ND
4-Amino-2,6-dinitrotoluene (4AMDNT)	19406-51-0	12	mg/kg	0.099	U (LOQ)	0.1	U (LOQ)	0.098	U (LOQ)	ND	ND	0.096	U (LOQ)	0.096	U (LOQ)	0.099	U (LOQ)	ND	ND
4-Nitrotoluene (4NT)	99-99-0	0.14	mg/kg	0.099	UJ (LOD)-/C	0.1	UJ (LOD)-/C	0.098	UJ (LOD)-/C	ND	ND	0.096	UJ (LOD)-/C	0.096	UJ (LOD)-/C	0.099	UJ (LOD)-/C	ND	ND
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	2.3	mg/kg	0.099	U (LOD)	0.1	U (LOD)	0.098	U (LOD)	ND	ND	0.096	U (LOD)	0.096	U (LOD)	0.099	U (LOD)	ND	ND
Nitrobenzene (NB)	98-95-3	2.2	mg/kg	0.2	UJ (LOD)-/C	0.2	UJ (LOD)-/C	0.2	UJ (LOD)-/C	ND	ND	0.19	UJ (LOD)-/C	0.19	UJ (LOD)-/C	0.2	UJ (LOD)-/C	ND	ND
Nitroglycerin (NG)	55-63-0	13	mg/kg	0.69	U (LOD)	0.7	U (LOD)	0.69	U (LOD)	ND	ND	0.67	U (LOD)	0.67	U (LOD)	0.69	U (LOD)	ND	ND
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	16	mg/kg	0.069	U (LOD)	0.07	U (LOD)	0.069	U (LOD)	ND	ND	0.067	U (LOD)	0.067	U (LOD)	0.069	U (LOD)	ND	ND
Pentaerythritol tetranitrate (PETN)	78-11-5	2.2	mg/kg	0.99	U (LOD)	1	U (LOD)	0.98	U (LOD)	ND	ND	0.96	U (LOD)	0.96	U (LOD)	0.99	U (LOD)	ND	ND
Tetryl	479-45-8	0.018	mg/kg	0.099	UJ (LOD)-/C	0.1	UJ (LOD)-/C	0.098	UJ (LOD)-/C	ND	ND	0.096	UJ (LOD)-/C	0.096	UJ (LOD)-/C	0.099	UJ (LOD)-/C	ND	ND

1. EPA Region 4 Ecological Risk Assessment Supplemental Guidance. Scientific Support Section Superfund Division EPA Region 4. March 2018. Screening values are further detailed in Appendix E, Ecological Risk Assessment Work Plan

Notes:

% = Percent
CAS = Chemical Abstracts Service
EPA = U.S. Environmental Protection Agency
in. = Inch(es)
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LMW = Low molecular weight
LOD = Limit of detection
LOQ = Limit of quantitation
mg/kg = Milligram(s) per kilogram
N/A = Not applicable
ND = Not detected
No. Number
NS = No standard
PAH = Polycyclic aromatic hydrocarbon
PCB = Polychlorinated biphenyl
RSD = Relative standard deviation
RSL = regional screening level
U = Analyte not detected Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate
- Bias low
+ Bias high

Validation Reason Codes:

A Serial dilution
C LCS Recovery
D MS RPD
H2 Prep Hold Time
I Surrogate recovery outside project limits
L Lab Blank
M MS Recovery
M2 Post Spike
P1 Column RPD
TR Trace Level Detect
V2 CCV

Concentrations highlighted in blue exceed EPA Region 4 Ecological Soil Screening Levels.

Table C-1c. Phase I Incremental Soil Sampling Analytical Results

Location				DU-20															
Sample ID				IINY-DU-20A-SSIS-20200316		IINY-DU-20B-SSIS-20200316		IINY-DU-20C-SSIS-20200316		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-20A-SBIS1-20200317		IINY-DU-20B-SBIS1-20200317		IINY-DU-20C-SBIS1-20200317		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in.)				0-6		0-6		0-6				6-36		6-36		6-36			
Matrix				Surface Soil		Surface Soil		Surface Soil				Subsurface Soil		Subsurface Soil		Subsurface Soil			
Sample Date				3/16/2020 15:30		3/16/2020 15:30		3/16/2020 15:30				3/17/2020 9:30		3/17/2020 9:30		3/17/2020 9:30			
Analyte	CAS No.	EPA Region 4 Ecological Soil Screening Levels (mg/kg)[1]	Unit																
Soil pH																			
pH	N/A	N/A	N/A	6.1		6.5		6.6		4.13	7.07	6.8		6.9		6.8		0.845	6.98
Polycyclic Aromatic Hydrocarbons																			
1-Methylnaphthalene	90-12-0	29	mg/kg	0.0076	J/TR	0.011		0.0076	J/TR	22.5	0.0137	0.0049	J/TR	0.005	J/TR	0.0049	J/TR	1.17	0.00508
2-Methylnaphthalene	91-57-6	29	mg/kg	0.011		0.018		0.01		33.500	0.024	0.0078	J/TR	0.0069	J/TR	0.008	J/TR	7.740	0.00904
Acenaphthene	83-32-9	29	mg/kg	0.0063	J/TR	0.016		0.012		42.600	0.0237	0.0067	J/TR	0.0079	J/TR	0.0035	J/TR	37.700	0.0118
Acenaphthylene	208-96-8	29	mg/kg	0.029		0.041		0.032		18.400	0.0497	0.02		0.017		0.027		24.100	0.0342
Anthracene	120-12-7	29	mg/kg	0.035		0.046		0.043		13.800	0.0556	0.025		0.028		0.025		6.660	0.0304
Benzo(a)anthracene	56-55-3	1.1	mg/kg	0.14		0.15		0.15		3.940	0.161	0.074		0.074		0.071		2.370	0.0774
Benzo(a)pyrene	50-32-8	1.1	mg/kg	0.16		0.17		0.15		6.250	0.185	0.074		0.071		0.079		5.410	0.0848
Benzo(b)fluoranthene	205-99-2	1.1	mg/kg	0.25		0.28		0.23		9.930	0.317	0.11		0.11		0.12		5.090	0.128
Benzo(g,h,i)perylene	191-24-2	1.1	mg/kg	0.13		0.13		0.11		9.360	0.152	0.045		0.042		0.05		8.850	0.0558
Benzo(k)fluoranthene	207-08-9	1.1	mg/kg	0.081		0.093		0.072		12.800	0.109	0.033		0.032		0.036		6.180	0.0389
Chrysene	218-01-9	1.1	mg/kg	0.17		0.19		0.16		8.810	0.212	0.079		0.076		0.083		4.430	0.0882
Dibenz(a,h)anthracene	53-70-3	1.1	mg/kg	0.03		0.028		0.028		4.030	0.0316	0.013		0.013		0.015		8.450	0.0166
Fluoranthene	206-44-0	1.1	mg/kg	0.27		0.32		0.28		9.120	0.357	0.14	J+/M	0.14	J+/M	0.13	J+/M	4.220	0.151
Fluorene	86-73-7	29	mg/kg	0.0098	J/TR	0.02		0.016		33.700	0.0282	0.0087	J/TR	0.011		0.0072	J/TR	21.300	0.0138
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	mg/kg	0.13		0.15		0.12		11.500	0.172	0.049		0.045		0.053		8.160	0.0591
Naphthalene	91-20-3	29	mg/kg	0.012		0.017		0.011		24.100	0.0214	0.0072	J/TR	0.007	J/TR	0.0083	J/TR	9.330	0.00926
Phenanthrene	85-01-8	29	mg/kg	0.1		0.14		0.13		16.900	0.176	0.072		0.081		0.056		18.200	0.102
Pyrene	129-00-0	1.1	mg/kg	0.25		0.31		0.27		11.000	0.354	0.14	J+/M	0.14	J+/M	0.14	J+/M	0.000	0.14
Total LMW PAHs	N/A	29	mg/kg	0.2107		0.309		0.2616		18.900	0.384	0.1523		0.1638		0.1399		7.860	0.182
Total HMW PAHs	N/A	1.1	mg/kg	1.611		1.821		1.57		8.080	2.01	0.757		0.743		0.777		2.250	0.802
Benzene, Toluene, Ethylbenzene, and Xylenes																			
Benzene	71-43-2	NS	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0018	U (LOD)	0.0015	U (LOD)	0.0017	U (LOD)	ND	ND
Ethylbenzene	100-41-4	NS	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0009	U (LOD)	0.00077	U (LOD)	0.00083	U (LOD)	ND	ND
m,p-Xylene	108-38-3	NS	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0018	U (LOD)	0.0015	U (LOD)	0.0017	U (LOD)	ND	ND
o-Xylene	95-47-6	NS	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0009	U (LOD)	0.00077	U (LOD)	0.00083	U (LOD)	ND	ND
Toluene	108-88-3	NS	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0009	U (LOD)	0.00077	U (LOD)	0.00083	U (LOD)	ND	ND
Xylenes, Total	1330-20-7	NS	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0009	U (LOD)	0.00077	U (LOD)	0.00083	U (LOD)	ND	ND

Notes:

See footnotes on last page of table.

Table C-1c. Phase I Incremental Soil Sampling Analytical Results

Location				DU-21															
Sample ID				IINY-DU-21A-SSIS-20200317		IINY-DU-21B-SSIS-20200317		IINY-DU-21C-SSIS-20200317		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-21A-SBIS1-20200317		IINY-DU-21B-SBIS1-20200317		IINY-DU-21C-SBIS1-20200317		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in.)				0-6		0-6		0-6				6-36		6-36		6-36			
Matrix				Surface Soil		Surface Soil		Surface Soil				Subsurface Soil		Subsurface Soil		Subsurface Soil			
Sample Date				3/17/2020 12:40		3/17/2020 12:40		3/17/2020 12:40				3/17/2020 11:45		3/17/2020 11:45		3/17/2020 11:45			
Analyte	CAS No.	EPA Region 4 Ecological Soil Screening Levels (mg/kg)[1]	Unit																
Soil pH																			
pH	N/A	N/A	N/A	6.3		6.8		6.8		4.35	7.36	7.0		7.1		7.3		2.14	7.52
Polycyclic Aromatic Hydrocarbons																			
1-Methylnaphthalene	90-12-0	29	mg/kg	0.0083	J/TR	0.0044	J/TR	0.0041	J/TR	41.8	0.0115	0.0063	J/TR	0.0053	J/TR	0.0052	J/TR	10.9	0.00713
2-Methylnaphthalene	91-57-6	29	mg/kg	0.01		0.0067	J/TR	0.0063	J/TR	26.500	0.0128	0.0083	J/TR	0.0081	J/TR	0.0074	J/TR	5.960	0.00912
Acenaphthene	83-32-9	29	mg/kg	0.025		0.0051	J/TR	0.0049	J/TR	99.000	0.0407	0.0067	J/TR	0.004	J/TR	0.0038	J/TR	33.500	0.00891
Acenaphthylene	208-96-8	29	mg/kg	0.028		0.019		0.021		20.800	0.0346	0.012		0.0098		0.012		11.300	0.0145
Anthracene	120-12-7	29	mg/kg	0.08		0.019		0.023		83.900	0.127	0.021		0.013		0.013		29.500	0.0273
Benzo(a)anthracene	56-55-3	1.1	mg/kg	0.26		0.088		0.098		64.900	0.392	0.073		0.061		0.066		9.040	0.0818
Benzo(a)pyrene	50-32-8	1.1	mg/kg	0.22		0.089		0.1		53.300	0.319	0.073		0.061		0.069		9.030	0.083
Benzo(b)fluoranthene	205-99-2	1.1	mg/kg	0.35		0.15		0.18		47.600	0.498	0.13		0.11		0.13		9.360	0.152
Benzo(g,h,i)perylene	191-24-2	1.1	mg/kg	0.12		0.058		0.063		42.900	0.167	0.045		0.037		0.04		9.940	0.0508
Benzo(k)fluoranthene	207-08-9	1.1	mg/kg	0.12		0.05		0.057		51.000	0.173	0.043		0.036		0.036		10.500	0.0485
Chrysene	218-01-9	1.1	mg/kg	0.25		0.097		0.11		55.700	0.366	0.087		0.071		0.078		10.200	0.0989
Dibenz(a,h)anthracene	53-70-3	1.1	mg/kg	0.038		0.016		0.019		49.000	0.0544	0.013		0.011		0.012		8.330	0.0145
Fluoranthene	206-44-0	1.1	mg/kg	0.47		0.16		0.18		64.300	0.707	0.15		0.11		0.12		16.400	0.179
Fluorene	86-73-7	29	mg/kg	0.03		0.0068	J/TR	0.0077	J/TR	88.600	0.0479	0.0074	J/TR	0.0051	J/TR	0.0046	J/TR	26.200	0.00946
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	mg/kg	0.15		0.07		0.074		46.000	0.211	0.053		0.042		0.047		11.600	0.0612
Naphthalene	91-20-3	29	mg/kg	0.012		0.008	J/TR	0.007	J/TR	29.400	0.0157	0.0086	J/TR	0.0076	J/TR	0.0073	J/TR	8.690	0.00955
Phenanthrene	85-01-8	29	mg/kg	0.32		0.058		0.066		101.000	0.523	0.077		0.047		0.046		31.100	0.101
Pyrene	129-00-0	1.1	mg/kg	0.5		0.17		0.18		66.200	0.756	0.15		0.11		0.12		16.400	0.179
Total LMW PAHs	N/A	29	mg/kg	0.5133		0.127		0.14		84.300	0.812	0.1473		0.0999		0.0993		23.800	0.185
Total HMW PAHs	N/A	1.1	mg/kg	**2.478**		0.948		1.061		57.000	**3.64**	0.817		0.649		0.718		11.600	0.941
Benzene, Toluene, Ethylbenzene, and Xylenes																			
Benzene	71-43-2	NS	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0026	U (LOD)	0.0018	U (LOD)	0.0026	U (LOD)	ND	ND
Ethylbenzene	100-41-4	NS	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0013	U (LOD)	0.00089	U (LOD)	0.0013	U (LOD)	ND	ND
m,p-Xylene	108-38-3	NS	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0026	U (LOD)	0.0018	U (LOD)	0.0026	U (LOD)	ND	ND
o-Xylene	95-47-6	NS	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0013	U (LOD)	0.00089	U (LOD)	0.0013	U (LOD)	ND	ND
Toluene	108-88-3	NS	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0013	U (LOD)	0.00089	U (LOD)	0.0013	U (LOD)	ND	ND
Xylenes, Total	1330-20-7	NS	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A	0.0013	U (LOD)	0.00089	U (LOD)	0.0013	U (LOD)	ND	ND

Table C-1c. Phase I Incremental Soil Sampling Analytical Results

Location				DU-22							
Sample ID				IINY-DU-22A-SSIS-20200316		IINY-DU-22B-SSIS-20200316		IINY-DU-22C-SSIS-20200316		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in.)				0-6		0-6		0-6			
Matrix				Surface Soil		Surface Soil		Surface Soil			
Sample Date				3/16/2020 16:45		3/16/2020 16:45		3/16/2020 16:45			
Analyte	CAS No.	Ecological Soil Screening Levels (mg/kg)[1]	Unit								
Soil pH											
pH	N/A	N/A	N/A	6.7		6.8		6.8			
Polycyclic Aromatic Hydrocarbons											
1-Methylnaphthalene	90-12-0	29	mg/kg	0.041		0.04		0.041		1.420	0.042
2-Methylnaphthalene	91-57-6	29	mg/kg	0.064		0.057		0.063		6.170	0.071
Acenaphthene	83-32-9	29	mg/kg	0.1		0.11		0.077		17.700	0.138
Acenaphthylene	208-96-8	29	mg/kg	0.26	J/TR	0.18		0.15		28.900	0.340
Anthracene	120-12-7	29	mg/kg	0.44		0.29		0.27		27.900	0.567
Benzo(a)anthracene	56-55-3	1.1	mg/kg	2		1.3		1.2		29.100	2.600
Benzo(a)pyrene	50-32-8	1.1	mg/kg	1.9		1.3		1.1		29.000	2.480
Benzo(b)fluoranthene	205-99-2	1.1	mg/kg	3.1		1.9		1.8		31.900	4.090
Benzo(g,h,i)perylene	191-24-2	1.1	mg/kg	1		0.78		0.64		22.500	1.260
Benzo(k)fluoranthene	207-08-9	1.1	mg/kg	1.1		0.62		0.56		38.900	1.500
Chrysene	218-01-9	1.1	mg/kg	2.2		1.4		1.2		33.100	2.930
Dibenz(a,h)anthracene	53-70-3	1.1	mg/kg	0.38		0.23		0.2		35.700	0.513
Fluoranthene	206-44-0	1.1	mg/kg	3.5		2.4		1.9		31.500	4.660
Fluorene	86-73-7	29	mg/kg	0.13		0.12		0.069		30.800	0.189
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	mg/kg	1.2		0.92		0.73		24.900	1.550
Naphthalene	91-20-3	29	mg/kg	0.066		0.053		0.063		11.200	0.078
Phenanthrene	85-01-8	29	mg/kg	1.4		1.1		0.71		32.300	1.940
Pyrene	129-00-0	1.1	mg/kg	3.5		2.4		2		29.500	4.590
Total LMW PAHs	N/A	29	mg/kg	2.501		1.95		1.443		26.900	3.3
Total HMW PAHs	N/A	1.1	mg/kg	**19.88**		**13.25**		**11.33**		30.300	**26.1**
Benzene, Toluene, Ethylbenzene, and Xylenes											
Benzene	71-43-2	NS	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A
Ethylbenzene	100-41-4	NS	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A
m,p-Xylene	108-38-3	NS	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A
o-Xylene	95-47-6	NS	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A
Toluene	108-88-3	NS	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A
Xylenes, Total	1330-20-7	NS	mg/kg	Not analyzed		Not analyzed		Not analyzed		N/A	N/A

1. EPA Region 4 Ecological Risk Assessment Supplemental Guidance. Scientific Support Section Superfund Division EPA Region 4. March 2018. Screening values are further detailed in Appendix E, Ecological Risk Assessment Work Plan

Notes:

% = Percent
CAS = Chemical Abstracts Service
EPA = U.S. Environmental Protection Agency
HMW = High molecular weight
in. = Inch(es)
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LMW = Low molecular weight
LOD = Limit of detection
LOQ = Limit of quantitation
mg/kg = Milligram(s) per kilogram
N/A = Not applicable
ND = Not detected
No. Number
NS = No standard
PAH = Polycyclic aromatic hydrocarbon
PCB = Polychlorinated biphenyl
RSD = Relative standard deviation
RSL = Regional screening level
U = Analyte not detected Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate
- Bias low
+ Bias high

Validation Reason Codes:

A	Serial dilution
C	LCS Recovery
D	MS RPD
H2	Prep Hold Time
I	Surrogate recovery outside project limits
L	Lab Blank
M	MS Recovery
M2	Post Spike
P1	Column RPD
TR	Trace Level Detect
V2	CCV

Concentrations highlighted in blue exceed EPA Region 4 Ecological Soil Screening Levels.

Table C-1d. Phase I Incremental Soil Sampling Analytical Results

Location				DU-23								DU-25							
Sample ID				IINY-DU-23A-SSIS-20200320		IINY-DU-23B-SSIS-20200320		IINY-DU-23C-SSIS-20200320		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-DU-25A-SSIS-20200320		IINY-DU-25B-SSIS-20200320		IINY-DU-25C-SSIS-20200320		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in.)				0-6		0-6		0-6				0-6		0-6		0-6			
Matrix				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date				3/20/2020 9:15		3/20/2020 9:15		3/20/2020 9:15				3/20/2020 10:30		3/20/2020 10:30		3/20/2020 10:30			
Analyte	CAS No.	Ecological Soil Screening Levels (mg/kg)[1]	Unit																
Soil pH																			
pH	N/A	N/A	N/A	6.0		5.4		5.5		5.71	6.44	6.2		6.4		6.4		1.82	6.62
Polychlorinated Biphenyls																			
PCB, Total	1336-36-3	0.041	mg/kg	0.034	J/TR	0.025	J/TR	0.019	J/TR	29.000	0.045	0.011	J/TR	0.016	J/TR	0.012	J/TR	20.400	0.020
PCB-1016 (Aroclor 1016)	12674-11-2	0.041	mg/kg	0.03	U (LOD)	0.03	U (LOD)	0.03	U (LOD)	ND	ND	0.03	U (LOD)	0.03	U (LOD)	0.029	U (LOD)	ND	ND
PCB-1221 (Aroclor 1221)	11104-28-2	0.041	mg/kg	0.077	U (LOD)	0.077	U (LOD)	0.079	U (LOD)	ND	ND	0.078	U (LOD)	0.077	U (LOD)	0.076	U (LOD)	ND	ND
PCB-1232 (Aroclor 1232)	11141-16-5	0.041	mg/kg	0.03	U (LOD)	0.03	U (LOD)	0.03	U (LOD)	ND	ND	0.03	U (LOD)	0.03	U (LOD)	0.029	U (LOD)	ND	ND
PCB-1242 (Aroclor 1242)	53469-21-9	0.041	mg/kg	0.046	U (LOD)	0.046	U (LOD)	0.047	U (LOD)	ND	ND	0.047	U (LOD)	0.046	U (LOD)	0.046	U (LOD)	ND	ND
PCB-1248 (Aroclor 1248)	12672-29-6	0.041	mg/kg	0.015	U (LOD)	0.015	U (LOD)	0.015	U (LOD)	ND	ND	0.015	U (LOD)	0.014	U (LOD)	0.014	U (LOD)	ND	ND
PCB-1254 (Aroclor 1254)	11097-69-1	0.041	mg/kg	0.032	U (LOD)	0.032	U (LOD)	0.033	U (LOD)	ND	ND	0.032	U (LOD)	0.032	U (LOD)	0.032	U (LOD)	ND	ND
PCB-1260 (Aroclor 1260)	11096-82-5	0.041	mg/kg	0.034	J/TR/P1	0.025	J/TR/P1	0.019	J/TR/P1	29.000	0.045	0.011	J/TR/P1	0.016	J/TR	0.012	J/TR	20.400	0.020
PCB-1262 (Aroclor 1262)	37324-23-5	0.041	mg/kg	0.015	U (LOD)	0.015	U (LOD)	0.016	U (LOD)	ND	ND	0.016	U (LOD)	0.015	U (LOD)	0.015	U (LOD)	ND	ND
PCB-1268 (Aroclor 1268)	11100-14-4	0.041	mg/kg	0.0065	U (LOD)	0.0065	U (LOD)	0.0066	U (LOD)	ND	ND	0.0065	U (LOD)	0.0064	U (LOD)	0.0063	U (LOD)	ND	ND

1. EPA Region 4 Ecological Risk Assessment Supplemental Guidance. Scientific Support Section Superfund Division EPA Region 4. March 2018. Screening values are further detailed in Appendix E, Ecological Risk Assessment Work Plan

DU-24 (T2 near AOC #16 – Area Dumping Area) was not sampled. The majority of DU-24 contained exposed bedrock with little to thin soil cover. Any PCBs that may have been released from former transformers would have been transported via runoff and overland flow across the bedrock outcrop of Round Island to the Hudson River. While sediment and soil was noted along the northeastern edge of DU-24 off the bedrock outcrop of Round Island, this sediment/soil was along the shoreline of the tidally influenced Hudson River. The Hudson River itself is a PCB source. Therefore, collecting PCBs from soil/sediment along the Hudson River would not provide information that could be used to evaluate a potential release related to former transformers.

Notes:

% = Percent
CAS = Chemical Abstracts Service
EPA = U.S. Environmental Protection Agency
in. = Inch(es)
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
mg/kg = Milligram(s) per kilogram
N/A = Not applicable
ND = Not detected
No. = Number
NS = No standard
PCB = Polychlorinated biphenyl
RSD = Relative standard deviation
RSL = regional screening level
U = Analyte not detected Numerical value is LOD or LOQ, as indicated
- Bias low
+ Bias high

Validation Reason Codes:

A Serial dilution
C LCS Recovery
D MS RPD
H2 Prep Hold Time
I Surrogate recovery outside project limits
L Lab Blank
M MS Recovery
M2 Post Spike
P1 Column RPD
TR Trace Level Detect
V2 CCV

Concentrations highlighted in blue exceed EPA Region 4 Ecological Soil Screening Levels.

Table C-1e. Phase I Incremental Soil Sampling Analytical Results

			Location	EXDU-1								EXDU-2								EXDU-3							
			Sample ID	IINY-EXDU-1A-SSIS-20200317		IINY-EXDU-1B-SSIS-20200317		IINY-EXDU-1C-SSIS-20200317		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-EXDU-2A-SSIS-20200317		IINY-EXDU-2B-SSIS-20200317		IINY-EXDU-2C-SSIS-20200317		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-EXDU-3A-SSIS-20200318		IINY-EXDU-3B-SSIS-20200318		IINY-EXDU-3C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test
			Depth (in.)	0-6		0-6		0-6				0-6		0-6		0-6				0-6		0-6		0-6			
			Matrix	Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
			Sample Date	3/17/2020 15:35		3/17/2020 15:35		3/17/2020 15:35				3/17/2020 16:10		3/17/2020 16:10		3/17/2020 16:10				3/18/2020 8:00		3/18/2020 8:00		3/18/2020 8:00			
Analyte	CAS No.	Ecological Soil Screening Levels (mg/kg)[1]	Unit																								
Soil pH																											
pH	N/A	N/A	N/A	7.0		6.9		6.9		0.833	7.08	7.0		6.8		6.9		1.5	7.2	6.3		6.5		5.5		8.7	7.4
Explosives Residues																											
1,3,5-Trinitrobenzene (TNB)	99-35-4	0.3	mg/kg	0.039	U (LOD)	0.04	U (LOD)	0.029	J/TR/P1	16.9	0.0513	0.04	U (LOD)	0.041	U (LOD)	0.04	U (LOD)	ND	ND	0.037	U (LOD)	0.039	U (LOD)	0.038	U (LOD)	ND	ND
1,3-Dinitrobenzene (DNB)	99-65-0	0.034	mg/kg	0.038	J/TR	0.039	J/TR	0.051	J/TR/P1	17	0.0609	0.04	U (LOD)	0.041	U (LOD)	0.04	U (LOD)	ND	ND	0.037	U (LOD)	0.039	U (LOD)	0.038	U (LOD)	ND	ND
2,4,6-Trinitrotoluene (TNT)	118-96-7	7.5	mg/kg	0.28	J-/C	0.21	J-/C	0.37	J-/C	28	0.489	0.099	UJ (LOQ)-/C	0.1	UJ (LOQ)-/C	0.1	UJ (LOQ)-/C	ND	ND	0.093	UJ (LOQ)-/C	0.097	UJ (LOQ)-/C	0.096	UJ (LOQ)-/C	ND	ND
2,4-Dinitrotoluene (24DNT)	121-14-2	6	mg/kg	0.063	J/TR	0.06	J/TR/P1	0.22		80	0.345	0.04	U (LOD)	0.041	U (LOD)	0.04	U (LOD)	ND	ND	0.037	U (LOD)	0.039	U (LOD)	0.038	U (LOD)	ND	ND
2,6-Dinitrotoluene (26DNT)	606-20-2	4	mg/kg	0.039	U (LOD)	0.04	U (LOD)	0.04	U (LOD)	ND	ND	0.04	U (LOD)	0.041	U (LOD)	0.04	U (LOD)	ND	ND	0.037	U (LOD)	0.039	U (LOD)	0.038	U (LOD)	ND	ND
2-Amino-4,6-dinitrotoluene (2AMDNT)	35572-78-2	14	mg/kg	0.097	U (LOQ)	0.1	U (LOQ)	0.1	U (LOQ)	ND	ND	0.099	U (LOQ)	0.1	U (LOQ)	0.1	U (LOQ)	ND	ND	0.093	U (LOQ)	0.097	U (LOQ)	0.096	U (LOQ)	ND	ND
2-Nitrotoluene (2NT)	88-72-2	0.19	mg/kg	0.097	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.099	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.093	U (LOD)	0.097	U (LOD)	0.096	U (LOD)	ND	ND
3,5-Dinitroaniline	618-87-1	NS	mg/kg	0.019	U (LOD)	0.02	U (LOD)	0.02	U (LOD)	ND	ND	0.02	U (LOD)	0.02	U (LOD)	0.02	U (LOD)	ND	ND	0.019	U (LOD)	0.019	U (LOD)	0.019	U (LOD)	ND	ND
3-Nitrotoluene (3NT)	99-08-1	0.13	mg/kg	0.19	U (LOQ)	0.2	U (LOQ)	0.2	U (LOQ)	ND	ND	0.2	U (LOQ)	0.2	U (LOQ)	0.2	U (LOQ)	ND	ND	0.19	U (LOQ)	0.19	U (LOQ)	0.19	U (LOQ)	ND	ND
4-Amino-2,6-dinitrotoluene (4AMDNT)	19406-51-0	12	mg/kg	0.097	U (LOQ)	0.1	U (LOQ)	0.1	U (LOQ)	ND	ND	0.099	U (LOQ)	0.1	U (LOQ)	0.1	U (LOQ)	ND	ND	0.093	U (LOQ)	0.097	U (LOQ)	0.096	U (LOQ)	ND	ND
4-Nitrotoluene (4NT)	99-99-0	0.14	mg/kg	0.097	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.099	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.093	U (LOD)	0.097	U (LOD)	0.096	U (LOD)	ND	ND
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	2.3	mg/kg	0.097	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.099	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.093	U (LOD)	0.097	U (LOD)	0.096	U (LOD)	ND	ND
Nitrobenzene (NB)	98-95-3	2.2	mg/kg	0.19	U (LOD)	0.2	U (LOD)	0.2	U (LOD)	ND	ND	0.2	U (LOD)	0.2	U (LOD)	0.2	U (LOD)	ND	ND	0.19	U (LOD)	0.19	U (LOD)	0.19	U (LOD)	ND	ND
Nitroglycerin (NG)	55-63-0	13	mg/kg	0.68	U (LOD)	0.7	U (LOD)	0.7	U (LOD)	ND	ND	0.69	U (LOD)	0.72	U (LOD)	0.71	U (LOD)	ND	ND	0.65	U (LOD)	0.68	U (LOD)	0.67	U (LOD)	ND	ND
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	16	mg/kg	0.068	U (LOD)	0.07	U (LOD)	0.07	U (LOD)	ND	ND	0.069	U (LOD)	0.072	U (LOD)	0.071	U (LOD)	ND	ND	0.065	U (LOD)	0.068	U (LOD)	0.067	U (LOD)	ND	ND
Pentaerythritol tetranitrate (PETN)	78-11-5	2.2	mg/kg	0.97	U (LOD)	1	U (LOD)	1	U (LOD)	ND	ND	0.99	U (LOD)	1	U (LOD)	1	U (LOD)	ND	ND	0.93	U (LOD)	0.97	U (LOD)	0.96	U (LOD)	ND	ND
N-Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	479-45-8	0.018	mg/kg	0.097	UJ (LOD)-/C	0.1	UJ (LOD)-/C	0.1	UJ (LOD)-/C	ND	ND	0.099	UJ (LOD)-/C	0.1	UJ (LOD)-/C	0.1	UJ (LOD)-/C	ND	ND	0.093	UJ (LOD)-/C	0.097	UJ (LOD)-/C	0.096	UJ (LOD)-/C	ND	ND

Notes:

See footnotes on last page of table.

Table C-1e. Phase I Incremental Soil Sampling Analytical Results

			Location	EXDU-4								EXDU-5							
			Sample ID	IINY-EXDU-4A-SSIS-20200317		IINY-EXDU-4B-SSIS-20200317		IINY-EXDU-4C-SSIS-20200317		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-EXDU-5A-SSIS-20200318		IINY-EXDU-5B-SSIS-20200318		IINY-EXDU-5C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test
			Depth (in.)	0-6		0-6		0-6				0-6		0-6		0-6			
			Matrix	Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
			Sample Date	3/17/2020 14:30		3/17/2020 14:30		3/17/2020 14:30				3/18/2020 9:30		3/18/2020 9:30		3/18/2020 9:30			
Analyte	CAS No.	EPA Region 4 Ecological Soil Screening Levels (mg/kg)[1]	Unit																
Soil pH																			
pH	N/A	N/A	N/A	6.5		6.3		6.8		3.85	7.17	7.1		7.2		7.3		1.39	7.45
Explosives Residues																			
1,3,5-Trinitrobenzene (TNB)	99-35-4	0.3	mg/kg	0.039	U (LOD)	0.04	U (LOD)	0.04	U (LOD)	ND	ND	0.039	U (LOD)	0.037	U (LOD)	0.037	U (LOD)	ND	ND
1,3-Dinitrobenzene (DNB)	99-65-0	0.034	mg/kg	0.039	U (LOD)	0.04	U (LOD)	0.04	U (LOD)	ND	ND	0.039	U (LOD)	0.037	U (LOD)	0.037	U (LOD)	ND	ND
2,4,6-Trinitrotoluene (TNT)	118-96-7	7.5	mg/kg	0.098	UJ (LOQ)/C	0.1	UJ (LOQ)/C	0.1	UJ (LOQ)/C	ND	ND	0.097	UJ (LOQ)/C	0.093	UJ (LOQ)/C	0.092	UJ (LOQ)/C	ND	ND
2,4-Dinitrotoluene (24DNT)	121-14-2	6	mg/kg	0.039	U (LOD)	0.04	U (LOD)	0.04	U (LOD)	ND	ND	0.039	U (LOD)	0.037	U (LOD)	0.037	U (LOD)	ND	ND
2,6-Dinitrotoluene (26DNT)	606-20-2	4	mg/kg	0.039	U (LOD)	0.04	U (LOD)	0.04	U (LOD)	ND	ND	0.039	U (LOD)	0.037	U (LOD)	0.037	U (LOD)	ND	ND
2-Amino-4,6-dinitrotoluene (2AMDNT)	35572-78-2	14	mg/kg	0.098	U (LOQ)	0.1	U (LOQ)	0.1	U (LOQ)	ND	ND	0.097	U (LOQ)	0.093	U (LOQ)	0.092	U (LOQ)	ND	ND
2-Nitrotoluene (2NT)	88-72-2	0.19	mg/kg	0.098	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.097	U (LOD)	0.093	U (LOD)	0.092	U (LOD)	ND	ND
3,5-Dinitroaniline	618-87-1	NS	mg/kg	0.02	UJ (LOD)/M	0.02	UJ (LOD)/M	0.02	UJ (LOD)/M	ND	ND	0.019	U (LOD)	0.019	U (LOD)	0.018	U (LOD)	ND	ND
3-Nitrotoluene (3NT)	99-08-1	0.13	mg/kg	0.2	U (LOQ)	0.2	U (LOQ)	0.2	U (LOQ)	ND	ND	0.19	U (LOQ)	0.19	U (LOQ)	0.18	U (LOQ)	ND	ND
4-Amino-2,6-dinitrotoluene (4AMDNT)	19406-51-0	12	mg/kg	0.098	U (LOQ)	0.1	U (LOQ)	0.1	U (LOQ)	ND	ND	0.097	U (LOQ)	0.093	U (LOQ)	0.092	U (LOQ)	ND	ND
4-Nitrotoluene (4NT)	99-99-0	0.14	mg/kg	0.098	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.097	U (LOD)	0.093	U (LOD)	0.092	U (LOD)	ND	ND
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	2.3	mg/kg	0.098	U (LOD)	0.1	U (LOD)	0.1	U (LOD)	ND	ND	0.097	U (LOD)	0.093	U (LOD)	0.092	U (LOD)	ND	ND
Nitrobenzene (NB)	98-95-3	2.2	mg/kg	0.2	U (LOD)	0.2	U (LOD)	0.2	U (LOD)	ND	ND	0.19	U (LOD)	0.19	U (LOD)	0.18	U (LOD)	ND	ND
Nitroglycerin (NG)	55-63-0	13	mg/kg	0.69	U (LOD)	0.7	U (LOD)	0.71	U (LOD)	ND	ND	0.68	U (LOD)	0.65	U (LOD)	0.65	U (LOD)	ND	ND
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	16	mg/kg	0.069	U (LOD)	0.07	U (LOD)	0.071	U (LOD)	ND	ND	0.068	U (LOD)	0.065	U (LOD)	0.065	U (LOD)	ND	ND
Pentaerythritol tetranitrate (PETN)	78-11-5	2.2	mg/kg	0.98	U (LOD)	1	U (LOD)	1	U (LOD)	ND	ND	0.97	U (LOD)	0.93	U (LOD)	0.92	U (LOD)	ND	ND
N-Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	479-45-8	0.018	mg/kg	0.098	UJ (LOD)/C	0.1	UJ (LOD)/C	0.1	UJ (LOD)/C	ND	ND	0.097	UJ (LOD)/C	0.093	UJ (LOD)/C	0.092	UJ (LOD)/C	ND	ND

Table C-1e. Phase I Incremental Soil Sampling Analytical Results

Location				EXDU-6								EXDU-7							
Sample ID				IINY-EXDU-6A-SSIS-20200318		IINY-EXDU-6B-SSIS-20200318		IINY-EXDU-6C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test	IINY-EXDU-7A-SSIS-20200318		IINY-EXDU-7B-SSIS-20200318		IINY-EXDU-7C-SSIS-20200318		% RSD	95% Upper Confidence Limit Chebychev Test
Depth (in.)				0-6		0-6		0-6				0-6		0-6		0-6			
Matrix				Surface Soil		Surface Soil		Surface Soil				Surface Soil		Surface Soil		Surface Soil			
Sample Date				3/18/2020 10:15		3/18/2020 10:15		3/18/2020 10:15				3/18/2020 11:45		3/18/2020 11:45		3/18/2020 11:45			
Analyte	CAS No.	Ecological Soil Screening Levels (mg/kg)[1]	Unit																
Soil pH																			
pH	N/A	N/A	N/A	7.2		7.3		7.3		0.795	7.41	7.0		7.0		7.1		0.821	7.18
Explosives Residues																			
1,3,5-Trinitrobenzene (TNB)	99-35-4	0.3	mg/kg	0.038	U (LOD)	0.039	U (LOD)	0.039	U (LOD)	ND	ND	0.038	U (LOD)	0.039	U (LOD)	0.037	U (LOD)	ND	ND
1,3-Dinitrobenzene (DNB)	99-65-0	0.034	mg/kg	0.038	U (LOD)	0.039	U (LOD)	0.039	U (LOD)	ND	ND	0.038	U (LOD)	0.039	U (LOD)	0.037	U (LOD)	ND	ND
2,4,6-Trinitrotoluene (TNT)	118-96-7	7.5	mg/kg	0.094	UJ (LOQ)-/C	0.096	UJ (LOQ)-/C	0.099	UJ (LOQ)-/C	ND	ND	0.094	UJ (LOQ)-/C	0.099	UJ (LOQ)-/C	0.093	UJ (LOQ)-/C	ND	ND
2,4-Dinitrotoluene (24DNT)	121-14-2	6	mg/kg	0.038	U (LOD)	0.039	U (LOD)	0.039	U (LOD)	ND	ND	0.038	U (LOD)	0.039	U (LOD)	0.037	U (LOD)	ND	ND
2,6-Dinitrotoluene (26DNT)	606-20-2	4	mg/kg	0.038	U (LOD)	0.039	U (LOD)	0.039	U (LOD)	ND	ND	0.038	U (LOD)	0.039	U (LOD)	0.037	U (LOD)	ND	ND
2-Amino-4,6-dinitrotoluene (2AMDNT)	35572-78-2	14	mg/kg	0.094	U (LOQ)	0.096	U (LOQ)	0.099	U (LOQ)	ND	ND	0.094	U (LOQ)	0.099	U (LOQ)	0.093	U (LOQ)	ND	ND
2-Nitrotoluene (2NT)	88-72-2	0.19	mg/kg	0.094	U (LOD)	0.096	U (LOD)	0.099	U (LOD)	ND	ND	0.094	U (LOD)	0.099	U (LOD)	0.093	U (LOD)	ND	ND
3,5-Dinitroaniline	618-87-1	NS	mg/kg	0.019	U (LOD)	0.019	U (LOD)	0.02	U (LOD)	ND	ND	0.019	U (LOD)	0.02	U (LOD)	0.019	U (LOD)	ND	ND
3-Nitrotoluene (3NT)	99-08-1	0.13	mg/kg	0.19	U (LOQ)	0.19	U (LOQ)	0.2	U (LOQ)	ND	ND	0.19	U (LOQ)	0.2	U (LOQ)	0.19	U (LOQ)	ND	ND
4-Amino-2,6-dinitrotoluene (4AMDNT)	19406-51-0	12	mg/kg	0.094	U (LOQ)	0.096	U (LOQ)	0.099	U (LOQ)	ND	ND	0.094	U (LOQ)	0.099	U (LOQ)	0.093	U (LOQ)	ND	ND
4-Nitrotoluene (4NT)	99-99-0	0.14	mg/kg	0.094	U (LOD)	0.096	U (LOD)	0.099	U (LOD)	ND	ND	0.094	U (LOD)	0.099	U (LOD)	0.093	U (LOD)	ND	ND
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	2.3	mg/kg	0.094	U (LOD)	0.096	U (LOD)	0.099	U (LOD)	ND	ND	0.094	U (LOD)	0.099	U (LOD)	0.093	U (LOD)	ND	ND
Nitrobenzene (NB)	98-95-3	2.2	mg/kg	0.19	U (LOD)	0.19	U (LOD)	0.2	U (LOD)	ND	ND	0.19	U (LOD)	0.2	U (LOD)	0.19	U (LOD)	ND	ND
Nitroglycerin (NG)	55-63-0	13	mg/kg	0.66	U (LOD)	0.67	U (LOD)	0.69	U (LOD)	ND	ND	0.66	U (LOD)	0.69	U (LOD)	0.65	U (LOD)	ND	ND
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	16	mg/kg	0.066	U (LOD)	0.067	U (LOD)	0.069	U (LOD)	ND	ND	0.066	U (LOD)	0.069	U (LOD)	0.065	U (LOD)	ND	ND
Pentaerythritol tetranitrate (PETN)	78-11-5	2.2	mg/kg	0.94	U (LOD)	0.96	U (LOD)	0.99	U (LOD)	ND	ND	0.94	U (LOD)	0.99	U (LOD)	0.93	U (LOD)	ND	ND
N-Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	479-45-8	0.018	mg/kg	0.094	UJ (LOD)-/C	0.096	UJ (LOD)-/C	0.099	UJ (LOD)-/C	ND	ND	0.094	UJ (LOD)-/C	0.099	UJ (LOD)-/C	0.093	UJ (LOD)-/C	ND	ND

1. EPA Region 4 Ecological Risk Assessment Supplemental Guidance. Scientific Support Section Superfund Division EPA Region 4. March 2018. Screening values are further detailed in Appendix E, Ecological Risk Assessment Work Plan

Notes:
% = Percent
CAS = Chemical Abstracts Service
EPA = U.S. Environmental Protection Agency
in. = Inch(es)
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
mg/kg = Milligram(s) per kilogram
N/A = Not applicable
ND = Not detected
No. Number
NS = No standard
RSD = Relative standard deviation
RSL = Regional screening level
U = Analyte not detected Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate
- Bias low
+ Bias high

Validation Reason Codes:
A Serial dilution
C LCS Recovery
D MS RPD
H2 Prep Hold Time
I Surrogate recovery outside project limits
L Lab Blank
M MS Recovery
M2 Post Spike
P1 Column RPD
TR Trace Level Detect
V2 CCV

Concentrations highlighted in blue exceed EPA Region 4 Ecological Soil Screening Levels.

Table C-2. Phase I Background Soil Analytical Results

Analyte	CAS No.	EPA Region 4 Ecological Soil Screening Levels (mg/kg)[1]	Unit	Location	BADU-1		BADU-2		BADU-3		BADU-4		BADU-5		BADU-6		BADU-7		BADU-8		95% Upper Confidence Limit Chebychev Test
				Sample ID	IINY-BADU-1		IINY-BADU-2		IINY-BADU-3		IINY-BADU-4		IINY-BADU-5		IINY-BADU-6		IINY-BADU-7		IINY-BADU-8		
				Depth (in.)	0-6		0-6		0-6		0-6		0-6		0-6		0-6		0-6		
				Matrix	Surface Soil		Surface Soil		Surface Soil		Surface Soil		Surface Soil		Surface Soil		Surface Soil		Surface Soil		
				Sample Date / Time	4/1/2020 11:45		4/1/2020 12:15		4/1/2020 12:45		4/1/2020 13:20		4/1/2020 9:55		4/1/2020 9:20		4/1/2020 9:00		4/1/2020 9:25		
Soil pH																					
pH	N/A	N/A	N/A		6.3		6.7		6		6.1		6.1		5.9		6.1		6		6.54
Mercury																					
Mercury	7439-97-6	0.013	mg/kg		0.290		0.310		0.260		0.200		0.120		0.320		0.200		0.120		0.351
Target Analyte List Metals																					
Aluminum	7429-90-5	NS	mg/kg		14,000		15,000		11,000		7,300		10,000		11,000		15,000		14,000		16,400
Antimony	7440-36-0	0.27	mg/kg		1.2		1.2		1.1		0.94		0.53		1.2		0.89		0.83		1.35
Arsenic	7440-38-2	6.8	mg/kg		4.3		4		3.5		2.1		6.3		7.5		7.1		7.8		8.59
Barium	7440-39-3	110	mg/kg		28		21		17		13		47		47		47		47		56.7
Beryllium	7440-41-7	2.5	mg/kg		0.31		0.23		0.11		0.057	J/TR	0.92		0.7		0.62		0.57		0.914
Cadmium	7440-43-9	0.36	mg/kg		0.22		0.14		0.13		0.11		0.23		0.29		0.16		0.12		0.274
Calcium	7440-70-2	NS	mg/kg		2,100		900		1,300		980		2,000		1,100		750		650		2,070
Total Chromium, Total	7440-47-3	23	mg/kg		7.4		6.4		6.9		3.6		22	J+/M	20		20		31		29.9
Cobalt	7440-48-4	13	mg/kg		2.1		1.7		1.1		0.59		6.4		5.3		5.5		7.3		7.83
Copper	7440-50-8	28	mg/kg		11	J/TR	8.5	J/TR	7	J/TR	4.9	J/TR	25		21	J/TR	16	J/TR	26		27.7
Iron	7439-89-6	NS	mg/kg		12,000		13,000		13,000		8,600		14,000		15,000		17,000		21,000		19,800
Lead	7439-92-1	11	mg/kg		53		57		50		33		49		94		58		46		82.1
Magnesium	7439-95-4	NS	mg/kg		1,400		1,300		1,000		600		2,100	J/M2/A	1,900		2,300		3,100		2,940
Manganese	7439-96-5	220	mg/kg		330		200		75		37		340		200		230		280		381
Nickel	7440-02-0	38	mg/kg		5.7		4.8		4		2.7		22		23		19		23		27.6
Potassium	2023695	NS	mg/kg		840		710		840		700		620		720		670		720		846
Selenium	7782-49-2	0.52	mg/kg		0.91		0.92		0.9		0.65		1.1		1.2		1.1		0.9		1.22
Silver	7440-22-4	4.2	mg/kg		0.33		0.28		0.4		0.28		0.14		0.33		0.25		0.17		0.405
Sodium	7440-23-5	NS	mg/kg		52	J/TR	38	J/TR	34	J/TR	36	J/TR	63	J-/M/TR	44	J/TR	36	J/TR	47	J/TR	59.1
Thallium	7440-28-0	0.05	mg/kg		0.1		0.099		0.082	J/TR	0.043	J/TR	0.2		0.18		0.17		0.16		0.215
Vanadium	7440-62-2	7.8	mg/kg		23		21		22		13		37	J+/M/M2	40		47		56		55.3
Zinc	7440-66-6	46	mg/kg		35		28		21	J/TR	30		60		72		45		48		69.1
Polycyclic Aromatic Hydrocarbons																					
1-Methylnaphthalene	90-12-0	29	mg/kg		0.028	J-/H2/TR	0.015	J-/H2/I/TR	0.012	J-/H2/I/TR	0.0099	J-/H2/I/TR	0.018	J-/H2/I/TR	0.015	J-/H2/I/TR	0.0053	J-/H2/I/TR	0.0039	J-/H2/I/TR	0.0252
2-Methylnaphthalene	91-57-6	29	mg/kg		0.022	J-/H2/TR	0.015	J-/H2/I/TR	0.013	J-/H2/I/TR	0.011	J-/H2/I/TR	0.017	J-/H2/I/TR	0.012	J-/H2/I/TR	0.0052	J-/H2/I/TR	0.0039	J-/H2/I/TR	0.0215
Acenaphthene	83-32-9	29	mg/kg		0.097	J-/H2	0.034	J-/H2/I/TR	0.024	J-/H2/I/TR	0.021	J-/H2/I/TR	0.049	J-/H2/M/I	0.072	J-/H2/I	0.0081	J-/H2/I/TR	0.0048	J-/H2/I/TR	0.0883
Acenaphthylene	208-96-8	29	mg/kg		0.05	J-/H2/TR	0.034	J-/H2/I/TR	0.028	J-/H2/I/TR	0.025	J-/H2/I/TR	0.081	J-/H2/I	0.028	J-/H2/I/TR	0.013	J-/H2/I	0.009	J-/H2/I/TR	0.0688
Anthracene	120-12-7	29	mg/kg		0.12	J-/H2	0.049	J-/H2/I	0.039	J-/H2/I	0.028	J-/H2/I/TR	0.12	J-/H2/M/I	0.094	J-/H2/I	0.015	J-/H2/I	0.0084	J-/H2/I/TR	0.13
Benzo(a)anthracene	56-55-3	1.1	mg/kg		0.68	J-/H2	0.21	J-/H2/I	0.17	J-/H2/I	0.1	J-/H2/I	0.51	J-/H2/I	0.68	J-/H2/I	0.067	J-/H2/I	0.043	J-/H2/I	0.727
Benzo(a)pyrene	50-32-8	1.1	mg/kg		0.79	J-/H2	0.22	J-/H2/I	0.19	J-/H2/I	0.12	J-/H2/I	0.52	J-/H2/I	0.69	J-/H2/I	0.063	J-/H2/I	0.045	J-/H2/I	0.783
Benzo(b)fluoranthene	205-99-2	1.1	mg/kg		1.3	J-/H2	0.38	J-/H2/I	0.31	J-/H2/I	0.19	J-/H2/I	0.73	J-/H2/I	1.1	J-/H2/I	0.11	J-/H2/I	0.072	J-/H2/I	1.24
Benzo(g,h,i)perylene	191-24-2	1.1	mg/kg		0.68	J-/H2	0.18	J-/H2/I	0.15	J-/H2/I	0.091	J-/H2/I	0.39	J-/H2/I	0.52	J-/H2/I	0.049	J-/H2/I	0.035	J-/H2/I	0.632
Benzo(k)fluoranthene	207-08-9	1.1	mg/kg		0.46	J-/H2	0.14	J-/H2/I	0.11	J-/H2/I	0.074	J-/H2/I	0.27	J-/H2/I	0.41	J-/H2/I	0.039	J-/H2/I	0.028	J-/H2/I	0.451
Chrysene	218-01-9	1.1	mg/kg		1	J-/H2	0.31	J-/H2/I	0.25	J-/H2/I	0.16	J-/H2/I	0.62	J-/H2/I	0.9	J-/H2/I	0.093	J-/H2/I	0.061	J-/H2/I	0.992
Dibenz(a,h)anthracene	53-70-3	1.1	mg/kg		0.15	J-/H2	0.042	J-/H2/I	0.036	J-/H2/I	0.027	R (LOD)/H2/I	0.092	J-/H2/I	0.13	J-/H2/I	0.013	J-/H2/I	0.0063	UJ (LOD)/H2/I	0.161
Fluoranthene	206-44-0	1.1	mg/kg		2.2	J-/H2	0.7	J-/H2/I	0.54	J-/H2/I	0.31	J-/H2/I	1.3	J-/H2/I	1.9	J-/H2	0.19	J-/H2/I	0.12	J-/H2/I	2.14
Fluorene	86-73-7	29	mg/kg		0.1	J-/H2	0.087	J-/H2/I	0.056	J-/H2/I	0.06	J-/H2/I	0.065	J-/H2/M/I	0.061	J-/H2/I	0.01	J-/H2/I	0.0058	J-/H2/I/TR	0.107
Indeno(1,2,3-c,d)pyrene	193-39-5	1.1	mg/kg		0.74	J-/H2	0.2	J-/H2/I	0.17	J-/H2/I	0.1	J-/H2/I	0.42	J-/H2/I	0.58	J-/H2/I	0.053	J-/H2/I	0.037	J-/H2/I	0.692
Naphthalene	91-20-3	29	mg/kg		0.031	J-/H2/TR	0.023	J-/H2/I/TR	0.017	J-/H2/I/TR	0.017	J-/H2/I/TR	0.022	J-/H2/I/TR	0.017	J-/H2/I/TR	0.0074	J-/H2/I/TR	0.0063	J-/H2/I/TR	0.0301
Phenanthrene	85-01-8	29	mg/kg		1.1	J-/H2	0.36	J-/H2/I	0.28	J-/H2/I	0.17	J-/H2/I/TR	0.58	J-/H2/I	0.86	J-/H2/I	0.09	J-/H2/I	0.061	J-/H2/I	1.02
Pyrene	129-00-0	1.1	mg/kg		1.9	J-/H2	0.6	J-/H2/I	0.46	J-/H2/I	0.27	J-/H2/I/TR	1.1	J-/H2/I	1.5	J-/H2	0.16	J-/H2/I	0.11	J-/H2/I	1.79
Total LMW PAHs	N/A	29	mg/kg		1.548		0.617		0.469		0.3419		0.952		1.159		0.154		0.1031		1.46
Total HMW PAHs	N/A	1.1	mg/kg		9.9		2.982		2.386		1.415		5.952		8.41		0.837		0.551		9.59

1. EPA Region 4 Ecological Risk Assessment Supplemental Guidance. Scientific Support Section Superfund Division EPA Region 4. March 2018. Screening values are further detailed in Appendix E, Ecological Risk Assessment Work Plan

Notes:
CAS = Chemical Abstracts Service
EPA = U.S. Environmental Protection Agency
HMW = High molecular weight
in. = Inch(es)
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LMW = Low molecular weight
LOD = Limit of detection
LOQ = Limit of quantitation
mg/kg = Milligram(s) per kilogram
N/A = Not applicable
No. Number
NS = No standard
PAH = Polycyclic aromatic hydrocarbon
PCB = Polychlorinated biphenyl
R = The data are unusable The sample results are rejected due to serious deficiencies in meeting the QC criteria The analyte may or may not be present in the sample
RSL = regional screening level
U = Analyte not detected Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate
- Bias low
+ Bias high

Validation Reason Codes:

A	Serial dilution
C	LCS Recovery
D	MS RPD
H2	Prep Hold Time
I	Surrogate recovery outside project limits
L	Lab Blank
M	MS Recovery
M2	Post Spike
P1	Column RPD
TR	Trace Level Detect
V2	CCV

Concentrations highlighted in blue exceed EPA Region 4 Ecological Soil Screening Levels.

Attachment D

Phase II Analytical Dataset

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Table D-1. Phase II Sediment Analytical Results

Location						Iona Island Hudson River Shoreline												
Sample ID						IINY-IHRS-DU-01A-SEDIS-041922		IINY-IHRS-DU-01B-SEDIS-041922		IINY-IHRS-DU-01C-SEDIS-041922					95% UCL Calculations per ITRC Calculator (2020)			
Depth (in.)						0-6		0-6		0-6								
Matrix						Sediment		Sediment		Sediment								
Sample Date						4/19/2022 10:45		4/19/2022 10:45		4/19/2022 10:45								
Analyte	CAS No.	Ecological Screening Value	Refinement Screening Value	Source	Unit							Mean	Arithmetic Standard Deviation	% Relative Standard Deviation	Student's-t	Chebychev	Adjusted CV of Increments	Recommended 95% UCL
Target Analyte List Metals																		
Aluminum	7429-90-5	25,000	58,000	i	mg/kg	6,900	J, A	5,700		6,300		6,300	600	10	7,310	7,810	1	7,310
Antimony	7440-36-0	2	25	a	mg/kg	110	J, A	89.0		110		103	12.1	11.8	123	134	0.956	123
Arsenic	7440-38-2	9.8	33	b	mg/kg	35.0	J, M	34.0		32.0		33.7	1.53	4.54	36.2	37.5	0.361	36.2
Barium	7440-39-3	20	60	b	mg/kg	370	J, D	510		470		450	72.1	16	572	631	1.33	572
Beryllium	7440-41-7	No screening value			mg/kg	0.910		0.920		0.760		0.863	0.0896	10.4	1.01	1.09	0.838	1.01
Cadmium	7440-43-9	1	5	b	mg/kg	9.60		9.30		8.90		9.27	0.351	3.79	9.86	10.2	0.302	9.86
Chromium, Total	7440-47-3	43.4	111	b	mg/kg	120	J, D	150		130		133	15.3	11.5	159	172	0.929	159
Cobalt	7440-48-4	50	50	b	mg/kg	14.0		14.0		12.0		13.3	1.15	8.66	15.3	16.2	0.695	15.3
Copper	7440-50-8	31.6	149	b	mg/kg	4,600	J, D	7,600		6,500		6,230	1,520	24.3	8,790	10,100	2.18	10,100
Iron	7439-89-6	20,000	40,000	g	mg/kg	180,000	J, A	140,000		150,000		157,000	20,800	13.3	192,000	209,000	1.09	192,000
Lead	7439-92-1	35.8	128	b	mg/kg	7,700	J, D/M2	14,000		8,000		9,900	3,550	35.9	15,900	18,800	3.71	18,800
Manganese	7439-96-5	460	1,100	g	mg/kg	1,200		1,200		1,200		1,200	0	0	1,200	1,200	0	1,200
Mercury (inorganic - aquatic life)	7439-97-6	0.18	1.1	b	mg/kg	0.0810		0.0730		0.0620		0.072	0.00954	13.2	0.0881	0.096	1.08	0.0881
Mercury (inorganic - wildlife based)		0.17	0.17	i														
Nickel	7440-02-0	22.7	48.6	b	mg/kg	69.0		110		77.0		85.3	21.7	25.5	122	140	2.31	140
Selenium	7782-49-2	0.72	2.9	i	mg/kg	0.590	UJ, M/D	0.530	U	0.770	U	0.63	0.125	19.8	0.841	0.944	1.7	0.944
Selenium (wildlife)		0.8	1.2	i														
Silver	7440-22-4	1	2.2	b	mg/kg	1.00	J, M	2.00		1.40		1.47	0.503	34.3	2.32	2.73	3.47	2.73
Thallium	7440-28-0	No screening value			mg/kg	0.0750	J, TR	0.0560	J, TR	0.0690	J, TR	0.0667	0.00971	14.6	0.083	0.0911	1.2	0.083
Vanadium	7440-62-2	No screening value			mg/kg	37.0	J, M	32.0		30.0		33	3.61	10.9	39.1	42.1	0.884	39.1
Zinc	7440-66-6	121	459	b	mg/kg	3,800		3,800		3,600		3,730	115	3.09	3,930	4,020	0.246	3,930

Notes: See footnotes on last page of table.

Table D-1. Phase II Sediment Analytical Results

Location						Rip Rap Drainage Swale													
Sample ID						IINY-RRDS-DU-01A-SEDIS-041922		IINY-RRDS-DU-01B-SEDIS-041922		IINY-RRDS-DU-01C-SEDIS-041922					95% UCL Calculations per ITRC Calculator (2020)			
Depth (in.)						0-6		0-6		0-6								
Matrix						Sediment		Sediment		Sediment								
Sample Date						4/19/2022 11:30		4/19/2022 11:30		4/19/2022 11:30								
Analyte	CAS No.	Ecological Screening Value	Refinement Screening Value	Source	Unit							Mean	Arithmetic Standard Deviation	% Relative Standard Deviation	Student's-t	Chebychev	Adjusted CV of Increments	Recommended 95% UCL
Target Analyte List Metals																		
Aluminum	7429-90-5	25,000	58,000	i	mg/kg	20,000		19,000		15,000		18,000	2,650	14.7	22,500	24,700	1.21	22,500
Antimony	7440-36-0	2	25	a	mg/kg	0.770		0.730		0.730		0.743	0.0231	3.11	0.782	0.801	0.247	0.782
Arsenic	7440-38-2	9.8	33	b	mg/kg	9.70		9.60		9.40		9.57	0.153	1.6	9.82	9.95	0.127	9.82
Barium	7440-39-3	20	60	b	mg/kg	110		100		110		107	5.77	5.41	116	121	0.432	116
Beryllium	7440-41-7	No screening value			mg/kg	0.990		0.900		0.890		0.927	0.0551	5.94	1.02	1.07	0.474	1.02
Cadmium	7440-43-9	1	5	b	mg/kg	0.960		0.940		0.910		0.937	0.0252	2.69	0.979	1	0.214	0.979
Chromium, Total	7440-47-3	43.4	111	b	mg/kg	43.0		40.0		40.0		41	1.73	4.22	43.9	45.4	0.337	43.9
Cobalt	7440-48-4	50	50	b	mg/kg	15.0		15.0		14.0		14.7	0.577	3.94	15.6	16.1	0.314	15.6
Copper	7440-50-8	31.6	149	b	mg/kg	58.0	J, TR	53.0	J, TR	51.0	J, TR	54	3.61	6.68	60.1	63.1	0.533	60.1
Iron	7439-89-6	20,000	40,000	g	mg/kg	37,000		35,000		35,000		35,700	1,150	3.24	37,600	38,600	0.258	37,600
Lead	7439-92-1	35.8	128	b	mg/kg	67.0		60.0		56.0		61	5.57	9.13	70.4	75	0.733	70.4
Manganese	7439-96-5	460	1,100	g	mg/kg	2,700		2,600		2,800		2,700	100	3.7	2,870	2,950	0.295	2,870
Mercury (inorganic - aquatic life)	7439-97-6	0.18	1.1	b	mg/kg	0.190		0.190		0.180		0.187	0.00577	3.09	0.196	0.201	0.246	0.196
Mercury (inorganic - wildlife based)		0.17	0.17	i														
Nickel	7440-02-0	22.7	48.6	b	mg/kg	34.0		34.0		34.0		34	0	0	34	34	0	34
Selenium	7782-49-2	0.72	2.9	i	mg/kg	0.780	J, TR	0.760	J, TR	0.750	J, TR	0.763	0.0153	2	0.789	0.802	0.16	0.789
Selenium (wildlife)		0.8	1.2	i														
Silver	7440-22-4	1	2.2	b	mg/kg	0.330		0.310		0.310		0.317	0.0115	3.65	0.336	0.346	0.29	0.336
Thallium	7440-28-0	No screening value			mg/kg	0.200		0.180		0.190		0.19	0.01	5.26	0.207	0.215	0.42	0.207
Vanadium	7440-62-2	No screening value			mg/kg	31.0		29.0		29.0		29.7	1.15	3.89	31.6	32.6	0.31	31.6
Zinc	7440-66-6	121	459	b	mg/kg	190	J, TR	190	J, TR	200		193	5.77	2.99	203	208	0.238	203

Notes: See footnotes on last page of table.

Table D-1. Phase II Sediment Analytical Results

Location						Tidal Wetland Swale												
Sample ID						IINY-TWS-DU-01A-SEDIS-041922		IINY-TWS-DU-01B-SEDIS-041922		IINY-TWS-DU-01C-SEDIS-041922					95% UCL Calculations per ITRC Calculator (2020)			
Depth (in.)						0-6		0-6		0-6								
Matrix						Sediment		Sediment		Sediment								
Sample Date						4/19/2022 12:10		4/19/2022 12:10		4/19/2022 12:10								
Analyte	CAS No.	Ecological Screening Value	Refinement Screening Value	Source	Unit							Mean	Arithmetic Standard Deviation	% Relative Standard Deviation	Student's-t	Chebychev	Adjusted CV of Increments	Recommended 95% UCL
Target Analyte List Metals																		
Aluminum	7429-90-5	25,000	58,000	i	mg/kg	16,000		16,000		15,000		15,700	577	3.69	16,600	17,100	0.294	16,600
Antimony	7440-36-0	2	25	a	mg/kg	1.00		0.730		0.790		0.84	0.142	16.9	1.08	1.2	1.41	1.08
Arsenic	7440-38-2	9.8	33	b	mg/kg	8.40		8.00		9.30		8.57	0.666	7.77	9.69	10.2	0.622	9.69
Barium	7440-39-3	20	60	b	mg/kg	95.0		95.0		92.0		94	1.73	1.84	96.9	98.4	0.147	96.9
Beryllium	7440-41-7	No screening value			mg/kg	0.960		0.950		0.870		0.927	0.0493	5.32	1.01	1.05	0.424	1.01
Cadmium	7440-43-9	1	5	b	mg/kg	1.20		0.840		2.20		1.41	0.705	49.9	2.6	3.19	6.41	3.19
Chromium, Total	7440-47-3	43.4	111	b	mg/kg	43.0		43.0		41.0		42.3	1.15	2.73	44.3	45.2	0.217	44.3
Cobalt	7440-48-4	50	50	b	mg/kg	14.0		13.0		13.0		13.3	0.577	4.33	14.3	14.8	0.345	14.3
Copper	7440-50-8	31.6	149	b	mg/kg	59.0	J, TR	55.0	J, TR	72.0	J, TR	62	8.89	14.3	77	84.4	1.18	77
Iron	7439-89-6	20,000	40,000	g	mg/kg	29,000		29,000		36,000		31,300	4,040	12.9	38,100	41,500	1.05	38,100
Lead	7439-92-1	35.8	128	b	mg/kg	79.0		65.0		97.0		80.3	16	20	107	121	1.71	121
Manganese	7439-96-5	460	1,100	g	mg/kg	1,100		1,000		1,200		1,100	100	9.09	1,270	1,350	0.73	1,270
Mercury (inorganic - aquatic life)	7439-97-6	0.18	1.1	b	mg/kg	0.190		0.210		0.180		0.193	0.0153	7.9	0.219	0.232	0.633	0.219
Mercury (inorganic - wildlife based)		0.17	0.17	i														
Nickel	7440-02-0	22.7	48.6	b	mg/kg	33.0		31.0		35.0		33	2	6.06	36.4	38	0.484	36.4
Selenium	7782-49-2	0.72	2.9	i	mg/kg	0.740	J, TR	0.610	J, TR	0.630	J, TR	0.66	0.07	10.6	0.778	0.836	0.857	0.778
Selenium (wildlife)		0.8	1.2	i														
Silver	7440-22-4	1	2.2	b	mg/kg	0.330		0.360		0.280		0.323	0.0404	12.5	0.391	0.425	1.02	0.391
Thallium	7440-28-0	No screening value			mg/kg	0.180	J, TR	0.180	J, TR	0.180	J, TR	0.18	3.4E-17	1.89E-14	0.18	0.18	1.51E-15	0.18
Vanadium	7440-62-2	No screening value			mg/kg	35.0		35.0		33.0		34.3	1.15	3.36	36.3	37.2	0.268	36.3
Zinc	7440-66-6	121	459	b	mg/kg	360		230	J, TR	990		527	406	77.2	1,210	1,550	15.7	1,550

Notes:

1. From EPA. 2018. Region 4 Ecological Risk Assessment Supplemental Guidance. March. Update.

a - Long, Edward R., and Lee G. Morgan. 1991. The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program. NOAA Technical Memorandum NOS OMA 52. Used effects range low (ER-L) for chronic and effects range medium (ER-M) for acute. (µg/kg dw)

b - MacDonald, et al. 2003. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters. Florida Department of Environmental Protection, Tallahassee, FL. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters. Used threshold effect concentration (TEC) for the ESV and probable effect concentration (PEC) for the RSV.

c - MacDonald, D.D. 1994. Approach to the Assessment of Sediment Quality in Florida Coastal Waters. Florida Department of Environmental Protection. 1994 Florida Sediment Quality Assessment Guidelines for Florida Coastal Waters.

g - Persaud, D., R. Jaagumagi and A. Hayton. 1993. Guidelines for the protection and management of aquatic sediment quality in Ontario. Ontario Ministry of the Environment. Queen's Printer of Ontario.

h - Washington State Sediment Management Standards, Cleanup Objectives. http://www.ecy.wa.gov/programs/tcp/smu/sed_standards.htm

i - Los Alamos National Laboratory ECORISK Database. September 2017. http://www.lanl.gov/environment/protection/eco-risk-assessment.php

95% UCL = 95% upper confidence limit for arithmetic mean
CAS = Chemical Abstracts Service
CV = Coefficient of variation
EPA = U.S. Environmental Protection Agency
in. = Inch(es)
J = Estimated: The analyte was positively identified; the quantitation is an estimate.
LANL = Los Alamos National Laboratory
mg/kg = Milligram(s) per kilogram
mV = Millivolt(s)
No. = Number
U = Not detected

Concentrations highlighted in blue exceed Ecological Screening Levels.

Table D-2. Phase II Background Sediment Analytical Results

| Location | | | | | | Con Hook Hudson River Shoreline | | | | | |

Table D-2. Phase II Background Sediment Analytical Results

| Location | | | | | | Con Hook Marsh Shoreline | | | | | |

Table D-3. Phase II Surface Water Analytical Results - Former Dump Area

Location					AOC #16 – Area D (former Dumping Area)																			
Sample ID					IINY-DUMP-SW-01-041922		IINY-DUMP-SW-02-041922		IINY-DUMP-SW-03-041922		IINY-DUMP-SW-04-041922		IINY-DUMP-SW-05-041922		IINY-DUMP-SW-06-041922		IINY-DUMP-SW-07-041922		IINY-DUMP-SW-08-041922		IINY-DUMP-SW-09-041922		IINY-DUMP-SW-10-041922	
Matrix					Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
Sample Date					4/19/2022 16:10		4/19/2022 15:00		4/19/2022 14:15		4/19/2022 15:50		4/19/2022 15:25		4/19/2022 14:55		4/19/2022 14:05		4/19/2022 13:30		4/19/2022 15:45		4/19/2022 15:20	
Analyte	**CAS #**	**Ecological Screening Levels Freshwater Chronic**	**Screening Level Source[1,2,3]**	**Unit**																				
Dissolved Target Analyte List Metals																								
Aluminum	7429-90-5	87	NRWQC	µg/L	24.0	J, TR	33.0	J, TR	70.0	U	21.0	J, TR	70.0	U	70.0	U	30.0	J, TR	70.0	U	21.0	J, TR	18.0	J, TR
Antimony	7440-36-0	190	GLI	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Arsenic	7440-38-2	150	NRWQC	µg/L	1.00	U	1.00	U	0.400	J, TR	1.00	U	1.00	U	1.00	U	1.00	U	0.340	J, TR	0.370	J, TR	0.390	J, TR
Barium	7440-39-3	220	GLI	µg/L	13.0		10.0		12.0		14.0		14.0		11.0		12.0		9.00		14.0		15.0	
Beryllium	7440-41-7	11	GLI	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U
Cadmium	7440-43-9	0.6	NRWQC	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U
Calcium	7440-70-2	116,000	Suter et al. 1996	µg/L	22,000		14,000		15,000		22,000		18,000		16,000		17,000		13,000		22,000		18,000	
Chromium	7440-47-3	56	NRWQC	µg/L	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U
Cobalt	7440-48-4	19	GLI	µg/L	0.350	U	0.350	U	0.350	U	0.350	U	0.120	J, TR	0.350	U	0.350	U	0.350	U	0.350	U	0.140	J, TR
Copper	7440-50-8	4.95	NRWQC	µg/L	2.40		2.10		2.80		2.30		3.60		1.30	J, TR	1.50	J, TR	3.30		2.50		3.60	
Iron	7439-89-6	1,000	NRWQC	µg/L	100	U, L	100	U, L	100	U, L	34.0	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L
Lead	7439-92-1	2.057	NRWQC	µg/L	0.700	U	0.300	J, TR	0.470	J, TR	0.700	U	1.00	J, TR	0.700	U	0.250	J, TR	0.700	U	0.700	U	0.890	J, TR
Magnesium	7439-95-4	82,000	Suter et al. 1996	µg/L	3,800		6,500		6,400		3,700		5,300		6,500		7,000		6,300		3,700		5,300	
Manganese	7439-96-5	93	GLI	µg/L	8.80		7.30		5.30		7.30		17.0		7.80		7.30		4.60		8.00		18.0	
Mercury	7439-97-6	0.77	NRWQC	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U
Nickel	7440-02-0	38.9	NRWQC	µg/L	0.450	J, TR	1.00	U	0.410	J, TR	0.330	J, TR	0.540	J, TR	0.330	J, TR	0.390	J, TR	1.00	U	0.560	J, TR	0.410	J, TR
Potassium	2023695	53,000	Suter et al. 1996	µg/L	1,500	J, TR	3,000		2,600	J, TR	1,400	J, TR	1,900	J, TR	2,700	J, TR	2,700	J, TR	2,600	J, TR	1,400	J, TR	1,900	J, TR
Selenium	7782-49-2	5	NRWQC	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Silver	7440-22-4	1.6	NRWQC	µg/L	0.100	U, L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
Sodium	7440-23-5	680,000	Suter et al. 1996	µg/L	15,000		31,000		30,000		15,000		17,000		30,000		33,000		29,000		15,000		17,000	
Thallium	7440-28-0	6	GLI	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Vanadium	7440-62-2	27	GLI	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U
Zinc	7440-66-6	88.4	NRWQC	µg/L	2.00	J, TR	11.0	J, TR	11.0	J, TR	8.00	U	35.0		7.20	J, TR	5.70	J, TR	4.00	J, TR	3.10	J, TR	37.0	

Notes:
See footnotes on last page of table.

Table D-3. Phase II Surface Water Analytical Results - Former Dump Area

Location					AOC #16 – Area D (former Dumping Area)																															
Sample ID					IINY-DUMP-SW-11-041922		IINY-DUMP-SW-12-041922		IINY-DUMP-SW-13-041922		IINY-DUMP-SW-14-041922		IINY-DUMP-SW-15-041922		IINY-DUMP-SW-16-041922		IINY-DUMP-SW-17-041922		IINY-DUMP-SW-18-041922		041922 (Duplicate of DUMP-SW-		IINY-DUMP-SW-19-041922		IINY-DUMP-SW-20-041922								
Matrix					Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water								
Sample Date					4/19/2022 14:50		4/19/2022 14:00		4/19/2022 13:25		4/19/2022 15:40		4/19/2022 15:15		4/19/2022 14:45		4/19/2022 13:50		4/19/2022 13:20		4/19/2022 8:00		4/19/2022 13:45		4/19/2022 15:35								
Analyte	CAS #	Ecological Screening Levels Freshwater Chronic	Screening Level Source[1,2,3]	Unit																							Dump 95UCL		Rationale						
Dissolved Target Analyte List Metals																																				
Aluminum	7429-90-5	87	NRWQC	µg/L	30.0	J, TR	19.0	J, TR	70.0	U	19.0	J, TR	70.0	U	70.0	U	70.0	U	70.0	U	70.0	U	70.0	U	18.0	J, TR	26.39		95% KM (t) UCL						
Antimony	7440-36-0	190	GLI	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.40	J, TR	1.30	J, TR	1.093		95% KM (t) UCL						
Arsenic	7440-38-2	150	NRWQC	µg/L	0.340	J, TR	1.00	U	0.340	J, TR	0.410	J, TR	0.340	J, TR	1.00	U	1.00	U	1.00	U	0.360	J, TR	0.610	J, TR	0.470	J, TR	0.447		95% KM (t) UCL						
Barium	7440-39-3	220	GLI	µg/L	13.0		13.0		12.0		15.0		13.0		13.0		14.0		13.0		12.0		12.0		12.0		13.29		95% Student's-t UCL						
Beryllium	7440-41-7	11	GLI	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.320	J, TR	0.0880	J, TR	0.088		Maximum						
Cadmium	7440-43-9	0.6	NRWQC	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	NA		No detections						
Calcium	7440-70-2	116,000	Suter et al. 1996	µg/L	18,000		17,000		16,000		22,000		17,000		18,000		17,000		17,000	J, A	17,000		17,000		12,000		18511		95% Student's-t UCL						
Chromium	7440-47-3	56	NRWQC	µg/L	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	0.500	J, TR	0.5		Maximum						
Cobalt	7440-48-4	19	GLI	µg/L	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.200	J, TR	0.120	J, TR	0.178		95% KM (t) UCL						
Copper	7440-50-8	4.95	NRWQC	µg/L	2.00		1.60	J, TR	2.10		2.70		4.00		1.80	J, TR	1.50	J, TR	2.90		1.90	J, TR	2.10		7.10		3.16		95% Student's-t UCL						
Iron	7439-89-6	1,000	NRWQC	µg/L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	100	U, L	NA		No detections						
Lead	7439-92-1	2.057	NRWQC	µg/L	0.200	J, TR	0.700	U	0.700	U	0.700	U	0.700	J, TR	0.700	U	0.700	U	0.210	J, TR	0.700	U	0.270	J, TR	1.00	J, TR	0.522		95% KM (t) UCL						
Magnesium	7439-95-4	82,000	Suter et al. 1996	µg/L	5,400		6,900		6,600		3,700		5,600		5,300		7,000		7,800		7,900		7,600		5,400		6291		95% Student's-t UCL						
Manganese	7439-96-5	93	GLI	µg/L	4.50		4.50		2.10	J, TR	8.20		4.50		3.70		3.60		2.20	J, TR	2.00	J, TR	1.90	J, TR	7.90		8.348		95% Student's-t UCL						
Mercury	7439-97-6	0.77	NRWQC	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	NA		No detections						
Nickel	7440-02-0	38.9	NRWQC	µg/L	0.440	J, TR	0.390	J, TR	0.330	J, TR	0.630	J, TR	0.510	J, TR	1.00	U	1.00	U	0.360	J, TR	0.510	J, TR	0.350	J, TR	0.420	J, TR	0.467		95% KM (t) UCL						
Potassium	2023695	53,000	Suter et al. 1996	µg/L	2,000	J, TR	2,700	J, TR	2,500	J, TR	1,500	J, TR	2,200	J, TR	1,900	J, TR	2,700	J, TR	2,600	J, TR	2,600	J, TR	2,500	J, TR	2,500	J, TR	2437		95% Student's-t UCL						
Selenium	7782-49-2	5	NRWQC	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	0.370	J, TR	1.00	U	0.37		Maximum						
Silver	7440-22-4	1.6	NRWQC	µg/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U, L	0.100	U, L	NA		No detections						
Sodium	7440-23-5	680,000	Suter et al. 1996	µg/L	20,000		33,000		30,000		15,000		21,000		20,000		35,000		37,000		38,000		36,000		23,000		28195		95% Student's-t UCL						
Thallium	7440-28-0	6	GLI	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.170	J, TR	0.200	U	0.17		Maximum						
Vanadium	7440-62-2	27	GLI	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	NA		No detections						
Zinc	7440-66-6	88.4	NRWQC	µg/L	6.50	J, TR	4.60	J, TR	5.00	J, TR	3.50	J, TR	26.0		7.20	J, TR	3.50	J, TR	5.50	J, TR	3.30	J, TR	3.80	J, TR	44.0		16.5		95% KM (t) UCL						

Ecological screening values for freshwater, chronic exposure. Hierarchy for selected values is as follows:

1. NRWQC, current values. available: https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table

2. Values from the publication by Suter et al. 1996. Toxicological benchmarks for screening potential contaminants of concern for effects on aquatic biota: 1996 Revision. ES/ER/TM-96/R2. https://rais.ornl.gov/documents/tm96r2.pdf. This source was used when no other values were available.

3. Great Lakes Initiative (GLI), Clearinghouse Resources Tier II criteria revised 2013. Available: https://www.epa.gov/gliclearinghouse. These values were selected over Canadian Council of Ministries of the Environment (2003), per USACE NAE.

NOTES:
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
U = Analyte not detected. Numerical value is LOD or LOQ, as indicated

Concentrations highlighted in blue exceed Ecological Screening Levels.

Validation Reason Codes:

A	Serial dilution
L	Lab Blank
TR	Trace Level Detect

Table D-4. Phase II Surface Water Analytical Results - Iona Island Hudson River Shoreline

Location					IHRS (Iona Island Hudson River shoreline along eastern boundary of AOC #16 – Area D)																							
Sample ID					IHRS-SW-01-041922		IHRS-SW-02-041922		IHRS-SW-03-041922		IHRS-SW-04-041922		IINY-IHRS-SW-FD1-041922 (Duplicate of IHRS-SW-04)		IHRS-SW-05-041922		IHRS-SW-06-041922		IHRS-SW-07-041922		IHRS-SW-08-041922		IHRS-SW-09-041922		IHRS-SW-10-041922		
Matrix					Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		
Sample Date					4/19/2022 16:30		4/19/2022 16:32		4/19/2022 16:35		4/19/2022 16:38		4/19/2022 8:00		4/19/2022 16:42		4/19/2022 16:45		4/19/2022 16:48		4/19/2022 16:53		4/19/2022 16:56		4/19/2022 17:00		
Analyte	**CAS #**	**Ecological Screening Levels Freshwater Chronic**	**Screening Level Source[1,2,3]**	**Unit**																								
Dissolved Target Analyte List Metals																												
Aluminum	7429-90-5	87	NRWQC	µg/L	19.0	J, TR	70.0	U	70.0	U	70.0	U	20.0	J, TR	70.0	U	26.0	J, TR	70.0	U	70.0	U	70.0	U	70.0	U		
Antimony	7440-36-0	190	GLI	µg/L	0.950	J, TR	1.00	U	1.00	U	1.00	U	1.30	J, TR	0.480	J, TR	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U		
Arsenic	7440-38-2	150	NRWQC	µg/L	0.400	J, TR	0.520	J, TR	0.540	J, TR	0.520	J, TR	0.590	J, TR	0.640	J, TR	0.610	J, TR	0.460	J, TR	0.490	J, TR	0.430	J, TR	0.450	J, TR		
Barium	7440-39-3	220	GLI	µg/L	14.0		17.0		14.0		14.0		12.0		14.0		14.0		14.0		13.0		14.0		14.0			
Beryllium	7440-41-7	11	GLI	µg/L	0.300	U	0.300	U, L	0.300	U	0.300	U	1.00	U, L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U		
Cadmium	7440-43-9	0.6	NRWQC	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U		
Calcium	7440-70-2	116,000	Suter et al. 1996	µg/L	14,000		23,000		23,000		23,000		22,000		23,000		23,000		22,000		22,000		23,000		23,000			
Chromium	7440-47-3	56	NRWQC	µg/L	1.80	U	0.560	J, TR	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U		
Cobalt	7440-48-4	19	GLI	µg/L	0.350	U	0.350	U	0.350	U	0.350	U	0.180	J, TR	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U		
Copper	7440-50-8	4.95	NRWQC	µg/L	8.00		3.40		3.70		4.40	J, D3	2.30	J, D3	6.40		2.70		3.10		3.30		2.90		3.50			
Iron	7439-89-6	1,000	NRWQC	µg/L	100	U, L	34.0	U, L	34.0	U, L	34.0	U, L	100	U, L	100	U, L	100	U, L	34.0	U, L	100	U, L	34.0	U, L	34.0	U, L		
Lead	7439-92-1	2.057	NRWQC	µg/L	3.00	U, L	0.700	U	0.700	U	0.700	U	0.240	J, TR	0.200	J, TR	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U		
Magnesium	7439-95-4	82,000	Suter et al. 1996	µg/L	5,700		3,800		3,900		3,900		3,600		3,900		3,700		3,700		3,800		3,900		3,900			
Manganese	7439-96-5	93	GLI	µg/L	12.0		9.40		8.10		8.30		11.0		8.60		8.50		8.00		7.80		7.20		7.60			
Mercury	7439-97-6	0.77	NRWQC	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U		
Nickel	7440-02-0	38.9	NRWQC	µg/L	1.00	U	0.470	J, TR	0.450	J, TR	0.370	J, TR	0.550	J, TR	0.480	J, TR	0.310	J, TR	0.520	J, TR	0.330	J, TR	0.530	J, TR	0.390	J, TR		
Potassium	2023695	53,000	Suter et al. 1996	µg/L	2,500	J, TR	1,500	J, TR	1,500	J, TR	1,500	J, TR	1,500	J, TR	1,500	J, TR	1,500	J, TR	1,500	J, TR	1,500	J, TR	1,500	J, TR	1,600	J, TR		
Selenium	7782-49-2	5	NRWQC	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	0.480	J, TR	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U		
Silver	7440-22-4	1.6	NRWQC	µg/L	0.100	U	0.0460	J, TR	0.100	U	0.100	U	0.0710	J, TR	0.460	J, TR	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U		
Sodium	7440-23-5	680,000	Suter et al. 1996	µg/L	22,000		15,000		15,000		15,000		14,000		15,000		15,000		15,000		16,000		16,000		16,000			
Thallium	7440-28-0	6	GLI	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.150	J, TR	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U		
Vanadium	7440-62-2	27	GLI	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U		
Zinc	7440-66-6	88.4	NRWQC	µg/L	60.0		3.10	J, TR	2.70	J, TR	3.20	J, TR	2.00	J, TR	3.00	J, TR	2.30	J, TR	2.60	J, TR	3.80	J, TR	8.00	U	8.00	U		

Notes:

See footnotes on last page of table.

Table D-4. Phase II Surface Water Analytical Results - Iona Island Hudson River Shoreline

Location					IHRS (Iona Island Hudson River shoreline along eastern boundary of AOC #16 – Area D)																											
Sample ID					IHRS-SW-11-041922		IHRS-SW-12-041922		IHRS-SW-13-041922		IHRS-SW-14-041922		IHRS-SW-15-041922		IHRS-SW-16-041922		IHRS-SW-17-041922		IHRS-SW-18-041922		IHRS-SW-19-041922		IHRS-SW-20-041922		IHRS 95UCL	Rationale
Matrix					Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water			
Sample Date					4/19/2022 17:03		4/19/2022 17:07		4/19/2022 17:10		4/19/2022 17:14		4/19/2022 17:19		4/19/2022 17:22		4/19/2022 17:25		4/19/2022 17:30		4/19/2022 17:35		4/19/2022 17:40			
Analyte	CAS #	Ecological Screening Levels Freshwater Chronic	Screening Level Source[1,2,3]	Unit																										
Dissolved Target Analyte List Metals																														
Aluminum	7429-90-5	87	NRWQC	µg/L	70.0	U	70.0	U	70.0	U	70.0	U	70.0	U	70.0	U	22.0	J, TR	22.0	J, TR	20.0	J, TR	22.0	J, TR	23.53	95% KM (t) UCL
Antimony	7440-36-0	190	GLI	µg/L	1.00	U	1.00	U	0.510	J, TR	1.00	U	1.00	U	1.00	U	1.00	U	0.660	J, TR	0.510	J, TR	1.00	U	0.774	95% KM (t) UCL
Arsenic	7440-38-2	150	NRWQC	µg/L	0.430	J, TR	0.470	J, TR	0.520	J, TR	0.560	J, TR	0.540	J, TR	0.450	J, TR	0.440	J, TR	0.500	J, TR	0.420	J, TR	0.430	J, TR	0.516	95% Student's-t UCL
Barium	7440-39-3	220	GLI	µg/L	15.0		16.0		19.0		19.0		19.0		23.0		17.0		19.0		21.0		17.0		17.45	95% Student's-t UCL
Beryllium	7440-41-7	11	GLI	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	NA	No detections
Cadmium	7440-43-9	0.6	NRWQC	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	NA	No detections
Calcium	7440-70-2	116,000	Suter et al. 1996	µg/L	23,000		23,000		23,000		23,000		23,000		23,000		22,000		22,000		22,000		22,000		23000	Maximum
Chromium	7440-47-3	56	NRWQC	µg/L	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	0.56	Maximum
Cobalt	7440-48-4	19	GLI	µg/L	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	NA	No detections
Copper	7440-50-8	4.95	NRWQC	µg/L	5.10		10.0		8.90		9.10		8.20		5.10		3.30		8.30		11.0		8.20		6.995	95% Student's-t UCL
Iron	7439-89-6	1,000	NRWQC	µg/L	34.0	U, L	34.0	U, L	34.0	U, L	100	U, L	34.0	U, L	34.0	U, L	100	U, L	100	U, L	34.0	U, L	110		110	Maximum
Lead	7439-92-1	2.057	NRWQC	µg/L	0.700	U	0.460	J, TR	0.320	J, TR	0.320	J, TR	0.280	J, TR	0.700	U	0.700	U	0.290	J, TR	0.370	J, TR	0.240	J, TR	0.359	95% KM (t) UCL
Magnesium	7439-95-4	82,000	Suter et al. 1996	µg/L	4,000		4,200		5,000		5,200		4,900		5,900		4,500		4,500		5,800		4,800		4736	95% Student's-t UCL
Manganese	7439-96-5	93	GLI	µg/L	8.30		10.0		11.0		12.0		11.0		16.0		10.0		7.30		8.30		6.90		10.17	95% Student's-t UCL
Mercury	7439-97-6	0.77	NRWQC	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	NA	No detections
Nickel	7440-02-0	38.9	NRWQC	µg/L	0.370	J, TR	0.310	J, TR	0.440	J, TR	0.520	J, TR	1.00	U	0.540	J, TR	0.480	J, TR	0.320	J, TR	0.480	J, TR	0.470	J, TR	0.465	95% KM (t) UCL
Potassium	2023695	53,000	Suter et al. 1996	µg/L	1,500	J, TR	1,600	J, TR	1,900	J, TR	1,900	J, TR	1,900	J, TR	2,300	J, TR	1,800	J, TR	1,600	J, TR	2,200	J, TR	1,800	J, TR	1848	95% Student's-t UCL
Selenium	7782-49-2	5	NRWQC	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	NA	No detections
Silver	7440-22-4	1.6	NRWQC	µg/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.1	U	0.100	U	0.46	Maximum
Sodium	7440-23-5	680,000	Suter et al. 1996	µg/L	17,000		19,000		26,000		28,000		26,000		34,000		22,000		21,000		32,000		23,000		22745	95% Student's-t UCL
Thallium	7440-28-0	6	GLI	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	NA	No detections
Vanadium	7440-62-2	27	GLI	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	NA	No detections
Zinc	7440-66-6	88.4	NRWQC	µg/L	8.00	U	3.80	J, TR	4.10	J, TR	3.60	J, TR	3.60	J, TR	7.70	J, TR	4.10	J, TR	5.00	J, TR	15.0	J, TR	6.40	J, TR	12.24	95% KM (t) UCL

Ecological screening values for freshwater, chronic exposure. Hierarchy for selected values is as follows:

1. NRWQC, current values. available: https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table

2. Values from the publication by Suter et al. 1996. Toxicological benchmarks for screening potential contaminants of concern for effects on aquatic biota: 1996 Revision. ES/ER/TM-96/R2. https://rais.ornl.gov/documents/tm96r2.pdf. This source was used when no other values were available.

3. Great Lakes Initiative (GLI), Clearinghouse Resources Tier II criteria revised 2013. Available: https://www.epa.gov/gliclearinghouse. These values were selected over Canadian Council of Ministries of the Environment (2003), per USACE NAE.

NOTES:

CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
RSL = regional screening level
U = Analyte not detected. Numerical value is LOD or LOQ, as indicated

Validation Reason Codes:
A Serial dilution
L Lab Blank
TR Trace Level Detect

Concentrations highlighted in blue exceed Ecological Screening Levels.

Table D-5. Phase II Surface Water Analytical Results - Iona Island Marsh Shoreline

| | | | | | Location | | | | | | | | | | | | | | | | | | | | | | | | | | | | RRDS (Riprap drainage swale) | | | | | | | | | | | | | | | | | | | | | | RRDS 95UCL | Rationale |
|---|---|---

Table D-5. Phase II Surface Water Analytical Results - Iona Island Marsh Shoreline

| | | | | | TWS (Tidal Wetland Swale) | | | | |

Table D-6. Phase II Background Surface Water Analytical Results - Con Hook Hudson River Shoreline

				Location	CHHRS (Con Hook Hudson River Shoreline)																					
				Sample ID	IINY-CHHRS-SW-01-042122		IINY-CHHRS-SW-02-042122		IINY-CHHRS-SW-FD1-042122 (Duplicate of CHHRS-SW-02)		IINY-CHHRS-SW-03-042122		IINY-CHHRS-SW-04-042122		IINY-CHHRS-SW-05-042122		IINY-CHHRS-SW-06-042122		IINY-CHHRS-SW-07-042122		IINY-CHHRS-SW-08-042122		IINY-CHHRS-SW-09-042122		IINY-CHHRS-SW-10-042122	
				Matrix	Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
				Sample Date	4/21/2022 9:55		4/21/2022 10:05		4/21/2022 8:00		4/21/2022 10:15		4/21/2022 10:25		4/21/2022 10:50		4/21/2022 11:00		4/21/2022 11:15		4/21/2022 11:40		4/21/2022 12:00		4/21/2022 12:10	
Analyte	**CAS #**	**Ecological Screening Levels Freshwater Chronic**	**Screening Level Source[1,2,3]**	**Unit**																						
Dissolved Target Analyte List Metals																										
Aluminum	7429-90-5	87	NRWQC	µg/L	20.0	J, TR	18.0	J, TR	23.0	J, TR	20.0	J, TR	18.0	J, TR	19.0	J, TR	21.0	J, TR	19.0	J, TR	22.0	J, TR	21.0	J, TR	36.0	J, TR
Antimony	7440-36-0	190	GLI	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Arsenic	7440-38-2	150	NRWQC	µg/L	0.380	J, TR	0.340	J, TR	0.400	J, TR	0.350	J, TR	0.370	J, TR	1.00	U	0.330	J, TR	0.360	J, TR	0.440	J, TR	0.340	J, TR	0.460	J, TR
Barium	7440-39-3	220	GLI	µg/L	12.0		12.0		12.0		12.0		12.0		13.0		13.0		12.0		13.0		12.0		13.0	
Beryllium	7440-41-7	11	GLI	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U
Cadmium	7440-43-9	0.6	NRWQC	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U
Calcium	7440-70-2	116,000	Suter et al. 1996	µg/L	21,000		22,000		21,000		22,000		22,000		22,000		22,000		22,000		22,000		22,000		22,000	
Chromium	7440-47-3	56	NRWQC	µg/L	1.80	U	1.80	U	0.550	J, TR	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U
Cobalt	7440-48-4	19	GLI	µg/L	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U
Copper	7440-50-8	4.95	NRWQC	µg/L	1.00	J, TR	1.10	J, TR	1.20	J, TR	0.950	J, TR	1.00	J, TR	1.10	J, TR	1.00	J, TR	1.10	J, TR	1.30	J, TR	3.40		1.20	J, TR
Iron	7439-89-6	1,000	NRWQC	µg/L	100	U, L	35.0	J, TR	100	U, L	42.0	J, TR	31.0	J, TR	34.0	J, TR	37.0	J, TR	32.0	J, TR	90.0	J, TR	54.0	J, TR	84.0	J, TR
Lead	7439-92-1	2.057	NRWQC	µg/L	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U
Magnesium	7439-95-4	82,000	Suter et al. 1996	µg/L	3,800		3,700		3,400		3,800		3,700		3,800		3,800		3,800		3,800		3,700		3,800	
Manganese	7439-96-5	93	GLI	µg/L	37.0		23.0		23.0		7.00		9.20		4.70		4.50		4.60		4.90		6.30		79.0	
Mercury	7439-97-6	0.77	NRWQC	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U
Nickel	7440-02-0	38.9	NRWQC	µg/L	1.00	U	0.320	J, TR	0.380	J, TR	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	0.400	J, TR	1.00	U	0.330	J, TR
Potassium	2023695	53,000	Suter et al. 1996	µg/L	1,300	J, TR	1,200	J, TR	1,200	J, TR	1,300	J, TR	1,100	J, TR	1,200	J, TR	1,400	J, TR	1,200	J, TR	1,200	J, TR	1,200	J, TR	1,200	J, TR
Selenium	7782-49-2	5	NRWQC	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Silver	7440-22-4	1.6	NRWQC	µg/L	0.100	U	0.100	U	0.100	U, L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
Sodium	7440-23-5	680,000	Suter et al. 1996	µg/L	18,000		15,000		15,000		16,000		15,000		15,000		16,000		16,000		15,000		15,000		15,000	
Thallium	7440-28-0	6	GLI	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Vanadium	7440-62-2	27	GLI	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U
Zinc	7440-66-6	88.4	NRWQC	µg/L	8.00	U	8.00	UJ, D	3.00	J, TR	8.00	U	8.00	U	8.00	U	8.00	U	90.0		8.00	U	3.00	J, TR	8.00	U

Notes:

See footnotes on last page of table.

Table D-6. Phase II Background Surface Water Analytical Results - Con Hook Hudson River Shoreline

Location					CHHRS (Con Hook Hudson River Shoreline)																			
Sample ID					IINY-CHHRS-SW-11-042122		IINY-CHHRS-SW-12-042122		IINY-CHHRS-SW-13-042122		IINY-CHHRS-SW-14-042122		IINY-CHHRS-SW-15-042122		IINY-CHHRS-SW-16-042122		IINY-CHHRS-SW-17-042122		IINY-CHHRS-SW-18-042122		IINY-CHHRS-SW-19-042122		IINY-CHHRS-SW-20-042122	
Matrix					Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
Sample Date					4/21/2022 12:35		4/21/2022 13:00		4/21/2022 13:15		4/21/2022 13:25		4/21/2022 13:35		4/21/2022 13:45		4/21/2022 14:00		4/21/2022 14:10		4/21/2022 14:20		4/21/2022 14:30	
Analyte	**CAS #**	**Ecological Screening Levels Freshwater Chronic**	**Screening Level Source[1,2,3]**	**Unit**																				
Dissolved Target Analyte List Metals																								
Aluminum	7429-90-5	87	NRWQC	µg/L	21.0	J, TR	20.0	J, TR	21.0	J, TR	20.0	J, TR	20.0	J, TR	18.0	J, TR	18.0	J, TR	19.0	J, TR	20.0	J, TR	19.0	J, TR
Antimony	7440-36-0	190	GLI	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Arsenic	7440-38-2	150	NRWQC	µg/L	0.350	J, TR	0.400	J, TR	1.00	U	1.00	U	0.350	J, TR	0.370	J, TR	0.400	J, TR	1.00	U	0.330	J, TR	0.450	J, TR
Barium	7440-39-3	220	GLI	µg/L	12.0		12.0		12.0		12.0		13.0		13.0		13.0		12.0		12.0		12.0	
Beryllium	7440-41-7	11	GLI	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U
Cadmium	7440-43-9	0.6	NRWQC	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U
Calcium	7440-70-2	116,000	Suter et al. 1996	µg/L	23,000		23,000		23,000		23,000		22,000		22,000		22,000		22,000		22,000		23,000	
Chromium	7440-47-3	56	NRWQC	µg/L	1.80	U	1.80	U	1.80	U, L	1.80	U	1.80	U	1.80	U	1.80	U, L	1.80	U	1.80	U	1.80	U
Cobalt	7440-48-4	19	GLI	µg/L	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.350	U	0.0930	J, TR	0.350	U	0.350	U	0.350	U
Copper	7440-50-8	4.95	NRWQC	µg/L	1.20	J, TR	1.10	J, TR	1.00	J, TR	1.10	J, TR	2.70		1.10	J, TR	2.50		1.00	J, TR	1.20	J, TR	1.20	J, TR
Iron	7439-89-6	1,000	NRWQC	µg/L	46.0	J, TR	28.0	J, TR	150		310		38.0	J, TR	43.0	J, TR	50.0	J, TR	39.0	J, TR	71.0	J, TR	51.0	J, TR
Lead	7439-92-1	2.057	NRWQC	µg/L	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.610	J, TR	0.700	U	0.700	U	0.700	U
Magnesium	7439-95-4	82,000	Suter et al. 1996	µg/L	3,900		4,000		3,900		3,900		3,800		3,800		3,900		3,800		3,800		3,900	
Manganese	7439-96-5	93	GLI	µg/L	5.00		5.10		5.20		6.90		8.70		7.90		7.50		8.00		8.60		10.0	
Mercury	7439-97-6	0.77	NRWQC	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U
Nickel	7440-02-0	38.9	NRWQC	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	J, TR	1.00	U	1.00	U	0.310	J, TR
Potassium	2023695	53,000	Suter et al. 1996	µg/L	1,200	J, TR	1,300	J, TR	1,200	J, TR	1,200	J, TR	1,200	J, TR	1,200	J, TR	1,200	J, TR	1,200	J, TR	1,200	J, TR	1,200	J, TR
Selenium	7782-49-2	5	NRWQC	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Silver	7440-22-4	1.6	NRWQC	µg/L	0.100	U	0.100	U, L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
Sodium	7440-23-5	680,000	Suter et al. 1996	µg/L	16,000		16,000		16,000		16,000		16,000		16,000		16,000		15,000		15,000		16,000	
Thallium	7440-28-0	6	GLI	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Vanadium	7440-62-2	27	GLI	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U
Zinc	7440-66-6	88.4	NRWQC	µg/L	8.00	U	8.00	U, L	8.00	U, L	8.00	U	8.00	U	8.00	U, L	8.00	U	8.00	U, L	8.00	U	8.00	U

Ecological screening values for freshwater, chronic exposure. Hierarchy for selected values is as follows:

1. NRWQC, current values. available: https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table

2. Values from the publication by Suter et al. 1996. Toxicological benchmarks for screening potential contaminants of concern for effects on aquatic biota: 1996 Revision. ES/ER/TM-96/R2. https://rais.ornl.gov/documents/tm96r2.pdf. This source was used when no other values were available.

3. Great Lakes Initiative (GLI), Clearinghouse Resources Tier II criteria revised 2013. Available: https://www.epa.gov/gliclearinghouse. These values were selected over Canadian Council of Ministries of the Environment (2003), per USACE NAE.

NOTES:
CAS = Chemical Abstracts Service
EPA = United States Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = not applicable
ND = not detected
NS = No standard
RSL = regional screening level
U = Analyte not detected. Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate

Concentrations highlighted in blue exceed Ecological Screening Levels.

Validation Reason Codes:
L Lab Blank
TR Trace Level Detect

Table D-7. Phase II Background Surface Water Analytical Results - Con Hook Marsh Shoreline

				Location	CHMS(Con Hook Marsh Shoreline)																			
				Sample ID	IINY-CHMS-SW-01-042122		IINY-CHMS-SW-02-042122		IINY-CHMS-SW-03-042122		IINY-CHMS-SW-04-042122		IINY-CHMS-SW-05-042122		IINY-CHMS-SW-06-042122		IINY-CHMS-SW-07-042122		IINY-CHMS-SW-08-042122		IINY-CHMS-SW-09-042122		IINY-CHMS-SW-10-042122	
				Matrix	Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
				Sample Date	4/21/2022 17:30		4/21/2022 17:25		4/21/2022 17:15		4/21/2022 17:10		4/21/2022 17:05		4/21/2022 16:40		4/21/2022 16:35		4/21/2022 16:32		4/21/2022 16:31		4/21/2022 16:30	
Analyte	CAS No.	Ecological Screening Levels Freshwater Chronic	Screening Level Source[1,2,3]	Unit																				
Dissolved Target Analyte List Metals																								
Aluminum	7429-90-5	87	NRWQC	µg/L	22.0	J, TR	70.0	U	20.0	J, TR	23.0	J, TR	44.0	J, TR	31.0	J, TR	25.0	J, TR	39.0	J, TR	39.0	J, TR	20.0	J, TR
Antimony	7440-36-0	190	GLI	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Arsenic	7440-38-2	150	NRWQC	µg/L	0.380	J, TR	1.00	U	0.420	J, TR	0.480	J, TR	0.420	J, TR	0.900	J, TR	1.50	J, TR	2.70	J, TR	0.690	J, TR	0.590	J, TR
Barium	7440-39-3	220	GLI	µg/L	14.0		13.0		13.0		13.0		13.0		17.0		17.0		17.0		16.0		15.0	
Beryllium	7440-41-7	11	GLI	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U
Cadmium	7440-43-9	0.6	NRWQC	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U
Calcium	7440-70-2	116,000	Suter et al. 1996	µg/L	20,000		22,000		22,000		21,000		20,000		23,000		24,000		23,000		24,000		25,000	
Chromium	7440-47-3	56	NRWQC	µg/L	0.510	J, TR	1.80	U	1.80	U	1.80	U	1.80	U	1.80	U	0.500	J, TR	1.80	U	0.560	J, TR	0.540	J, TR
Cobalt	7440-48-4	19	GLI	µg/L	0.110	J, TR	0.350	U	0.350	U	0.350	U	0.350	U	0.120	J, TR	0.150	J, TR	0.140	J, TR	0.150	J, TR	0.120	J, TR
Copper	7440-50-8	4.95	NRWQC	µg/L	0.710	J, TR	1.30	J, TR	1.30	J, TR	1.30	J, TR	1.30	J, TR	0.650	J, TR	0.680	J, TR	0.630	J, TR	0.700	J, TR	0.820	J, TR
Iron	7439-89-6	1,000	NRWQC	µg/L	100	U, L	100	U, L	100	U, L	100	U, L	110	+J, L	140	+J, L	400		250		160	+J, L	160	+J, L
Lead	7439-92-1	2.057	NRWQC	µg/L	0.700	U	0.700	U	0.700	U	0.700	U	0.220	J, TR	0.700	U	0.230	J, TR	0.390	J, TR	0.700	U	0.700	U
Magnesium	7439-95-4	82,000	Suter et al. 1996	µg/L	6,500		4,100		3,900		4,200		4,100		11,000		11,000		12,000		11,000		11,000	
Manganese	7439-96-5	93	GLI	µg/L	41.0		8.20		12.0		10.0		16.0		310		330		540		270		210	
Mercury	7439-97-6	0.77	NRWQC	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U
Nickel	7440-02-0	38.9	NRWQC	µg/L	0.510	J, TR	1.00	U	0.410	J, TR	0.410	J, TR	0.330	J, TR	0.510	J, TR	0.460	J, TR	0.400	J, TR	0.460	J, TR	0.420	J, TR
Potassium	2023695	53,000	Suter et al. 1996	µg/L	1,800	J, TR	1,300	J, TR	1,200	J, TR	1,300	J, TR	1,400	J, TR	2,900	J, TR	3,000		3,200		2,900	J, TR	3,000	
Selenium	7782-49-2	5	NRWQC	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Silver	7440-22-4	1.6	NRWQC	µg/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
Sodium	7440-23-5	680,000	Suter et al. 1996	µg/L	41,000		19,000		17,000		20,000		19,000		97,000		95,000		100,000		95,000		91,000	
Thallium	7440-28-0	6	GLI	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Vanadium	7440-62-2	27	GLI	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U
Zinc	7440-66-6	88.4	NRWQC	µg/L	2.50	J, TR	3.50	J, TR	3.70	J, TR	3.40	J, TR	4.20	J, TR	8.00	U	8.00	U	8.00	U	8.00	U	8.00	U

Notes:
See footnotes on last page of table.

Table D-7. Phase II Background Surface Water Analytical Results - Con Hook Marsh Shoreline

Location					CHMS (Con Hook Marsh Shoreline)																											
Sample ID					IINY-CHMS-SW-11-042122		IINY-CHMS-SW-12-042122		IINY-CHMS-SW-13-042122		IINY-CHMS-SW-14-042122		IINY-CHMS-SW-15-042122		IINY-CHMS-SW-16-042122		IINY-CHMS-SW-17-042122		042122 (Duplicate of CHMS-SW-17)		IINY-CHMS-SW-18-042122		IINY-CHMS-SW-19-042122		IINY-CHMS-SW-20-042122	
Matrix					Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
Sample Date					4/21/2022 16:20		4/21/2022 16:15		4/21/2022 16:10		4/21/2022 16:00		4/21/2022 15:55		4/21/2022 15:40		4/21/2022 15:25		4/21/2022 8:00		4/21/2022 15:35		4/21/2022 15:15		4/21/2022 15:10	
Analyte	CAS No.	Ecological Screening Levels Freshwater Chronic	Screening Level Source[1,2,3]	Unit																						
Dissolved Target Analyte List Metals																										
Aluminum	7429-90-5	87	NRWQC	µg/L	51.0	J, TR	24.0	J, TR	26.0	J, TR	260		320		110		20.0	J, TR	70.0	U	25.0	J, TR	70.0	U	21.0	J, TR
Antimony	7440-36-0	190	GLI	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Arsenic	7440-38-2	150	NRWQC	µg/L	0.620	J, TR	0.480	J, TR	0.530	J, TR	0.730	J, TR	0.760	J, TR	0.740	J, TR	0.420	J, TR	0.400	J, TR	0.460	J, TR	0.400	J, TR	0.440	J, TR
Barium	7440-39-3	220	GLI	µg/L	16.0		17.0		18.0		7.00		4.80		7.90		11.0		10.0		10.0		10.0		12.0	
Beryllium	7440-41-7	11	GLI	µg/L	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U	0.300	U
Cadmium	7440-43-9	0.6	NRWQC	µg/L	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U
Calcium	7440-70-2	116,000	Suter et al. 1996	µg/L	23,000		26,000		27,000		8,900		7,600		12,000		20,000		20,000		20,000		20,000		18,000	
Chromium	7440-47-3	56	NRWQC	µg/L	0.640	J, TR	0.610	J, TR	0.550	J, TR	0.540	J, TR	0.600	J, TR	0.540	J, TR	1.80	U	1.80	U	0.520	J, TR	1.80	U	0.550	J, TR
Cobalt	7440-48-4	19	GLI	µg/L	0.180	J, TR	0.130	J, TR	0.130	J, TR	0.120	J, TR	0.350	U	0.130	J, TR	0.350	U	0.350	U	0.350	U	0.350	U	0.100	J, TR
Copper	7440-50-8	4.95	NRWQC	µg/L	0.690	J, TR	0.730	J, TR	0.790	J, TR	0.790	J, TR	0.770	J, TR	0.610	J, TR	1.00	J, TR	0.970	J, TR	1.00	J, TR	0.960	J, TR	1.20	J, TR
Iron	7439-89-6	1,000	NRWQC	µg/L	200	+J, L	150	+J, L	160	+J, L	310		320		230		100	U, L	100	U, L	100	U, L	100	U, L	100	U, L
Lead	7439-92-1	2.057	NRWQC	µg/L	0.700	U	0.700	U	0.700	U	0.300	J, TR	0.290	J, TR	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U	0.700	U
Magnesium	7439-95-4	82,000	Suter et al. 1996	µg/L	10,000		12,000		13,000		3,400		2,900		4,400		3,700		3,700		3,800		3,700		3,800	
Manganese	7439-96-5	93	GLI	µg/L	290		180		200		89.0		120		180		17.0	-J, M	16.0		14.0		19.0		18.0	
Mercury	7439-97-6	0.77	NRWQC	µg/L	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U	0.0800	U
Nickel	7440-02-0	38.9	NRWQC	µg/L	0.560	J, TR	0.390	J, TR	0.330	J, TR	0.440	J, TR	0.420	J, TR	0.420	J, TR	0.380	J, TR	0.450	J, TR	1.00	U	1.00	U	0.570	J, TR
Potassium	2023695	53,000	Suter et al. 1996	µg/L	2,700	J, TR	3,100		3,300		1,500	J, TR	1,400	J, TR	2,100	J, TR	1,200	J, TR	1,300	J, TR	1,300	J, TR	1,200	J, TR	1,300	J, TR
Selenium	7782-49-2	5	NRWQC	µg/L	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U
Silver	7440-22-4	1.6	NRWQC	µg/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U, L	0.100	U	0.100	U
Sodium	7440-23-5	680,000	Suter et al. 1996	µg/L	86,000		100,000		110,000		25,000		22,000		37,000		17,000		17,000		17,000		17,000		20,000	
Thallium	7440-28-0	6	GLI	µg/L	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Vanadium	7440-62-2	27	GLI	µg/L	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U
Zinc	7440-66-6	88.4	NRWQC	µg/L	2.90	J, TR	8.00	U	8.00	U	2.40	J, TR	8.00	U	2.50	J, TR	3.70	-J, M/TR	8.00	U	8.00	U	8.00	U	2.00	J, TR

Notes:

Ecological screening values for freshwater, chronic exposure. Hierarchy for selected values is as follows:

1. NRWQC, current values. available: https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table
2. Values from the publication by Suter et al. 1996. Toxicological benchmarks for screening potential contaminants of concern for effects on aquatic biota: 1996 Revision. ES/ER/TM-96/R2. https://rais.ornl.gov/documents/tm96r2.pdf. This source was used when no other values were available.
3. Great Lakes Initiative (GLI), Clearinghouse Resources Tier II criteria revised 2013. Available: https://www.epa.gov/gliclearinghouse. These values were selected over Canadian Council of Ministries of the Environment (2003), per USACE NAE.

µg/L = Microgram(s) per liter
CAS = Chemical Abstracts Service
EPA = U.S. Environmental Protection Agency
J = Estimated: The analyte was positively identified; the quantitation is an estimation
LOD = Limit of detection
LOQ = Limit of quantitation
N/A = Not applicable
ND = Not detected
NRWQC = National Recommended Water Quality Criteria
No. = Number
NS = No standard
RSL = Regional screening level
U = Analyte not detected. Numerical value is LOD or LOQ, as indicated
UJ = Analyte not detected, and associated numerical value (LOD or LOQ) is approximate

Concentrations highlighted in blue exceed Ecological Screening Levels.

Validation Reason Codes:

L	Lab Blank
TR	Trace Level Detect

Table D-8. Phase II Soil Parameters

Location		DU-4								DU-7							
Sample ID		IINY-DU-04A-SSIS-041822		IINY-DU-04B-SSIS-041822		IINY-DU-04C-SSIS-041822		Mean	Arithmetic Standard Deviation	% Relative Standard Deviation (RSD)	IINY-DU-07A-SSIS-041822		IINY-DU-07B-SSIS-041822		IINY-DU-07C-SSIS-041822		Mean	Arithmetic Standard Deviation	% Relative Standard Deviation (RSD)
Depth (in.)		0-6		0-6		0-6					0-6		0-6		0-6				
Matrix		Surface Soil		Surface Soil		Surface Soil					Surface Soil		Surface Soil		Surface Soil				
Sample Date / Time		4/18/2022 14:50		4/18/2022 14:50		4/18/2022 14:50					4/18/2022 13:25		4/18/2022 13:25		4/18/2022 13:25				
	Unit																		
General Chemistry																			
pH (from Phase I)	N/A	6.9		7.0		7.0		6.97	0.06	0.829	7.4		7.4		7.5		7.43	0.0577	0.777
Oxidation Reduction Potential (ORP) by Field Screening	mV	284		275		269		276	7.55	3	402		310		307		340	54	16
Standard hydrogen electrode corrected ORP	mV	489		480		474		481	7.55	2	607		515		512		545	54	10
Total Organic Carbon (TOC)	mg/kg	13,000		37,000		36,000		28,667	13,576.94	47.4	34,000		32,000		33,000		33,000	1,000	3.03
CEC Analytical[1]	MEQ/100g	1,800	X	1,700	X	1,600	X	N/A	N/A	N/A	1,700	X	1,700	X	X	X	N/A	N/A	N/A
CEC Calculation[2]	MEQ/100g	132		105		83		106.38	N/A	N/A	188		161		175		174.71	N/A	N/A
CEC Re-analysis[3]	MEQ/100g	33		33		34		33	0.58	2	24		25		24		24	0.58	2
Grain Size																			
Gravel	%	6.38		10.76		10.47		9.2	2.45	26.6	8.39		8.89		11.70		9.66	1.78	18.5
Sand Coarse	%	0.57		1.78		3.04		1.8	1.24	68.7	4.16		4.69		6.91		5.25	1.46	27.8
Sand Medium	%	18.51		17.48		18.30		18.1	0.544	3.01	26.85		23.36		27.30		25.8	2.16	8.35
Sand Fine	%	25.22		24.44		22.06		23.9	1.65	6.89	20.46		20.53		19.42		20.1	0.622	3.09
Silt	%	41.97		39.51		37.57		39.7	2.21	5.56	30.51		33.52		25.95		30.0	3.81	12.7
Clay	%	7.36		6.03		8.57		7.32	1.27	17.4	9.64		9.00		8.72		9.12	0.472	5.2

Notes:
See footnotes on last page of table

Table D-8. Phase II Soil Parameters

Location		DU-9								DU-11							
	Sample ID	IINY-DU-09A-SSIS-041822		IINY-DU-09B-SSIS-041822		IINY-DU-09C-SSIS-041822		Mean	Arithmetic Standard Deviation	% Relative Standard Deviation (RSD)	IINY-DU-11A-SSIS-041822		IINY-DU-11B-SSIS-041822		IINY-DU-11C-SSIS-041822		Mean	Arithmetic Standard Deviation	% Relative Standard Deviation (RSD)
	Depth (in.)	0-6		0-6		0-6					0-6		0-6		0-6				
	Matrix	Surface Soil		Surface Soil		Surface Soil					Surface Soil		Surface Soil		Surface Soil				
Sample Date / Time		4/18/2022 16:20		4/18/2022 16:20		4/18/2022 16:20					4/18/2022 16:20		4/18/2022 16:20		4/18/2022 16:20				
	Unit																		
General Chemistry																			
pH (from Phase I)	N/A	7.1		6.9		7.0		7.0	0.1	1.43	7.0		7.0		7.2		7.07	0.115	1.63
Oxidation Reduction Potential (ORP) by Field Screening	mV	242		245		240		242	3	1	239		252		225		239	14	6
Standard hydrogen electrode corrected ORP	mV	447		450		445		447	3	1	444		457		430		444	14	3
Total Organic Carbon (TOC)	mg/kg	30,000		30,000		34,000		31,333	2,309	7.37	30,000		30,000		NA		30,000	0	0
CEC Analytical[1]	MEQ/100g	1,700	X	1,700	X	1,700	X	N/A	N/A	N/A	1,700	X	1,700	X	NA	X	N/A	N/A	N/A
CEC Calculation[2]	MEQ/100g	93		76		104		90.79	N/A	N/A	301		269		288		286.05	N/A	N/A
CEC Re-analysis[3]	MEQ/100g	27		28		28		28	0.58	2	23		25		32		27	4.73	18
Grain Size																			
Gravel	%	4.92		4.83		10.76		6.84	3.40	49.7	1.34		2.35		NA		2.01	0.58	29.0
Sand Coarse	%	0.48		0.89		0.72		0.70	0.21	29.6	3.64		0.76		NA		1.72	1.66	96.7
Sand Medium	%	14.43		17.22		14.59		15.4	1.57	10.2	23.48		30.51		NA		28.2	4.06	14.4
Sand Fine	%	26.12		28.00		24.39		26.2	1.806	6.90	19.45		19.92		NA		19.8	0.271	1.37
Silt	%	49.20		45.53		45.90		46.9	2.02	4.3	49.17		43.57		NA		45.4	3.23	7.1
Clay	%	4.85		3.54		3.64		4.01	0.729	18.2	2.91		2.88		NA		2.89	0.017	0.6

Table D-8. Phase II Soil Parameters

Location		DU-13									DU-17								
	Sample ID	IINY-DU-13A-SSIS-041822		IINY-DU-13B-SSIS-041822		IINY-DU-13C-SSIS-041822		Mean	Arithmetic Standard Deviation	% Relative Standard Deviation (RSD)	IINY-DU-17A-SSIS-041922		IINY-DU-17B-SSIS-041922		IINY-DU-17C-SSIS-041922		Mean	Arithmetic Standard Deviation	% Relative Standard Deviation (RSD)
	Depth (in.)	0-6		0-6		0-6					0-6		0-6		0-6				
	Matrix	Surface Soil		Surface Soil		Surface Soil					Surface Soil		Surface Soil		Surface Soil				
Sample Date / Time		4/18/2022 14:00		4/18/2022 14:00		4/18/2022 14:00					4/18/2022 15:40		4/18/2022 15:40		4/18/2022 15:40				
	Unit																		
General Chemistry																			
pH (from Phase I)	N/A	6.8		7.0		6.9		6.90	0.1	1.45	7.2		7.2		7.1		7.17	0.0577	0.806
Oxidation Reduction Potential (ORP) by Field Screening	mV	307		298		322		309	12	4	294		297		288		293	5	2
Standard hydrogen electrode corrected ORP	mV	512		503		527		514	12	2	499		502		493		498	5	1
Total Organic Carbon (TOC)	mg/kg	42,000		46,000		43,000		43,667	2,082	4.77	47,000		44,000		29,000		40,000	9,644	24.1
CEC Analytical[1]	MEQ/100g	1,700	X	1,600	X	1,600	X	N/A	N/A	N/A	1,700	X	1,600	X	1,700	X	N/A	N/A	N/A
CEC Calculation[2]	MEQ/100g	98		92		94		94.57	N/A	N/A	750		436		579		588	N/A	N/A
CEC Re-analysis[3]	MEQ/100g	32		36		39		36	4	10	41		38		36		38	3	7
Grain Size																			
Gravel	%	7.23		5.64		5.63		6.17	0.921	14.9	8.56		5.20		16.15		9.97	5.61	56.3
Sand Coarse	%	11.84		3.16		1.43		5.48	5.58	102	11.33		10.23		13.84		11.8	1.85	15.7
Sand Medium	%	32.80		26.57		29.84		29.7	3.12	10.5	34.09		39.91		34.37		36.1	3.28	9.09
Sand Fine	%	17.35		20.93		21.44		19.9	2.23	11.2	15.49		15.59		12.01		14.4	2.04	14.2
Silt	%	29.07		41.76		39.35		36.7	6.74	18.4	28.99		27.57		22.18		26.2	3.59	13.7
Clay	%	1.70		1.94		2.31		1.98	0.307	15.5	1.54		1.51		1.45		1.5	0.0458	3.06

Table D-8. Phase II Soil Parameters

Location		DU-18									DU-19							
	Sample ID	IINY-DU-18A-SSIS-041922		IINY-DU-18B-SSIS-041922		IINY-DU-18C-SSIS-041922		Mean	Arithmetic Standard Deviation	% Relative Standard Deviation (RSD)	IINY-DU-19A-SSIS-041922		IINY-DU-19B-SSIS-041922		IINY-DU-19C-SSIS-041922		Mean	Arithmetic Standard Deviation	% Relative Standard Deviation (RSD)
	Depth (in.)	0-6		0-6		0-6					0-6		0-6		0-6				
	Matrix	Surface Soil		Surface Soil		Surface Soil					Surface Soil		Surface Soil		Surface Soil				
	Sample Date / Time	4/19/2022 10:15		4/19/2022 10:15		4/19/2022 10:15					4/19/2022 9:25		4/19/2022 9:25						
	Unit																		
General Chemistry																			
pH (from Phase I)	N/A	7.5		8.0		7.8		7.77	0.252	3.24	7.7		7.5		7.4		7.53	0.153	2.03
Oxidation Reduction Potential (ORP) by Field Screening	mV	300		290		299		296	6	2	275		292		297		288	12	4
Standard hydrogen electrode corrected ORP	mV	505		495		504		501	6	1	480		497		502		493	12	2
Total Organic Carbon (TOC)	mg/kg	120,000		280,000		300,000		233,333	98,658	42.3	38,000		36,000		25,000		33,000	7,000	21.2
CEC Analytical[1]	MEQ/100g	1,600	X	1,500	X	1,500	X	N/A	N/A	N/A	1,700	X	1,700	X	1,700	X	N/A	N/A	N/A
CEC Calculation[2]	MEQ/100g	135		134		136		135	N/A	N/A	108		161		129		133	N/A	N/A
CEC Re-analysis[3]	MEQ/100g	91		39		30		53	33	62	33		31		34		33	2	5
Grain Size																			
Gravel	%	9.98		0.47		1.45		3.97	5.23	132	0.75		1.23		3.61		1.86	1.53	82.2
Sand Coarse	%	15.96		9.31		6.30		10.5	4.94	47	0.25		0.16		4.78		1.73	2.64	153
Sand Medium	%	38.14		71.21		74.43		61.3	20.09	32.8	34.05		27.71		34.47		32.1	3.79	11.8
Sand Fine	%	6.87		6.28		9.94		7.7	1.97	25.5	24.49		25.90		18.75		23	3.79	16.4
Silt	%	26.71		9.59		7.43		14.6	10.6	72.5	40.02		42.60		36.00		39.5	3.33	8.41
Clay	%	2.34		3.14		0.44		1.97	1.39	70.3	0.43		2.39		2.38		1.73	1.13	65.1

Notes:
1. Initial laboratory CEC results were deemed abnormally high by several orders of magnitude. Analytical results were rejected during data validation.
2. CEC for onsite soil was calculated using Phase I metals analytical results (calcium, magnesium, potassium, sodium).
3. The laboratory re-analyzed CEC samples after correcting an error with reagents. Analytical results are from re-analysis. However, laboratory holding times and conditions are unknown.
% = Percent

Table D-9. Phase II Onsite ISM Sediment Physical Parameters

Location		Iona Island Hudson River Shoreline								Rip Rap Drainage Swale								Tidal Wetland Swale							
Sample ID		IINY-IHRS-DU-01A-SEDIS-041922		IINY-IHRS-DU-01B-SEDIS-041922		IINY-IHRS-DU-01C-SEDIS-041922				IINY-RRDS-DU-01A-SEDIS-041922		IINY-RRDS-DU-01B-SEDIS-041922		IINY-RRDS-DU-01C-SEDIS-041922				IINY-TWS-DU-01A-SEDIS-041922		IINY-TWS-DU-01B-SEDIS-041922		IINY-TWS-DU-01C-SEDIS-041922			
Depth (in.)		0-6		0-6		0-6				0-6		0-6		0-6				0-6		0-6		0-6			
Matrix		Sediment		Sediment		Sediment				Sediment		Sediment		Sediment				Sediment		Sediment		Sediment			
Sample Date		4/19/2022 10:45		4/19/2022 10:45		4/19/2022 10:45				4/19/2022 11:30		4/19/2022 11:30		4/19/2022 11:30				4/19/2022 12:10		4/19/2022 12:10		4/19/2022 12:10			
Analyte	Unit							Mean	Arithmetic Standard Deviation	% Relative Standard Deviation (RSD)						Mean	Arithmetic Standard Deviation	% Relative Standard Deviation (RSD)						Mean	Arithmetic Standard Deviation	% Relative Standard Deviation (RSD)
General Chemistry																										
pH	N/A	6.8		6.6		6.9		6.77	0.15	2.260	7.3		7.1		7.1		7.17	0.115	1.6	7.0		7.4		7.2		7.2	0.2	2.8
ORP by Field Screening	mV	754		493		512		586	146.00	25	322		342		310		325	16	5.0	333		296		312		314	19	5.9
Standard hydrogen electrode corrected ORP	mV	959		698		717		791	146.00	18	527		547		515		530	16	3.1	538		501		517		519	19	3.6
TOC	mg/kg	2,600		4,500		3,500		3,530	950.00	26.9	74,000		73,000		88,000		78,300	8,390	10.7	63,000		60,000		64,000		62,300	2,080	3.3
Grain Size																										
Gravel	%	8.27		7.21		11.73		9.07	2.36	26.1	0.89		1.52		1.32		1.24	0.322	25.9	6.99		2.79		13.48		7.75	5.39	69.5
Sand Coarse	%	21.34		20.28		25.00		22.2	2.48	11.2	1.29		0.34		0.33		0.653	0.551	84.4	1.33		1.31		2.66		1.77	0.774	43.8
Sand Medium	%	53.61		51.41		45.99		50.3	3.92	7.79	5.99		6.27		4.47		5.58	0.969	17.4	5.89		6.73		8.82		7.15	1.51	21.1
Sand Fine	%	10.56		16.14		12.03		12.9	2.89	22.4	8.50		5.67		5.71		6.63	1.62	24.5	7.38		7.47		10.81		8.55	1.95	22.9
Silt	%	4.45		-2.82		-2.94		-0.437	4.23	-969	54.37		49.03		53.10		52.2	2.79	5.35	46.23		48.01		38.90		44.4	4.83	10.9
Clay	%	1.78		7.79		8.20		5.92	3.59	60.7	28.95		37.17		35.06		33.7	4.27	12.7	32.18		33.70		25.33		30.4	4.46	14.7

Notes:
% = Percent
in. = Inch(es)
mg/kg = Milligram(s) per kilogram
mV = Millivolt(s)
N/A = Not applicable
ORP = Oxidation reduction potential
TOC = Total organic carbon

Table D-10. Phase II Background ISM Sediment Physical Parameters

Location	Con Hook Hudson River Shoreline																					
Sample ID	IINY-CHHRS-SU-01-SEDIS-042122		IINY-CHHRS-SU-02-SEDIS-042122		IINY-CHHRS-SU-03-SEDIS-042122		IINY-CHHRS-SU-04-SEDIS-042122		IINY-CHHRS-SU-05-SEDIS-042122		IINY-CHHRS-SU-06-SEDIS-042122		IINY-CHHRS-SU-07-SEDIS-042122		IINY-CHHRS-SU-08-SEDIS-042122					
Depth (in.)	0-6		0-6		0-6		0-6		0-6		0-6		0-6		0-6							
Matrix	Sediment		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment							
Sample Date	4/21/2022 13:00		4/21/2022 12:40		4/21/2022 12:20		4/21/2022 11:40		4/21/2022 11:25		4/21/2022 10:40		4/21/2022 10:15		4/21/2022 10:05							
Analyte																	Mean		Arithmetic Standard Deviation		% Relative Standard Deviation (RSD)	
Field Parameters																						
pH	6.6		6.6		6.8		6.6		6.5		6.6		6.6		6.7		6.63		0.0886		1.3	
ORP by Field Screening	452		448		576		576		512		550		612		493		527		61		11.5	
Standard hydrogen electrode corrected ORP	657		653		781		781		717		755		817		698		732		61		8.3	
TOC	46,000	J, P2	42,000	J, P2	36,000	J, P2	32,000	J, P2	34,000	J, P2	7,200	J, P2	25,000	J, P2	12,000	J, P2	29,300		13,700		46.9	
Grain Size																						
Gravel	1.44		0.00		0.00		0.63		0.00		17.03		22.63		32.83		15		14		93	
Sand Coarse	0.48		0.16		0.16		0.00		0.08		27.43		21.59		21.18		10		13		124	
Sand Medium	2.32		0.72		0.72		0.39		0.54		43.36		20.48		24.96		12		16		139	
Sand Fine	4.79		3.18		3.66		2.45		2.80		2.58		6.27		6.20		4		2		39	
Silt	59.74		65.87		62.12		63.50		63.27		7.16		21.62		7.83		44		27		61	
Clay	31.24		30.07		33.35		33.03		33.30		2.44		7.40		6.99		22.2		13.9		62.5	

Notes:
% = Percent
in. = Inch(es)
mg/kg = Milligram(s) per kilogram
mV = Millivolt(s)
N/A = Not applicable
J = Estimated: The analyte was positively identified; the quantitation is an estimation
ORP = Oxidation reduction potential
TOC = Total organic carbon

Table D-10. Phase II Background ISM Sediment Physical Parameters

Location		Con Hook Marsh Shoreline																					
Sample ID		IINY-CHMS-SU-01-SEDIS-042122		IINY-CHMS-SU-02-SEDIS-042122		IINY-CHMS-SU-03-SEDIS-042122		IINY-CHMS-SU-04-SEDIS-042122		IINY-CHMS-SU-05-SEDIS-042122		IINY-CHMS-SU-06-SEDIS-042122		IINY-CHMS-SU-07-SEDIS-042122		IINY-CHMS-SU-08-SEDIS-042122				
Depth (in.)		0-6		0-6		0-6		0-6		0-6		0-6		0-6		0-6					
Matrix		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment		Sediment					
Sample Date		4/21/2022 14:44		4/21/2022 14:37		4/21/2022 14:29		4/21/2022 14:20		4/21/2022 14:07		4/21/2022 13:55		4/21/2022 13:45		4/21/2022 13:30					
Analyte	**Unit**																	**Mean**	**Arithmetic Standard Deviation**	**% Relative Standard Deviation (RSD)**
Field Parameters																				
pH	N/A	6.9		6.8		7		6.8		6.8		6.5		6.8		6.9		6.81	0.146	2.1
ORP by Field Screening	mV	375		422		412		426		399		402		405		427		408	17	4.3
Standard hydrogen electrode corrected ORP	mV	580		627		617		631		604		607		610		632		614	17	2.8
TOC	mg/kg	220,000	J, P2	250,000	J, P2	220,000	J, P2	200,000	J, P2	110,000	J, P2	140,000	J, P2	130,000	J, P2	150,000	J, P2	178,000	51,200	28.8
Grain Size																				
Gravel	%	0.67		1.53		1.53		0.83		0.69		1.60		3.07		0.73		1	1	61
Sand Coarse	%	1.67		1.87		2.83		2.66		1.76		3.27		6.82		1.09		3	2	65
Sand Medium	%	11.37		6.67		16.05		18.82		8.41		10.64		15.17		9.61		12	4	35
Sand Fine	%	16.38		21.60		18.17		17.65		9.10		10.79		13.97		14.96		15	4	27
Silt	%	43.09		40.42		45.35		44.58		47.83		46.59		44.19		55.83		46	5	10
Clay	%	26.82		17.91		16.07		15.45		32.20		27.11		16.79		17.78		21.3	6.42	30.2

Notes:
% = Percent
in. = Inch(es)
mg/kg = Milligram(s) per kilogram
mV = Millivolt(s)
N/A = Not applicable
J = Estimated: The analyte was positively identified; the quantitation is an estimation
ORP = Oxidation reduction potential
TOC = Total organic carbon

Attachment E

ISM Calculator Results/ProUCL Outputs

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Calculation of Combined 95UCL Exposure Point Concentrations—Iona Island Surface Soil

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
1	DU 1	10000.00	0.52	0.51	0.47			3	0.07	0.5	0.03	0.2	0.4	0.02	0.5	0.6
2	DU 2	10000.00	0.61	0.62	0.68			3	0.07	0.6	0.04	0.3	0.4	0.02	0.7	0.7
3	DU 3	10000.00	0.7	0.63	0.65			3	0.07	0.7	0.04	0.3	0.4	0.02	0.7	0.8
4	DU 4	10000.00	1.5	2.1	1.5			3	0.07	1.7	0.3	2.4	1.4	0.2	2.3	2.6
5	DU 5	10000.00	0.49	0.47	0.59			3	0.07	0.5	0.1	0.5	0.9	0.04	0.6	0.7
6	DU 6	10000.00	1.4	0.62	0.58			3	0.07	0.9	0.5	3.3	3.8	0.3	1.6	2.0
7	DU 7	10000.00	0.75	1.6	2.5			3	0.07	1.6	0.9	6.2	3.8	0.5	3.1	3.8
9	DU 9	10000.00	0.44	0.42	0.44			3	0.07	0.4	0.01	0.1	0.2	0.01	0.5	0.5
10	DU 10	10000.00	0.41	0.41	0.35			3	0.07	0.4	0.03	0.2	0.6	0.02	0.4	0.5
11	DU 11	10000.00	0.74	0.83	0.9			3	0.07	0.8	0.1	0.6	0.7	0.05	1.0	1.0
12	DU 12	10000.00	0.7	0.63	0.58			3	0.07	0.6	0.1	0.4	0.7	0.03	0.7	0.8
13	DU 13	10000.00	1.2	1.4	2.5			3	0.07	1.7	0.7	4.9	2.9	0.4	2.9	3.5
14	DU 14	10000.00	0.6	0.56	0.59			3	0.07	0.6	0.02	0.1	0.3	0.01	0.6	0.6
15	DU 15	10000.00	1.1	0.7	0.7			3	0.07	0.8	0.2	1.6	2.0	0.1	1.2	1.4
16	DU 16	10000.00	0.44	0.4	0.42			3	0.07	0.4	0.02	0.1	0.3	0.01	0.5	0.5
Combined DUs Weighted by Area		**150000.00**	--	--	--	--	--	**45**	**1.00**	**0.8**	**0.1**	**0.002**	**High**	**0.05**	**0.9**	**1.0**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**1.04**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
1	DU 1	10000.00	11	12	8.9			3	0.07	10.6	1.6	11.2	1.1	0.9	13.3	14.6
2	DU 2	10000.00	14	13	14			3	0.07	13.7	0.6	4.1	0.3	0.3	14.6	15.1
3	DU 3	10000.00	15	13	12			3	0.07	13.3	1.5	10.8	0.8	0.9	15.9	17.2
4	DU 4	10000.00	23	30	41			3	0.07	31.3	9.1	64.2	2.0	5.2	46.6	54.2
5	DU 5	10000.00	11	11	12			3	0.07	11.3	0.6	4.1	0.4	0.3	12.3	12.8
6	DU 6	10000.00	10	11	8			3	0.07	9.7	1.5	10.8	1.1	0.9	12.2	13.5
7	DU 7	10000.00	18	17	17			3	0.07	17.3	0.6	4.1	0.2	0.3	18.3	18.8
9	DU 9	10000.00	7	7.3	6.9			3	0.07	7.1	0.2	1.5	0.2	0.1	7.4	7.6
10	DU 10	10000.00	7.5	7.2	6.5			3	0.07	7.1	0.5	3.6	0.5	0.3	7.9	8.4
11	DU 11	10000.00	37	43	39			3	0.07	39.7	3.1	21.6	0.5	1.8	44.8	47.4
12	DU 12	10000.00	13	14	14			3	0.07	13.7	0.6	4.1	0.3	0.3	14.6	15.1
13	DU 13	10000.00	9.7	11	11			3	0.07	10.6	0.8	5.3	0.5	0.4	11.8	12.5
14	DU 14	10000.00	16	18	17			3	0.07	17.0	1.0	7.1	0.4	0.6	18.7	19.5
15	DU 15	10000.00	7	6.5	7.1			3	0.07	6.9	0.3	2.3	0.3	0.2	7.4	7.7
16	DU 16	10000.00	7.1	6.8	7.2			3	0.07	7.0	0.2	1.5	0.2	0.1	7.4	7.6
Combined DUs Weighted by Area		**150000.00**	--	--	--	--	--	**45**	**1.00**	**14.4**	**0.7**	**0.01**	**Medium**	**0.4**	**15.3**	**16.1**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**16.1**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
1	DU 1	10000.00	0.35	0.26	0.24			3	0.07	0.28	0.06	0.41	1.46	0.03	0.38	0.43
2	DU 2	10000.00	0.2	0.23	0.25			3	0.07	0.23	0.03	0.18	0.79	0.01	0.27	0.29
3	DU 3	10000.00	0.26	0.24	0.26			3	0.07	0.25	0.01	0.08	0.32	0.01	0.27	0.28
4	DU 4	10000.00	1.1	1	0.86			3	0.07	0.99	0.12	0.85	0.86	0.07	1.19	1.29
5	DU 5	10000.00	0.23	0.2	0.2			3	0.07	0.21	0.02	0.12	0.58	0.01	0.24	0.25
6	DU 6	10000.00	0.22	0.31	0.19			3	0.07	0.24	0.06	0.44	1.84	0.04	0.35	0.40
7	DU 7	10000.00	0.59	0.48	0.62			3	0.07	0.56	0.07	0.52	0.93	0.04	0.69	0.75
9	DU 9	10000.00	0.23	0.22	0.26			3	0.07	0.24	0.02	0.15	0.62	0.01	0.27	0.29
10	DU 10	10000.00	0.17	0.19	0.29			3	0.07	0.22	0.06	0.45	2.10	0.04	0.33	0.38
11	DU 11	10000.00	0.37	0.36	0.37			3	0.07	0.37	0.01	0.04	0.11	0.003	0.38	0.38
12	DU 12	10000.00	0.38	0.33	0.35			3	0.07	0.35	0.03	0.18	0.50	0.01	0.40	0.42
13	DU 13	10000.00	0.74	0.77	0.75			3	0.07	0.75	0.02	0.11	0.14	0.01	0.78	0.79
14	DU 14	10000.00	0.28	0.27	0.28			3	0.07	0.28	0.01	0.04	0.15	0.003	0.29	0.29
15	DU 15	10000.00	0.58	0.38	0.58			3	0.07	0.51	0.12	0.82	1.59	0.07	0.71	0.80
16	DU 16	10000.00	0.25	0.33	0.27			3	0.07	0.28	0.04	0.29	1.04	0.02	0.35	0.39
Combined DUs Weighted by Area		**150000.00**	--	--	--	--	--	**45**	**1.00**	**0.38**	**0.01**	**0.0003**	**Medium**	**0.01**	**0.40**	**0.42**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**0.42**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
1	DU 1	10000.00	21	22	21			3	0.07	21.3	0.6	4.1	0.2	0.3	22.3	22.8
2	DU 2	10000.00	27	26	28			3	0.07	27.0	1.0	7.1	0.3	0.6	28.7	29.5
3	DU 3	10000.00	28	25	27			3	0.07	26.7	1.5	10.8	0.4	0.9	29.2	30.5
4	DU 4	10000.00	49	61	58			3	0.07	56.0	6.2	44.2	0.8	3.6	66.5	71.7
5	DU 5	10000.00	25	25	24			3	0.07	24.7	0.6	4.1	0.2	0.3	25.6	26.1
6	DU 6	10000.00	38	42	30			3	0.07	36.7	6.1	43.2	1.2	3.5	47.0	52.0
7	DU 7	10000.00	43	60	44			3	0.07	49.0	9.5	67.5	1.4	5.5	65.1	73.0
9	DU 9	10000.00	30	28	27			3	0.07	28.3	1.5	10.8	0.4	0.9	30.9	32.2
10	DU 10	10000.00	23	23	23			3	0.07	23.0	0.0	0.0	0.0	0.0	23.0	23.0
11	DU 11	10000.00	30	37	33			3	0.07	33.3	3.5	24.8	0.7	2.0	39.3	42.2
12	DU 12	10000.00	51	48	47			3	0.07	48.7	2.1	14.7	0.3	1.2	52.2	53.9
13	DU 13	10000.00	220	600	260			3	0.07	360.0	208.8	1476.5	4.1	120.6	712.0	885.5
14	DU 14	10000.00	23	26	25			3	0.07	24.7	1.5	10.8	0.4	0.9	27.2	28.5
15	DU 15	10000.00	30	31	33			3	0.07	31.3	1.5	10.8	0.3	0.9	33.9	35.2
16	DU 16	10000.00	38	33	39			3	0.07	36.7	3.2	22.7	0.6	1.9	42.1	44.8
Combined DUs Weighted by Area		**150000.00**	--	--	--	--	--	**45**	**1.00**	**55.2**	**14.0**	**0.3**	**High**	**8.1**	**78.7**	**90.3**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**90.3**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Iona Island
Lead

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
1	DU 1	10000.00	84	57	52			3	0.07	64.3	17.2	121.7	1.9	9.9	93.4	107.7
2	DU 2	10000.00	78	93	110			3	0.07	93.7	16.0	113.2	1.2	9.2	120.7	134.0
3	DU 3	10000.00	150	120	120			3	0.07	130.0	17.3	122.5	0.9	10.0	159.2	173.6
4	DU 4	10000.00	250	360	280			3	0.07	296.7	56.9	402.1	1.4	32.8	392.5	439.8
5	DU 5	10000.00	82	76	100			3	0.07	86.0	12.5	88.3	1.0	7.2	107.1	117.4
6	DU 6	10000.00	93	130	72			3	0.07	98.3	29.4	207.6	2.1	17.0	147.8	172.2
7	DU 7	10000.00	690	2000	570			3	0.07	1086.7	793.2	5609.1	5.2	458.0	2424.0	3082.9
9	DU 9	10000.00	63	58	54			3	0.07	58.3	4.5	31.9	0.5	2.6	65.9	69.7
10	DU 10	10000.00	31	35	37			3	0.07	34.3	3.1	21.6	0.6	1.8	39.5	42.0
11	DU 11	10000.00	130	110	130			3	0.07	123.3	11.5	81.6	0.7	6.7	142.8	152.4
12	DU 12	10000.00	82	83	89			3	0.07	84.7	3.8	26.8	0.3	2.2	91.0	94.2
13	DU 13	10000.00	190	150	160			3	0.07	166.7	20.8	147.2	0.9	12.0	201.8	219.1
14	DU 14	10000.00	96	120	110			3	0.07	108.7	12.1	85.2	0.8	7.0	129.0	139.0
15	DU 15	10000.00	130	130	120			3	0.07	126.7	5.8	40.8	0.3	3.3	136.4	141.2
16	DU 16	10000.00	38	42	46			3	0.07	42.0	4.0	28.3	0.7	2.3	48.7	52.1
Combined DUs Weighted by Area		**150000.00**	**--**	**--**	**--**	**--**	**--**	**45**	**1.00**	**173.4**	**53.1**	**1.1**	**High**	**30.7**	**262.9**	**307.1**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**307.1**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
1	DU 1	10000.00	0.14	0.12	0.12			3	0.07	0.1	0.01	0.08	0.6	0.01	0.1	0.2
2	DU 2	10000.00	0.13	0.13	0.13			3	0.07	0.1	0.0	0.0	0.0	0.0	0.1	0.1
3	DU 3	10000.00	0.13	0.14	0.13			3	0.07	0.1	0.01	0.04	0.3	0.003	0.1	0.1
4	DU 4	10000.00	0.16	0.19	0.2			3	0.07	0.2	0.02	0.15	0.8	0.01	0.2	0.2
5	DU 5	10000.00	0.11	0.1	0.1			3	0.07	0.1	0.01	0.04	0.4	0.003	0.1	0.1
6	DU 6	10000.00	0.14	0.15	0.12			3	0.07	0.1	0.02	0.11	0.8	0.01	0.2	0.2
7	DU 7	10000.00	0.21	0.19	0.21			3	0.07	0.2	0.01	0.08	0.4	0.01	0.2	0.2
9	DU 9	10000.00	0.11	0.12	0.14			3	0.07	0.1	0.02	0.11	0.9	0.01	0.1	0.2
10	DU 10	10000.00	0.15	0.15	0.15			3	0.07	0.2	0.0	0.0	0.0	0.0	0.2	0.2
11	DU 11	10000.00	0.19	0.22	0.22			3	0.07	0.2	0.02	0.12	0.6	0.01	0.2	0.3
12	DU 12	10000.00	0.15	0.14	0.15			3	0.07	0.1	0.01	0.04	0.3	0.003	0.2	0.2
13	DU 13	10000.00	0.16	0.16	0.18			3	0.07	0.2	0.01	0.08	0.5	0.01	0.2	0.2
14	DU 14	10000.00	0.11	0.13	0.12			3	0.07	0.1	0.01	0.07	0.6	0.01	0.1	0.1
15	DU 15	10000.00	0.16	0.15	0.16			3	0.07	0.2	0.01	0.04	0.3	0.003	0.2	0.2
16	DU 16	10000.00	0.13	0.12	0.12			3	0.07	0.1	0.01	0.04	0.3	0.003	0.1	0.1
Combined DUs Weighted by Area		**150000.00**	**--**	**--**	**--**	**--**	**--**	**45**	**1.00**	**0.1**	**0.003**	**0.0001**	**Low**	**0.002**	**0.15**	**0.15**

Degrees of freedom by Welch-Satterthwaite approximation	

Student's-t or Chebshev 95% UCL may be appropriate.	**Recommended UCL**	
	Student's t 95% UCL	**0.15**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
1	DU 1	10000.00	92	76	67			3	0.07	78.3	12.7	89.5	1.1	7.3	99.7	110.2
2	DU 2	10000.00	72	74	80			3	0.07	75.3	4.2	29.4	0.4	2.4	82.4	85.8
3	DU 3	10000.00	98	130	99			3	0.07	109.0	18.2	128.6	1.2	10.5	139.7	154.8
4	DU 4	10000.00	280	190	150			3	0.07	206.7	66.6	470.8	2.3	38.4	318.9	374.2
5	DU 5	10000.00	74	74	79			3	0.07	75.7	2.9	20.4	0.3	1.7	80.5	82.9
6	DU 6	10000.00	68	79	56			3	0.07	67.7	11.5	81.3	1.2	6.6	87.1	96.6
7	DU 7	10000.00	200	210	210			3	0.07	206.7	5.8	40.8	0.2	3.3	216.4	221.2
9	DU 9	10000.00	69	67	70			3	0.07	68.7	1.5	10.8	0.2	0.9	71.2	72.5
10	DU 10	10000.00	59	60	55			3	0.07	58.0	2.6	18.7	0.3	1.5	62.5	64.7
11	DU 11	10000.00	87	100	110			3	0.07	99.0	11.5	81.5	0.8	6.7	118.4	128.0
12	DU 12	10000.00	95	100	93			3	0.07	96.0	3.6	25.5	0.3	2.1	102.1	105.1
13	DU 13	10000.00	140	150	170			3	0.07	153.3	15.3	108.0	0.7	8.8	179.1	191.8
14	DU 14	10000.00	74	74	78			3	0.07	75.3	2.3	16.3	0.2	1.3	79.2	81.1
15	DU 15	10000.00	250	120	120			3	0.07	163.3	75.1	530.7	3.2	43.3	289.9	352.2
16	DU 16	10000.00	70	71	66			3	0.07	69.0	2.6	18.7	0.3	1.5	73.5	75.7
Combined DUs Weighted by Area		**150000.00**	**--**	**--**	**--**	**--**	**--**	**45**	**1.00**	**106.8**	**7.0**	**0.1**	**High**	**4.1**	**115.5**	**124.5**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**124.5**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
1	DU 1	10000.00	0.3496	0.3076	0.2636			3	0.08	0.3	0.04	0.3	1.0	0.02	0.4	0.4
2	DU 2	10000.00	7.647	3.671	3.772			3	0.08	5.0	2.3	16.0	3.2	1.3	8.9	10.7
3	DU 3	10000.00	1.455	0.89	0.5779			3	0.08	1.0	0.4	3.1	3.2	0.3	1.7	2.1
4	DU 4	10000.00	6.22	3.709	1.86			3	0.08	3.9	2.2	15.5	3.9	1.3	7.6	9.4
5	DU 5	10000.00	0.7918	0.623	0.6961			3	0.08	0.7	0.1	0.6	0.9	0.05	0.8	0.9
9	DU 9	10000.00	0.4915	0.3276	0.3782			3	0.08	0.4	0.1	0.6	1.5	0.05	0.5	0.6
11	DU 11	10000.00	1.622	2.023	1.167			3	0.08	1.6	0.4	3.0	1.9	0.2	2.3	2.7
12	DU 12	10000.00	7.749	5.278	6.514			3	0.08	6.5	1.2	8.7	1.3	0.7	8.6	9.6
13	DU 13	10000.00	58.06	63.95	34.22			3	0.08	52.1	15.7	111.3	2.1	9.1	78.6	91.7
16	DU 16	10000.00	1.825	1.692	0.5919			3	0.08	1.4	0.7	4.8	3.5	0.4	2.5	3.1
20	DU 20	10000.00	0.2107	0.309	0.2616			3	0.08	0.3	0.05	0.3	1.3	0.03	0.3	0.4
21	DU 21	10000.00	0.5133	0.127	0.14			3	0.08	0.3	0.2	1.6	6.0	0.1	0.6	0.8
22	DU 22	10000.00	2.501	1.95	1.443			3	0.08	2.0	0.5	3.7	1.9	0.3	2.9	3.3
Combined DUs Weighted by Area		**130000.00**	--	--	--	--	--	**39**	**1.00**	**5.8**	**1.2**	**0.03**	**High**	**0.7**	**7.9**	**8.9**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**8.9**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
1	DU 1	10000.00	1.7766	1.5636	1.3346			3	0.08	1.6	0.2	1.6	1.0	0.1	1.9	2.1
2	DU 2	10000.00	31.197	14.921	14.182			3	0.08	20.1	9.6	68.0	3.4	5.6	36.3	44.3
3	DU 3	10000.00	6.565	3.824	2.6629			3	0.08	4.4	2.0	14.2	3.3	1.2	7.7	9.4
4	DU 4	10000.00	25.03	17.999	11.04			3	0.08	18.0	7.0	49.5	2.7	4.0	29.8	35.6
5	DU 5	10000.00	3.7308	2.616	3.0761			3	0.08	3.1	0.6	4.0	1.3	0.3	4.1	4.6
9	DU 9	10000.00	2.3795	1.5826	1.8322			3	0.08	1.9	0.4	2.9	1.5	0.2	2.6	3.0
11	DU 11	10000.00	8.632	11.493	7.037			3	0.08	9.1	2.3	16.0	1.8	1.3	12.9	14.7
12	DU 12	10000.00	25.529	16.448	23.554			3	0.08	21.8	4.8	33.8	1.5	2.8	29.9	33.9
13	DU 13	10000.00	176.86	191.85	104.82			3	0.08	157.8	46.5	329.0	2.1	26.9	236.3	274.9
16	DU 16	10000.00	6.045	5.567	2.4939			3	0.08	4.7	1.9	13.6	2.9	1.1	8.0	9.6
20	DU 20	10000.00	1.611	0.1821	0.157			3	0.08	0.7	0.8	5.9	9.1	0.5	2.1	2.7
21	DU 21	10000.00	2.478	0.948	1.061			3	0.08	1.5	0.9	6.0	4.0	0.5	2.9	3.6
22	DU 22	10000.00	19.88	13.25	11.33			3	0.08	14.8	4.5	31.7	2.1	2.6	22.4	26.1
Combined DUs Weighted by Area		**130000.00**	--	--	--	--	--	**39**	**1.00**	**20.0**	**3.7**	**0.0847**	**High**	**2.2**	**26.3**	**29.4**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**29.4**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
EXDU-1	EXDU-1	10000.00	0.038	0.039	0.051			3	0.33	0.043	0.007	0.051	1.199	0.004	0.055	0.061
EXDU-2	EXDU-2	10000.00	0.04	0.041	0.04			3	0.33	0.040	0.001	0.004	0.101	0.0003	0.041	0.042
EXDU-3	EXDU-3	10000.00	0.037	0.039	0.038			3	0.33	0.038	0.001	0.007	0.186	0.001	0.040	0.041
Combined DUs Weighted by Area		**30000.00**	--	--	--	--	--	**9**	**1.00**	**0.040**	**0.002**	**0.0001**	**Low**	**0.001**	**0.044**	**0.046**

Degrees of freedom by Welch-Satterthwaite approximation	

Student's-t or Chebyshev 95% UCL may be appropriate.	**Recommended UCL**	
	Student's t 95% UCL	**0.044**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU	Decision unit
SD	Standard deviation
SE	Standard error
UCL	Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
23	DU 23	10000.00	0.034	0.025	0.019			3	0.50	0.026	0.0075	0.0534	2.1	0.0044	0.0387	0.0450
25	DU 25	10000.00	0.011	0.016	0.012			3	0.50	0.013	0.0026	0.0187	1.4	0.0015	0.0175	0.0197
Combined DUs Weighted by Area		**20000.00**	--	--	--	--	--	**6**	**1.00**	**0.020**	**0.0040**	**0.0002**	**Medium**	**0.0023**	0.0262	**0.0296**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**0.0296**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Combined 95UCL Exposure Point Concentrations—Former Dump Area Surface and Subsurface Soil

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
17A	DU 17A	10000.00	9.9	7.3	6.5			3	0.17	7.9	1.8	12.6	1.6	1.0	10.9	12.4
17B	DU 17B	10000.00	4.8	4.5	4.4			3	0.17	4.6	0.2	1.5	0.3	0.1	4.9	5.1
18A	DU 18A	10000.00	6.5	6.2	6.9			3	0.17	6.5	0.4	2.5	0.4	0.2	7.1	7.4
18B	DU 18B	10000.00	11	13	5.5			3	0.17	9.8	3.9	27.5	2.8	2.2	16.4	19.6
19A	DU 19A	10000.00	0.5	0.28	0.5			3	0.17	0.4	0.1	0.9	2.1	0.1	0.6	0.7
19B	DU 19B	10000.00	0.12	0.11	0.11			3	0.17	0.1	0.01	0.04	0.4	0.003	0.1	0.1
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**4.9**	**0.7**	**0.02**	**Medium**	**0.4**	**6.1**	**6.7**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**6.7**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
17A	DU 17A	10000.00	8.2	2.7	8.8			3	0.17	6.6	3.4	23.8	3.6	1.9	12.2	15.0
17B	DU 17B	10000.00	22	25	23			3	0.17	23.3	1.5	10.8	0.5	0.9	25.9	27.2
18A	DU 18A	10000.00	7.8	15	15			3	0.17	12.6	4.2	29.4	2.3	2.4	19.6	23.1
18B	DU 18B	10000.00	17	19	16			3	0.17	17.3	1.5	10.8	0.6	0.9	19.9	21.2
19A	DU 19A	10000.00	9.6	6.8	12			3	0.17	9.5	2.6	18.4	1.9	1.5	13.9	16.0
19B	DU 19B	10000.00	2.8	2.9	2.6			3	0.17	2.8	0.2	1.1	0.4	0.1	3.0	3.2
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**12.0**	**1.1**	**0.04**	**High**	**0.6**	**13.2**	**14.7**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**14.7**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
17A	DU 17A	10000.00	5	20	16			3	0.17	13.7	7.8	54.9	4.0	4.5	26.8	33.2
17B	DU 17B	10000.00	3.9	3.4	3.2			3	0.17	3.5	0.4	2.5	0.7	0.2	4.1	4.4
18A	DU 18A	10000.00	5.2	4.2	4.5			3	0.17	4.6	0.5	3.6	0.8	0.3	5.5	5.9
18B	DU 18B	10000.00	7.6	24	4.7			3	0.17	12.1	10.4	73.6	6.1	6.0	29.6	38.3
19A	DU 19A	10000.00	0.33	0.25	0.3			3	0.17	0.3	0.04	0.3	1.0	0.02	0.4	0.4
19B	DU 19B	10000.00	0.097	0.093	0.087			3	0.17	0.1	0.01	0.04	0.4	0.003	0.1	0.1
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**5.7**	**2.2**	**0.1**	**High**	**1.3**	**8.7**	**11.2**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**11.2**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
17A	DU 17A	10000.00	19	6.9	25			3	0.17	17.0	9.2	65.2	3.8	5.3	32.5	40.2
17B	DU 17B	10000.00	13	13	12			3	0.17	12.7	0.6	4.1	0.3	0.3	13.6	14.1
18A	DU 18A	10000.00	14	33	240			3	0.17	95.7	125.4	886.4	9.3	72.4	307.0	411.1
18B	DU 18B	10000.00	33	32	29			3	0.17	31.3	2.1	14.7	0.5	1.2	34.8	36.6
19A	DU 19A	10000.00	10	10	11			3	0.17	10.3	0.6	4.1	0.4	0.3	11.3	11.8
19B	DU 19B	10000.00	7.8	7.7	7.8			3	0.17	7.8	0.1	0.4	0.1	0.03	7.9	7.9
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**29.1**	**21.0**	**0.7**	**High**	**12.1**	**64.4**	**81.9**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebychev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**81.9**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
17A	DU 17A	10000.00	210	83	280			3	0.17	191.0	99.9	706.2	3.7	57.7	359.4	442.3
17B	DU 17B	10000.00	180	130	130			3	0.17	146.7	28.9	204.1	1.4	16.7	195.3	219.3
18A	DU 18A	10000.00	40	1700	1000			3	0.17	913.3	833.4	5892.9	6.5	481.2	2318.3	3010.6
18B	DU 18B	10000.00	5500	5600	5100			3	0.17	5400.0	264.6	1870.8	0.3	152.8	5846.0	6065.8
19A	DU 19A	10000.00	130	180	140			3	0.17	150.0	26.5	187.1	1.2	15.3	194.6	216.6
19B	DU 19B	10000.00	210	210	210			3	0.17	210.0	0.0	0.0	0.0	0.0	210.0	210.0
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**1168.5**	**146.8**	**4.9**	**High**	**84.8**	**1416.0**	**1538.0**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**1538.0**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
17A	DU 17A	10000.00	2900	1500	1200			3	0.17	1866.7	907.4	6416.1	3.4	523.9	3396.4	4150.2
17B	DU 17B	10000.00	2700	1200	820			3	0.17	1573.3	994.0	7029.0	4.5	573.9	3249.2	4075.0
18A	DU 18A	10000.00	1500	1400	1400			3	0.17	1433.3	57.7	408.2	0.3	33.3	1530.7	1578.6
18B	DU 18B	10000.00	2900	2000	2400			3	0.17	2433.3	450.9	3188.5	1.3	260.3	3193.5	3568.1
19A	DU 19A	10000.00	61	38	67			3	0.17	55.3	15.3	108.2	2.0	8.8	81.1	93.9
19B	DU 19B	10000.00	14	12	11			3	0.17	12.3	1.5	10.8	0.9	0.9	14.9	16.2
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**1229.1**	**236.8**	**7.9**	**High**	**136.7**	**1520.5**	**1824.9**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**1824.9**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
17A	DU 17A	10000.00	0.98	0.61	0.77			3	0.17	0.8	0.2	1.3	1.7	0.1	1.1	1.3
17B	DU 17B	10000.00	0.9	0.8	0.77			3	0.17	0.8	0.1	0.5	0.6	0.04	0.9	1.0
18A	DU 18A	10000.00	4.3	2.3	1.5			3	0.17	2.7	1.4	10.2	3.8	0.8	5.1	6.3
18B	DU 18B	10000.00	0.71	2.1	0.71			3	0.17	1.2	0.8	5.7	4.8	0.5	2.5	3.2
19A	DU 19A	10000.00	0.46	0.11	0.43			3	0.17	0.3	0.2	1.4	4.1	0.1	0.7	0.8
19B	DU 19B	10000.00	0.12	0.23	0.27			3	0.17	0.2	0.1	0.5	2.7	0.04	0.3	0.4
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**1.0**	**0.3**	**0.01**	**High**	**0.2**	**1.4**	**1.7**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**1.7**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
17A	DU 17A	10000.00	16	5.9	20			3	0.17	14.0	7.3	51.4	3.7	4.2	26.2	32.3
17B	DU 17B	10000.00	19	21	19			3	0.17	19.7	1.2	8.2	0.4	0.7	21.6	22.6
18A	DU 18A	10000.00	16	29	30			3	0.17	25.0	7.8	55.2	2.2	4.5	38.2	44.7
18B	DU 18B	10000.00	79	64	52			3	0.17	65.0	13.5	95.7	1.5	7.8	87.8	99.0
19A	DU 19A	10000.00	16	17	17			3	0.17	16.7	0.6	4.1	0.2	0.3	17.6	18.1
19B	DU 19B	10000.00	14	14	14			3	0.17	14.0	0.0	0.0	0.0	0.0	14.0	14.0
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**25.7**	**2.9**	**0.1**	**High**	**1.7**	**29.3**	**33.0**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**32.96**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
17A	DU 17A	10000.00	0.52	0.2	0.68			3	0.17	0.5	0.2	1.7	3.7	0.1	0.9	1.1
17B	DU 17B	10000.00	1.1	1.4	1.5			3	0.17	1.3	0.2	1.5	1.1	0.1	1.7	1.9
18A	DU 18A	10000.00	0.36	0.74	0.58			3	0.17	0.6	0.2	1.3	2.4	0.1	0.9	1.0
18B	DU 18B	10000.00	0.79	0.95	0.86			3	0.17	0.9	0.1	0.6	0.7	0.05	1.0	1.1
19A	DU 19A	10000.00	0.42	0.35	0.44			3	0.17	0.4	0.05	0.3	0.8	0.03	0.5	0.5
19B	DU 19B	10000.00	0.23	0.23	0.23			3	0.17	0.2	0.0	0.0	0.0	0.0	0.2	0.2
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**0.6**	**0.1**	**0.002**	**High**	**0.04**	**0.7**	**0.8**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.

Recommended UCL	
Chebyshev 95% UCL	**0.805**

The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
17A	DU 17A	10000.00	0.12	0.1	0.15			3	0.17	0.1	0.03	0.2	1.4	0.01	0.2	0.2
17B	DU 17B	10000.00	0.6	0.72	0.8			3	0.17	0.7	0.10	0.7	1.0	0.06	0.9	1.0
18A	DU 18A	10000.00	0.13	0.21	0.2			3	0.17	0.2	0.04	0.3	1.7	0.03	0.3	0.3
18B	DU 18B	10000.00	0.35	0.31	0.27			3	0.17	0.3	0.04	0.3	0.9	0.02	0.4	0.4
19A	DU 19A	10000.00	0.12	0.12	0.14			3	0.17	0.1	0.01	0.1	0.6	0.01	0.1	0.2
19B	DU 19B	10000.00	0.07	0.076	0.071			3	0.17	0.1	0.003	0.02	0.3	0.002	0.1	0.1
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**0.3**	**0.02**	**0.001**	**Medium**	**0.01**	**0.3**	**0.3**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**0.304**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
17A	DU 17A	10000.00	8200	7200	5700			3	0.17	7033.3	1258.3	8897.6	1.3	726.5	9154.7	10200.0
17B	DU 17B	10000.00	1900	2900	1600			3	0.17	2133.3	680.7	4813.2	2.3	393.0	3280.9	3846.4
18A	DU 18A	10000.00	83	1800	1600			3	0.17	1161.0	938.9	6639.1	5.7	542.1	2743.9	3523.9
18B	DU 18B	10000.00	5600	5000	3100			3	0.17	4566.7	1305.1	9228.6	2.0	753.5	6766.9	7851.1
19A	DU 19A	10000.00	120	90	110			3	0.17	106.7	15.3	108.0	1.0	8.8	132.4	145.1
19B	DU 19B	10000.00	60	61	62			3	0.17	61.0	1.0	7.1	0.1	0.6	62.7	63.5
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**2510.3**	**358.7**	**12.0**	**High**	**207.1**	**2912.8**	**3413.0**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**3413.0**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
17A	DU 17A	10000.00	1.015	0.857	1.451			3	0.17	1.1	0.3	2.2	2.0	0.2	1.6	1.9
17B	DU 17B	10000.00	1.892	1.196	1.829			3	0.17	1.6	0.4	2.7	1.7	0.2	2.3	2.6
18A	DU 18A	10000.00	1.266	1.45	1.703			3	0.17	1.5	0.2	1.6	1.1	0.1	1.8	2.0
18B	DU 18B	10000.00	2.131	2.038	2.732			3	0.17	2.3	0.4	2.7	1.2	0.2	2.9	3.2
19A	DU 19A	10000.00	2.478	0.97	1.209			3	0.17	1.6	0.8	5.7	3.7	0.5	2.9	3.6
19B	DU 19B	10000.00	0.0461	0.0459	0.02114			3	0.17	0.04	0.01	0.1	2.7	0.01	0.1	0.1
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**1.4**	**0.2**	**0.01**	**High**	**0.1**	**1.6**	**1.8**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**1.79**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
17A	DU 17A	10000.00	5.92	4.953	8.64			3	0.17	6.5	1.9	13.5	2.1	1.1	9.7	11.3
17B	DU 17B	10000.00	6.83	2.284	4.94			3	0.17	4.7	2.3	16.1	3.4	1.3	8.5	10.4
18A	DU 18A	10000.00	5.42	7.04	10.41			3	0.17	7.6	2.5	18.0	2.4	1.5	11.9	14.0
18B	DU 18B	10000.00	3.239	5.11	8.57			3	0.17	5.6	2.7	19.1	3.4	1.6	10.2	12.4
19A	DU 19A	10000.00	21.51	9.65	10.4			3	0.17	13.9	6.6	47.0	3.4	3.8	25.0	30.6
19B	DU 19B	10000.00	0.2861	0.3237	0.1511			3	0.17	0.3	0.1	0.6	2.5	0.1	0.4	0.5
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**6.4**	**1.4**	**0.05**	**High**	**0.8**	**8.1**	**9.9**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**9.85**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

Calculation of Weighted 95% UCLs for a Combined Decision Unit (DU) from Several Smaller DUs

See the "Instructions" tab (worksheet) for detailed instructions.

Select whether the DU is based on area or volume:	Area

Number of increments per replicate:	50

DU	DU Name	DU Area (any constant units)	Replicate concentration					Number of Replicates	Weight	Arithmetic Mean	SD of replicates	SD of increments	CV of DU	SE of DU	95% UCL	
			Rep 1	Rep 2	Rep 3	Rep 4	Rep 5								Student's-t	Chebyshev
17A	DU 17A	10000.00	0.14	0.13	0.14			3	0.17	0.1	0.01	0.04	0.3	0.003	0.1	0.2
17B	DU 17B	10000.00	0.016	0.015	0.015			3	0.17	0.02	0.001	0.004	0.3	0.0003	0.02	0.02
18A	DU 18A	10000.00	0.29	0.17	0.4			3	0.17	0.3	0.1	0.8	2.8	0.1	0.5	0.6
18A	DU 18B	10000.00	0.15	0.1	0.057			3	0.17	0.1	0.05	0.3	3.2	0.03	0.2	0.2
19A	DU 19A	10000.00	0.011	0.0071	0.015			3	0.17	0.01	0.004	0.03	2.5	0.002	0.02	0.02
19B	DU 19B	10000.00	0.05	0.049	0.054			3	0.17	0.1	0.003	0.02	0.4	0.002	0.1	0.1
Combined DUs Weighted by Area		**60000.00**	--	--	--	--	--	**18**	**1.00**	**0.1**	**0.02**	**0.001**	**High**	**0.01**	**0.1**	**0.15**

Degrees of freedom by Welch-Satterthwaite approximation	

Chebyshev 95% UCL is recommended because the dispersion of the data is high.	**Recommended UCL**	
	Chebyshev 95% UCL	**0.15**
The User should consult the instructions for additional guidance on which 95% UCL is recommended for specific data sets.		

Notes

DU Decision unit
SD Standard deviation
SE Standard error
UCL Upper confidence limit

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ProUCL Output for Calculation of Surface Water UCL Exposure Point Concentrations

1	**UCL Statistics for Data Sets with Non-Detects**											
2												
3	User Selected Options											
4	Date/Time of Computation	ProUCL 5.2 11/10/2022 1:09:04 AM										
5	From File	proucl_data.xls										
6	Full Precision	OFF										
7	Confidence Coefficient	95%										
8	Number of Bootstrap Operations	2000										
9												
2880	**Result (dump-sw-aluminum)**											
2881												
2882	**General Statistics**											
2883	Total Number of Observations	20			Number of Distinct Observations	7						
2884	Number of Detects	10			Number of Non-Detects	10						
2885	Number of Distinct Detects	6			Number of Distinct Non-Detects	1						
2886	Minimum Detect	18			Minimum Non-Detect	70						
2887	Maximum Detect	33			Maximum Non-Detect	70						
2888	Variance Detects	32.01			Percent Non-Detects	50%						
2889	Mean Detects	23.3			SD Detects	5.658						
2890	Median Detects	21			CV Detects	0.243						
2891	Skewness Detects	0.793			Kurtosis Detects	-1.102						
2892	Mean of Logged Detects	3.124			SD of Logged Detects	0.231						
2893												
2894	**Normal GOF Test on Detects Only**											
2895	Shapiro Wilk Test Statistic	0.837			**Shapiro Wilk GOF Test**							
2896	1% Shapiro Wilk Critical Value	0.781			Detected Data appear Normal at 1% Significance Level							
2897	Lilliefors Test Statistic	0.258			**Lilliefors GOF Test**							
2898	1% Lilliefors Critical Value	0.304			Detected Data appear Normal at 1% Significance Level							
2899	**Detected Data appear Normal at 1% Significance Level**											
2900												
2901	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
2902	KM Mean	23.3			KM Standard Error of Mean	1.789						
2903	90KM SD	5.367			95% KM (BCA) UCL	26.17						
2904	95% KM (t) UCL	26.39			95% KM (Percentile Bootstrap) UCL	26.25						
2905	95% KM (z) UCL	26.24			95% KM Bootstrap t UCL	27.99						
2906	90% KM Chebyshev UCL	28.67			95% KM Chebyshev UCL	31.1						
2907	97.5% KM Chebyshev UCL	34.47			99% KM Chebyshev UCL	41.1						
2908	**Note: KM UCLs may be biased low with this dataset. Other substitution method recommended**											
2909												
2910	**Gamma GOF Tests on Detected Observations Only**											
2911	A-D Test Statistic	0.717			**Anderson-Darling GOF Test**							
2912	5% A-D Critical Value	0.725			Detected data appear Gamma Distributed at 5% Significance Level							
2913	K-S Test Statistic	0.25			**Kolmogorov-Smirnov GOF**							
2914	5% K-S Critical Value	0.266			Detected data appear Gamma Distributed at 5% Significance Level							
2915	**Detected data appear Gamma Distributed at 5% Significance Level**											
2916												
2917	**Gamma Statistics on Detected Data Only**											
2918	k hat (MLE)	20.25			k star (bias corrected MLE)	14.24						
2919	Theta hat (MLE)	1.15			Theta star (bias corrected MLE)	1.636						
2920	nu hat (MLE)	405.1			nu star (bias corrected)	284.9						
2921	Mean (detects)	23.3										
2922												
2923	**Gamma ROS Statistics using Imputed Non-Detects**											
2924	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2925	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
2926	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2927	This is especially true when the sample size is small.											
2928	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2929	Minimum	15.29			Mean	23.3						
2930	Maximum	33			Median	21.64						
2931	SD	5.355			CV	0.23						
2932	k hat (MLE)	20.55			k star (bias corrected MLE)	17.5						
2933	Theta hat (MLE)	1.134			Theta star (bias corrected MLE)	1.332						
2934	nu hat (MLE)	821.9			nu star (bias corrected)	700						
2935	Adjusted Level of Significance (β)	0.038										
2936	Approximate Chi Square Value (699.95, α)	639.6			Adjusted Chi Square Value (699.95, β)	635						
2937	95% Gamma Approximate UCL	25.5			95% Gamma Adjusted UCL	25.68						
2938												
2939	**Estimates of Gamma Parameters using KM Estimates**											
2940	Mean (KM)	23.3			SD (KM)	5.367						
2941	Variance (KM)	28.81			SE of Mean (KM)	1.789						
2942	k hat (KM)	18.84			k star (KM)	16.05						
2943	nu hat (KM)	753.8			nu star (KM)	642						
2944	theta hat (KM)	1.236			theta star (KM)	1.452						
2945	80% gamma percentile (KM)	28			90% gamma percentile (KM)	30.99						
2946	95% gamma percentile (KM)	33.62			99% gamma percentile (KM)	38.92						
2947												
2948	**Gamma Kaplan-Meier (KM) Statistics**											
2949	Approximate Chi Square Value (642.02, α)	584.2			Adjusted Chi Square Value (642.02, β)	579.9						
2950	95% KM Approximate Gamma UCL	25.6			95% KM Adjusted Gamma UCL	25.8						
2951	**Note: KM UCLs may be biased low with this dataset. Other substitution method recommended**											
2952												
2953	**Lognormal GOF Test on Detected Observations Only**											

2954				Shapiro Wilk Test Statistic		0.857		**Shapiro Wilk GOF Test**				
2955				10% Shapiro Wilk Critical Value		0.869		Detected Data Not Lognormal at 10% Significance Level				
2956				Lilliefors Test Statistic		0.234		**Lilliefors GOF Test**				
2957				10% Lilliefors Critical Value		0.241		Detected Data appear Lognormal at 10% Significance Level				
2958				**Detected Data appear Approximate Lognormal at 10% Significance Level**								
2959												
2960				**Lognormal ROS Statistics Using Imputed Non-Detects**								
2961				Mean in Original Scale		23.26		Mean in Log Scale				3.124
2962				SD in Original Scale		5.223		SD in Log Scale				0.219
2963				95% t UCL (assumes normality of ROS data)		25.28		95% Percentile Bootstrap UCL				25.16
2964				95% BCA Bootstrap UCL		25.35		95% Bootstrap t UCL				25.41
2965				95% H-UCL (Log ROS)		25.48						
2966												
2967				**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**								
2968				KM Mean (logged)		3.124		KM Geo Mean				22.73
2969				KM SD (logged)		0.219		95% Critical H Value (KM-Log)				1.798
2970				KM Standard Error of Mean (logged)		0.0732		95% H-UCL (KM -Log)				25.49
2971				KM SD (logged)		0.219		95% Critical H Value (KM-Log)				1.798
2972				KM Standard Error of Mean (logged)		0.0732						
2973				**Note: KM UCLs may be biased low with this dataset. Other substitution method recommended**								
2974												
2975				**DL/2 Statistics**								
2976				**DL/2 Normal**				**DL/2 Log-Transformed**				
2977				Mean in Original Scale		29.15		Mean in Log Scale				3.339
2978				SD in Original Scale		7.154		SD in Log Scale				0.273
2979				95% t UCL (Assumes normality)		31.92		95% H-Stat UCL				32.83
2980				**DL/2 is not a recommended method, provided for comparisons and historical reasons**								
2981												
2982				**Nonparametric Distribution Free UCL Statistics**								
2983				**Detected Data appear Normal Distributed at 1% Significance Level**								
2984												
2985				**Suggested UCL to Use**								
2986				95% KM (t) UCL		26.39						
2987												
2988				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
2989				Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.								
2990				However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.								
2991												
2992	**Result (dump-sw-antimony)**											
2993												
2994				**General Statistics**								
2995				Total Number of Observations		20		Number of Distinct Observations				3
2996				Number of Detects		2		Number of Non-Detects				18
2997				Number of Distinct Detects		2		Number of Distinct Non-Detects				1
2998				Minimum Detect		1.3		Minimum Non-Detect				1
2999				Maximum Detect		1.4		Maximum Non-Detect				1
3000				Variance Detects		0.005		Percent Non-Detects				90%
3001				Mean Detects		1.35		SD Detects				0.0707
3002				Median Detects		1.35		CV Detects				0.0524
3003				Skewness Detects		N/A		Kurtosis Detects				N/A
3004				Mean of Logged Detects		0.299		SD of Logged Detects				0.0524
3005												
3006				**Warning: Data set has only 2 Detected Values.**								
3007				**This is not enough to compute meaningful or reliable statistics and estimates.**								
3008												
3009												
3010				**Normal GOF Test on Detects Only**								
3011				**Not Enough Data to Perform GOF Test**								
3012												
3013				**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**								
3014				KM Mean		1.035		KM Standard Error of Mean				0.0336
3015				90KM SD		0.106		95% KM (BCA) UCL				N/A
3016				95% KM (t) UCL		1.093		95% KM (Percentile Bootstrap) UCL				N/A
3017				95% KM (z) UCL		1.09		95% KM Bootstrap t UCL				N/A
3018				90% KM Chebyshev UCL		1.136		95% KM Chebyshev UCL				1.181
3019				97.5% KM Chebyshev UCL		1.245		99% KM Chebyshev UCL				1.369
3020												
3021				**Gamma GOF Tests on Detected Observations Only**								
3022				**Not Enough Data to Perform GOF Test**								
3023												
3024				**Gamma Statistics on Detected Data Only**								
3025				k hat (MLE)		728.7		k star (bias corrected MLE)				N/A
3026				Theta hat (MLE)		0.00185		Theta star (bias corrected MLE)				N/A
3027				nu hat (MLE)		2915		nu star (bias corrected)				N/A
3028				Mean (detects)		1.35						
3029												
3030				**Estimates of Gamma Parameters using KM Estimates**								
3031				Mean (KM)		1.035		SD (KM)				0.106
3032				Variance (KM)		0.0113		SE of Mean (KM)				0.0336
3033				k hat (KM)		95.01		k star (KM)				80.79
3034				nu hat (KM)		3800		nu star (KM)				3232
3035				theta hat (KM)		0.0109		theta star (KM)				0.0128
3036				80% gamma percentile (KM)		1.13		90% gamma percentile (KM)				1.185

3037				95% gamma percentile (KM)		1.231				99% gamma percentile (KM)		1.322
3038												
3039						**Gamma Kaplan-Meier (KM) Statistics**							
3040										Adjusted Level of Significance (β)		0.038
3041				Approximate Chi Square Value (N/A, α)		3101				Adjusted Chi Square Value (N/A, β)		3090
3042				95% KM Approximate Gamma UCL		1.079				95% KM Adjusted Gamma UCL		1.082
3043												
3044						**Lognormal GOF Test on Detected Observations Only**							
3045						**Not Enough Data to Perform GOF Test**							
3046												
3047						**Lognormal ROS Statistics Using Imputed Non-Detects**						
3048				Mean in Original Scale		0.952				Mean in Log Scale		-0.0694
3049				SD in Original Scale		0.199				SD in Log Scale		0.205
3050				95% t UCL (assumes normality of ROS data)		1.029				95% Percentile Bootstrap UCL		1.026
3051				95% BCA Bootstrap UCL		1.03				95% Bootstrap t UCL		1.034
3052				95% H-UCL (Log ROS)		1.037						
3053												
3054						**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**							
3055				KM Mean (logged)		0.0299				KM Geo Mean		1.03
3056				KM SD (logged)		0.0906				95% Critical H Value (KM-Log)		N/A
3057				KM Standard Error of Mean (logged)		0.0286				95% H-UCL (KM -Log)		N/A
3058				KM SD (logged)		0.0906				95% Critical H Value (KM-Log)		N/A
3059				KM Standard Error of Mean (logged)		0.0286						
3060												
3061						**DL/2 Statistics**						
3062				**DL/2 Normal**						**DL/2 Log-Transformed**		
3063				Mean in Original Scale		0.585				Mean in Log Scale		-0.594
3064				SD in Original Scale		0.262				SD in Log Scale		0.306
3065				95% t UCL (Assumes normality)		0.686				95% H-Stat UCL		0.659
3066				**DL/2 is not a recommended method, provided for comparisons and historical reasons**								
3067												
3068						**Nonparametric Distribution Free UCL Statistics**							
3069						**Data do not follow a Discernible Distribution**							
3070												
3071						**Suggested UCL to Use**							
3072				95% KM (t) UCL		1.093						
3073												
3074						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
3075						Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.						
3076						However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.						
3077												
3078	**Result (dump-sw-arsenic)**											
3079												
3080						**General Statistics**						
3081				Total Number of Observations		20				Number of Distinct Observations		8
3082				Number of Detects		10				Number of Non-Detects		10
3083				Number of Distinct Detects		7				Number of Distinct Non-Detects		1
3084				Minimum Detect		0.34				Minimum Non-Detect		1
3085				Maximum Detect		0.61				Maximum Non-Detect		1
3086				Variance Detects		0.00717				Percent Non-Detects		50%
3087				Mean Detects		0.401				SD Detects		0.0846
3088				Median Detects		0.38				CV Detects		0.211
3089				Skewness Detects		1.951				Kurtosis Detects		4.107
3090				Mean of Logged Detects		-0.931				SD of Logged Detects		0.187
3091												
3092						**Normal GOF Test on Detects Only**							
3093				Shapiro Wilk Test Statistic		0.756				**Shapiro Wilk GOF Test**		
3094				1% Shapiro Wilk Critical Value		0.781				Detected Data Not Normal at 1% Significance Level		
3095				Lilliefors Test Statistic		0.258				**Lilliefors GOF Test**		
3096				1% Lilliefors Critical Value		0.304				Detected Data appear Normal at 1% Significance Level		
3097						**Detected Data appear Approximate Normal at 1% Significance Level**						
3098												
3099						**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**						
3100				KM Mean		0.401				KM Standard Error of Mean		0.0268
3101				90KM SD		0.0803				95% KM (BCA) UCL		0.45
3102				95% KM (t) UCL		0.447				95% KM (Percentile Bootstrap) UCL		0.449
3103				95% KM (z) UCL		0.445				95% KM Bootstrap t UCL		0.503
3104				90% KM Chebyshev UCL		0.481				95% KM Chebyshev UCL		0.518
3105				97.5% KM Chebyshev UCL		0.568				99% KM Chebyshev UCL		0.667
3106						**Note: KM UCLs may be biased low with this dataset. Other substitution method recommended**						
3107												
3108						**Gamma GOF Tests on Detected Observations Only**							
3109				A-D Test Statistic		0.822				**Anderson-Darling GOF Test**		
3110				5% A-D Critical Value		0.724				Detected Data Not Gamma Distributed at 5% Significance Level		
3111				K-S Test Statistic		0.228				**Kolmogorov-Smirnov GOF**		
3112				5% K-S Critical Value		0.266				Detected data appear Gamma Distributed at 5% Significance Level		
3113						**Detected data follow Appr. Gamma Distribution at 5% Significance Level**						
3114												
3115						**Gamma Statistics on Detected Data Only**							
3116				k hat (MLE)		29.51				k star (bias corrected MLE)		20.73
3117				Theta hat (MLE)		0.0136				Theta star (bias corrected MLE)		0.0193
3118				nu hat (MLE)		590.3				nu star (bias corrected)		414.5
3119				Mean (detects)		0.401						

3120											
3121	**Gamma ROS Statistics using Imputed Non-Detects**										
3122	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs										
3123	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)										
3124	For such situations, GROS method may yield incorrect values of UCLs and BTVs										
3125	This is especially true when the sample size is small.										
3126	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates										
3127					Minimum	0.288			Mean	0.401	
3128					Maximum	0.61			Median	0.389	
3129					SD	0.0777			CV	0.194	
3130					k hat (MLE)	30.6			k star (bias corrected MLE)	26.04	
3131					Theta hat (MLE)	0.0131			Theta star (bias corrected MLE)	0.0154	
3132					nu hat (MLE)	1224			nu star (bias corrected)	1042	
3133					Adjusted Level of Significance (β)	0.038					
3134					Approximate Chi Square Value (N/A, α)	967.7			Adjusted Chi Square Value (N/A, β)	962.1	
3135					95% Gamma Approximate UCL	0.432			95% Gamma Adjusted UCL	0.434	
3136											
3137	**Estimates of Gamma Parameters using KM Estimates**										
3138					Mean (KM)	0.401			SD (KM)	0.0803	
3139					Variance (KM)	0.00645			SE of Mean (KM)	0.0268	
3140					k hat (KM)	24.93			k star (KM)	21.23	
3141					nu hat (KM)	997.4			nu star (KM)	849.1	
3142					theta hat (KM)	0.0161			theta star (KM)	0.0189	
3143					80% gamma percentile (KM)	0.472			90% gamma percentile (KM)	0.516	
3144					95% gamma percentile (KM)	0.554			99% gamma percentile (KM)	0.631	
3145											
3146	**Gamma Kaplan-Meier (KM) Statistics**										
3147					Approximate Chi Square Value (849.10, α)	782.5			Adjusted Chi Square Value (849.10, β)	777.4	
3148					95% KM Approximate Gamma UCL	0.435			95% KM Adjusted Gamma UCL	0.438	
3149	**Note: KM UCLs may be biased low with this dataset. Other substitution method recommended**										
3150											
3151	**Lognormal GOF Test on Detected Observations Only**										
3152					Shapiro Wilk Test Statistic	0.807			**Shapiro Wilk GOF Test**		
3153					10% Shapiro Wilk Critical Value	0.869			Detected Data Not Lognormal at 10% Significance Level		
3154					Lilliefors Test Statistic	0.217			**Lilliefors GOF Test**		
3155					10% Lilliefors Critical Value	0.241			Detected Data appear Lognormal at 10% Significance Level		
3156	**Detected Data appear Approximate Lognormal at 10% Significance Level**										
3157											
3158	**Lognormal ROS Statistics Using Imputed Non-Detects**										
3159					Mean in Original Scale	0.4			Mean in Log Scale	-0.931	
3160					SD in Original Scale	0.0742			SD in Log Scale	0.173	
3161					95% t UCL (assumes normality of ROS data)	0.429			95% Percentile Bootstrap UCL	0.428	
3162					95% BCA Bootstrap UCL	0.433			95% Bootstrap t UCL	0.438	
3163					95% H-UCL (Log ROS)	0.429					
3164											
3165	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**										
3166					KM Mean (logged)	-0.931			KM Geo Mean	0.394	
3167					KM SD (logged)	0.177			95% Critical H Value (KM-Log)	1.773	
3168					KM Standard Error of Mean (logged)	0.0592			95% H-UCL (KM -Log)	0.43	
3169					KM SD (logged)	0.177			95% Critical H Value (KM-Log)	1.773	
3170					KM Standard Error of Mean (logged)	0.0592					
3171	**Note: KM UCLs may be biased low with this dataset. Other substitution method recommended**										
3172											
3173	**DL/2 Statistics**										
3174					**DL/2 Normal**				**DL/2 Log-Transformed**		
3175					Mean in Original Scale	0.451			Mean in Log Scale	-0.812	
3176					SD in Original Scale	0.0773			SD in Log Scale	0.177	
3177					95% t UCL (Assumes normality)	0.48			95% H-Stat UCL	0.485	
3178	**DL/2 is not a recommended method, provided for comparisons and historical reasons**										
3179											
3180	**Nonparametric Distribution Free UCL Statistics**										
3181	**Detected Data appear Approximate Normal Distributed at 1% Significance Level**										
3182											
3183	**Suggested UCL to Use**										
3184					95% KM (t) UCL	0.447					
3185											
3186	When a data set follows an approximate distribution passing only one of the GOF tests,										
3187	it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL										
3188											
3189	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
3190	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.										
3191	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
3192											
3193											
3194	**Result (dump-sw-barium)**										
3195											
3196	**General Statistics**										
3197					Total Number of Observations	20			Number of Distinct Observations	7	
3198									Number of Missing Observations	0	
3199					Minimum	9			Mean	12.7	
3200					Maximum	15			Median	13	
3201					SD	1.525			Std. Error of Mean	0.341	
3202					Coefficient of Variation	0.12			Skewness	-0.72	

3203												
3204						**Normal GOF Test**						
3205					Shapiro Wilk Test Statistic	0.929		**Shapiro Wilk GOF Test**				
3206					1% Shapiro Wilk Critical Value	0.868		Data appear Normal at 1% Significance Level				
3207					Lilliefors Test Statistic	0.178		**Lilliefors GOF Test**				
3208					1% Lilliefors Critical Value	0.223		Data appear Normal at 1% Significance Level				
3209					**Data appear Normal at 1% Significance Level**							
3210												
3211						**Assuming Normal Distribution**						
3212					**95% Normal UCL**			**95% UCLs (Adjusted for Skewness)**				
3213					95% Student's-t UCL	13.29		95% Adjusted-CLT UCL (Chen-1995)	13.2			
3214								95% Modified-t UCL (Johnson-1978)	13.28			
3215												
3216						**Gamma GOF Test**						
3217					A-D Test Statistic	0.7		**Anderson-Darling Gamma GOF Test**				
3218					5% A-D Critical Value	0.74		Detected data appear Gamma Distributed at 5% Significance Level				
3219					K-S Test Statistic	0.192		**Kolmogorov-Smirnov Gamma GOF Test**				
3220					5% K-S Critical Value	0.193		Detected data appear Gamma Distributed at 5% Significance Level				
3221					**Detected data appear Gamma Distributed at 5% Significance Level**							
3222												
3223						**Gamma Statistics**						
3224					k hat (MLE)	67.84		k star (bias corrected MLE)	57.69			
3225					Theta hat (MLE)	0.187		Theta star (bias corrected MLE)	0.22			
3226					nu hat (MLE)	2713		nu star (bias corrected)	2308			
3227					MLE Mean (bias corrected)	12.7		MLE Sd (bias corrected)	1.672			
3228								Approximate Chi Square Value (0.05)	2197			
3229					Adjusted Level of Significance	0.038		Adjusted Chi Square Value	2189			
3230												
3231						**Assuming Gamma Distribution**						
3232					95% Approximate Gamma UCL	13.34		95% Adjusted Gamma UCL	13.39			
3233												
3234						**Lognormal GOF Test**						
3235					Shapiro Wilk Test Statistic	0.899		**Shapiro Wilk Lognormal GOF Test**				
3236					10% Shapiro Wilk Critical Value	0.92		Data Not Lognormal at 10% Significance Level				
3237					Lilliefors Test Statistic	0.199		**Lilliefors Lognormal GOF Test**				
3238					10% Lilliefors Critical Value	0.176		Data Not Lognormal at 10% Significance Level				
3239					**Data Not Lognormal at 10% Significance Level**							
3240												
3241						**Lognormal Statistics**						
3242					Minimum of Logged Data	2.197		Mean of logged Data	2.534			
3243					Maximum of Logged Data	2.708		SD of logged Data	0.127			
3244												
3245						**Assuming Lognormal Distribution**						
3246					95% H-UCL	13.37		90% Chebyshev (MVUE) UCL	13.79			
3247					95% Chebyshev (MVUE) UCL	14.28		97.5% Chebyshev (MVUE) UCL	14.97			
3248					99% Chebyshev (MVUE) UCL	16.31						
3249												
3250						**Nonparametric Distribution Free UCL Statistics**						
3251						**Data appear to follow a Discernible Distribution**						
3252												
3253						**Nonparametric Distribution Free UCLs**						
3254					95% CLT UCL	13.26		95% BCA Bootstrap UCL	13.15			
3255					95% Standard Bootstrap UCL	13.24		95% Bootstrap-t UCL	13.23			
3256					95% Hall's Bootstrap UCL	13.23		95% Percentile Bootstrap UCL	13.25			
3257					90% Chebyshev(Mean, Sd) UCL	13.72		95% Chebyshev(Mean, Sd) UCL	14.19			
3258					97.5% Chebyshev(Mean, Sd) UCL	14.83		99% Chebyshev(Mean, Sd) UCL	16.09			
3259												
3260						**Suggested UCL to Use**						
3261					95% Student's-t UCL	13.29						
3262												
3263						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
3264						Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.						
3265						However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.						
3266												
3267						**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**						
3268						**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**						
3269												
3270	**Result (dump-sw-beryllium)**											
3271												
3272						**General Statistics**						
3273					Total Number of Observations	20		Number of Distinct Observations	3			
3274					Number of Detects	2		Number of Non-Detects	18			
3275					Number of Distinct Detects	2		Number of Distinct Non-Detects	1			
3276					Minimum Detect	0.088		Minimum Non-Detect	0.3			
3277					Maximum Detect	0.32		Maximum Non-Detect	0.3			
3278					Variance Detects	0.0269		Percent Non-Detects	90%			
3279					Mean Detects	0.204		SD Detects	0.164			
3280					Median Detects	0.204		CV Detects	0.804			
3281					Skewness Detects	N/A		Kurtosis Detects	N/A			
3282					Mean of Logged Detects	-1.785		SD of Logged Detects	0.913			
3283												
3284						**Warning: Data set has only 2 Detected Values.**						
3285						**This is not enough to compute meaningful or reliable statistics and estimates.**						

3286											
3287											
3288	**Normal GOF Test on Detects Only**										
3289	**Not Enough Data to Perform GOF Test**										
3290											
3291	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**										
3292				KM Mean	0.0996			KM Standard Error of Mean	0.016		
3293				90KM SD	0.0506			95% KM (BCA) UCL	N/A		
3294				95% KM (t) UCL	0.127			95% KM (Percentile Bootstrap) UCL	N/A		
3295				95% KM (z) UCL	0.126			95% KM Bootstrap t UCL	N/A		
3296				90% KM Chebyshev UCL	0.148			95% KM Chebyshev UCL	0.169		
3297				97.5% KM Chebyshev UCL	0.199			99% KM Chebyshev UCL	0.259		
3298											
3299	**Gamma GOF Tests on Detected Observations Only**										
3300	**Not Enough Data to Perform GOF Test**										
3301											
3302	**Gamma Statistics on Detected Data Only**										
3303				k hat (MLE)	2.715			k star (bias corrected MLE)	N/A		
3304				Theta hat (MLE)	0.0751			Theta star (bias corrected MLE)	N/A		
3305				nu hat (MLE)	10.86			nu star (bias corrected)	N/A		
3306				Mean (detects)	0.204						
3307											
3308	**Estimates of Gamma Parameters using KM Estimates**										
3309				Mean (KM)	0.0996			SD (KM)	0.0506		
3310				Variance (KM)	0.00256			SE of Mean (KM)	0.016		
3311				k hat (KM)	3.88			k star (KM)	3.331		
3312				nu hat (KM)	155.2			nu star (KM)	133.3		
3313				theta hat (KM)	0.0257			theta star (KM)	0.0299		
3314				80% gamma percentile (KM)	0.14			90% gamma percentile (KM)	0.173		
3315				95% gamma percentile (KM)	0.203			99% gamma percentile (KM)	0.268		
3316											
3317	**Gamma Kaplan-Meier (KM) Statistics**										
3318								Adjusted Level of Significance (β)	0.038		
3319				Approximate Chi Square Value (133.26, α)	107.6			Adjusted Chi Square Value (133.26, β)	105.8		
3320				95% KM Approximate Gamma UCL	0.123			95% KM Adjusted Gamma UCL	0.125		
3321											
3322	**Lognormal GOF Test on Detected Observations Only**										
3323	**Not Enough Data to Perform GOF Test**										
3324											
3325	**Lognormal ROS Statistics Using Imputed Non-Detects**										
3326				Mean in Original Scale	0.108			Mean in Log Scale	-2.382		
3327				SD in Original Scale	0.0682			SD in Log Scale	0.573		
3328				95% t UCL (assumes normality of ROS data)	0.135			95% Percentile Bootstrap UCL	0.135		
3329				95% BCA Bootstrap UCL	0.139			95% Bootstrap t UCL	0.144		
3330				95% H-UCL (Log ROS)	0.143						
3331											
3332	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**										
3333				KM Mean (logged)	-2.366			KM Geo Mean	0.0939		
3334				KM SD (logged)	0.281			95% Critical H Value (KM-Log)	1.838		
3335				KM Standard Error of Mean (logged)	0.089			95% H-UCL (KM -Log)	0.11		
3336				KM SD (logged)	0.281			95% Critical H Value (KM-Log)	1.838		
3337				KM Standard Error of Mean (logged)	0.089						
3338	**Note: KM UCLs may be biased low with this dataset. Other substitution method recommended**										
3339											
3340	**DL/2 Statistics**										
3341	**DL/2 Normal**							**DL/2 Log-Transformed**			
3342				Mean in Original Scale	0.155			Mean in Log Scale	-1.886		
3343				SD in Original Scale	0.0411			SD in Log Scale	0.212		
3344				95% t UCL (Assumes normality)	0.171			95% H-Stat UCL	0.169		
3345	**DL/2 is not a recommended method, provided for comparisons and historical reasons**										
3346											
3347	**Nonparametric Distribution Free UCL Statistics**										
3348	**Data do not follow a Discernible Distribution**										
3349											
3350	**Suggested UCL to Use**										
3351				95% KM (t) UCL	0.127						
3352											
3353	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
3354	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.										
3355	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
3356											
3357	**Result (dump-sw-cadmium)**										
3358											
3359	**General Statistics**										
3360				Total Number of Observations	20			Number of Distinct Observations	1		
3361				Number of Detects	0			Number of Non-Detects	20		
3362				Number of Distinct Detects	0			Number of Distinct Non-Detects	1		
3363											
3364	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**										
3365	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**										
3366	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**										
3367											
3368	**The data set for variable Result (dump-sw-cadmium) was not processed!**										

3369											
3370											
3371											
3372	**Result (dump-sw-calcium)**										
3373											
3374						**General Statistics**					
3375					Total Number of Observations	20		Number of Distinct Observations	8		
3376								Number of Missing Observations	0		
3377					Minimum	12000		Mean	17400		
3378					Maximum	22000		Median	17000		
3379					SD	2873		Std. Error of Mean	642.4		
3380					Coefficient of Variation	0.165		Skewness	0.218		
3381											
3382						**Normal GOF Test**					
3383					Shapiro Wilk Test Statistic	0.905		**Shapiro Wilk GOF Test**			
3384					1% Shapiro Wilk Critical Value	0.868		Data appear Normal at 1% Significance Level			
3385					Lilliefors Test Statistic	0.217		**Lilliefors GOF Test**			
3386					1% Lilliefors Critical Value	0.223		Data appear Normal at 1% Significance Level			
3387						**Data appear Normal at 1% Significance Level**					
3388											
3389						**Assuming Normal Distribution**					
3390					**95% Normal UCL**			**95% UCLs (Adjusted for Skewness)**			
3391					95% Student's-t UCL	18511		95% Adjusted-CLT UCL (Chen-1995)	18490		
3392								95% Modified-t UCL (Johnson-1978)	18516		
3393											
3394						**Gamma GOF Test**					
3395					A-D Test Statistic	0.783		**Anderson-Darling Gamma GOF Test**			
3396					5% A-D Critical Value	0.74		Data Not Gamma Distributed at 5% Significance Level			
3397					K-S Test Statistic	0.196		**Kolmogorov-Smirnov Gamma GOF Test**			
3398					5% K-S Critical Value	0.193		Data Not Gamma Distributed at 5% Significance Level			
3399						**Data Not Gamma Distributed at 5% Significance Level**					
3400											
3401						**Gamma Statistics**					
3402					k hat (MLE)	38.29		k star (bias corrected MLE)	32.58		
3403					Theta hat (MLE)	454.5		Theta star (bias corrected MLE)	534.1		
3404					nu hat (MLE)	1531		nu star (bias corrected)	1303		
3405					MLE Mean (bias corrected)	17400		MLE Sd (bias corrected)	3049		
3406								Approximate Chi Square Value (0.05)	1220		
3407					Adjusted Level of Significance	0.038		Adjusted Chi Square Value	1214		
3408											
3409						**Assuming Gamma Distribution**					
3410					95% Approximate Gamma UCL	18581		95% Adjusted Gamma UCL	18678		
3411											
3412						**Lognormal GOF Test**					
3413					Shapiro Wilk Test Statistic	0.915		**Shapiro Wilk Lognormal GOF Test**			
3414					10% Shapiro Wilk Critical Value	0.92		Data Not Lognormal at 10% Significance Level			
3415					Lilliefors Test Statistic	0.189		**Lilliefors Lognormal GOF Test**			
3416					10% Lilliefors Critical Value	0.176		Data Not Lognormal at 10% Significance Level			
3417						**Data Not Lognormal at 10% Significance Level**					
3418											
3419						**Lognormal Statistics**					
3420					Minimum of Logged Data	9.393		Mean of logged Data	9.751		
3421					Maximum of Logged Data	9.999		SD of logged Data	0.167		
3422											
3423						**Assuming Lognormal Distribution**					
3424					95% H-UCL	18636		90% Chebyshev (MVUE) UCL	19363		
3425					95% Chebyshev (MVUE) UCL	20250		97.5% Chebyshev (MVUE) UCL	21483		
3426					99% Chebyshev (MVUE) UCL	23903					
3427											
3428						**Nonparametric Distribution Free UCL Statistics**					
3429						**Data appear to follow a Discernible Distribution**					
3430											
3431						**Nonparametric Distribution Free UCLs**					
3432					95% CLT UCL	18457		95% BCA Bootstrap UCL	18450		
3433					95% Standard Bootstrap UCL	18447		95% Bootstrap-t UCL	18610		
3434					95% Hall's Bootstrap UCL	18581		95% Percentile Bootstrap UCL	18500		
3435					90% Chebyshev(Mean, Sd) UCL	19327		95% Chebyshev(Mean, Sd) UCL	20200		
3436					97.5% Chebyshev(Mean, Sd) UCL	21412		99% Chebyshev(Mean, Sd) UCL	23791		
3437											
3438						**Suggested UCL to Use**					
3439					95% Student's-t UCL	18511					
3440											
3441	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
3442	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.										
3443	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
3444											
3445	**Result (dump-sw-chromium)**										
3446											
3447						**General Statistics**					
3448					Total Number of Observations	20		Number of Distinct Observations	2		
3449					Number of Detects	1		Number of Non-Detects	19		
3450					Number of Distinct Detects	1		Number of Distinct Non-Detects	1		
3451											

3452	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
3453	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**											
3454												
3455	**The data set for variable Result (dump-sw-chromium) was not processed!**											
3456												
3457												
3458	**Result (dump-sw-cobalt)**											
3459												
3460	**General Statistics**											
3461						Total Number of Observations	20			Number of Distinct Observations	4	
3462						Number of Detects	4			Number of Non-Detects	16	
3463						Number of Distinct Detects	3			Number of Distinct Non-Detects	1	
3464						Minimum Detect	0.12			Minimum Non-Detect	0.35	
3465						Maximum Detect	0.2			Maximum Non-Detect	0.35	
3466						Variance Detects	0.00143			Percent Non-Detects	80%	
3467						Mean Detects	0.145			SD Detects	0.0379	
3468						Median Detects	0.13			CV Detects	0.261	
3469						Skewness Detects	1.659			Kurtosis Detects	2.615	
3470						Mean of Logged Detects	-1.954			SD of Logged Detects	0.241	
3471												
3472	**Normal GOF Test on Detects Only**											
3473						Shapiro Wilk Test Statistic	0.791			**Shapiro Wilk GOF Test**		
3474						1% Shapiro Wilk Critical Value	0.687			Detected Data appear Normal at 1% Significance Level		
3475						Lilliefors Test Statistic	0.303			**Lilliefors GOF Test**		
3476						1% Lilliefors Critical Value	0.413			Detected Data appear Normal at 1% Significance Level		
3477	**Detected Data appear Normal at 1% Significance Level**											
3478	**Note GOF tests may be unreliable for small sample sizes**											
3479												
3480	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
3481						KM Mean	0.145			KM Standard Error of Mean	0.0189	
3482						90KM SD	0.0328			95% KM (BCA) UCL	N/A	
3483						95% KM (t) UCL	0.178			95% KM (Percentile Bootstrap) UCL	N/A	
3484						95% KM (z) UCL	0.176			95% KM Bootstrap t UCL	N/A	
3485						90% KM Chebyshev UCL	0.202			95% KM Chebyshev UCL	0.228	
3486						97.5% KM Chebyshev UCL	0.263			99% KM Chebyshev UCL	0.333	
3487												
3488	**Gamma GOF Tests on Detected Observations Only**											
3489						A-D Test Statistic	0.534			**Anderson-Darling GOF Test**		
3490						5% A-D Critical Value	0.657			Detected data appear Gamma Distributed at 5% Significance Level		
3491						K-S Test Statistic	0.287			**Kolmogorov-Smirnov GOF**		
3492						5% K-S Critical Value	0.394			Detected data appear Gamma Distributed at 5% Significance Level		
3493	**Detected data appear Gamma Distributed at 5% Significance Level**											
3494	**Note GOF tests may be unreliable for small sample sizes**											
3495												
3496	**Gamma Statistics on Detected Data Only**											
3497						k hat (MLE)	21.91			k star (bias corrected MLE)	5.643	
3498						Theta hat (MLE)	0.00662			Theta star (bias corrected MLE)	0.0257	
3499						nu hat (MLE)	175.3			nu star (bias corrected)	45.15	
3500						Mean (detects)	0.145					
3501												
3502	**Gamma ROS Statistics using Imputed Non-Detects**											
3503	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
3504	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
3505	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
3506	This is especially true when the sample size is small.											
3507	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
3508						Minimum	0.0772			Mean	0.146	
3509						Maximum	0.227			Median	0.14	
3510						SD	0.0401			CV	0.275	
3511						k hat (MLE)	13.74			k star (bias corrected MLE)	11.71	
3512						Theta hat (MLE)	0.0106			Theta star (bias corrected MLE)	0.0125	
3513						nu hat (MLE)	549.6			nu star (bias corrected)	468.5	
3514						Adjusted Level of Significance (β)	0.038					
3515						Approximate Chi Square Value (468.53, α)	419.3			Adjusted Chi Square Value (468.53, β)	415.7	
3516						95% Gamma Approximate UCL	0.163			95% Gamma Adjusted UCL	N/A	
3517												
3518	**Estimates of Gamma Parameters using KM Estimates**											
3519						Mean (KM)	0.145			SD (KM)	0.0328	
3520						Variance (KM)	0.00108			SE of Mean (KM)	0.0189	
3521						k hat (KM)	19.56			k star (KM)	16.66	
3522						nu hat (KM)	782.3			nu star (KM)	666.3	
3523						theta hat (KM)	0.00741			theta star (KM)	0.0087	
3524						80% gamma percentile (KM)	0.174			90% gamma percentile (KM)	0.192	
3525						95% gamma percentile (KM)	0.208			99% gamma percentile (KM)	0.24	
3526												
3527	**Gamma Kaplan-Meier (KM) Statistics**											
3528						Approximate Chi Square Value (666.31, α)	607.4			Adjusted Chi Square Value (666.31, β)	603	
3529						95% KM Approximate Gamma UCL	0.159			95% KM Adjusted Gamma UCL	0.16	
3530												
3531	**Lognormal GOF Test on Detected Observations Only**											
3532						Shapiro Wilk Test Statistic	0.816			**Shapiro Wilk GOF Test**		
3533						10% Shapiro Wilk Critical Value	0.792			Detected Data appear Lognormal at 10% Significance Level		
3534						Lilliefors Test Statistic	0.27			**Lilliefors GOF Test**		

3535				10% Lilliefors Critical Value		0.346	Detected Data appear Lognormal at 10% Significance Level					
3536	**Detected Data appear Lognormal at 10% Significance Level**											
3537	**Note GOF tests may be unreliable for small sample sizes**											
3538												
3539	**Lognormal ROS Statistics Using Imputed Non-Detects**											
3540				Mean in Original Scale		0.146				Mean in Log Scale		-1.954
3541				SD in Original Scale		0.0377				SD in Log Scale		0.254
3542			95% t UCL (assumes normality of ROS data)			0.161				95% Percentile Bootstrap UCL		0.16
3543				95% BCA Bootstrap UCL		0.16				95% Bootstrap t UCL		0.162
3544				95% H-UCL (Log ROS)		0.163						
3545												
3546	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
3547				KM Mean (logged)		-1.954				KM Geo Mean		0.142
3548				KM SD (logged)		0.209				95% Critical H Value (KM-Log)		1.791
3549			KM Standard Error of Mean (logged)			0.12				95% H-UCL (KM -Log)		0.158
3550				KM SD (logged)		0.209				95% Critical H Value (KM-Log)		1.791
3551			KM Standard Error of Mean (logged)			0.12						
3552	**Note: KM UCLs may be biased low with this dataset. Other substitution method recommended**											
3553												
3554	**DL/2 Statistics**											
3555	**DL/2 Normal**						**DL/2 Log-Transformed**					
3556				Mean in Original Scale		0.169				Mean in Log Scale		-1.785
3557				SD in Original Scale		0.0194				SD in Log Scale		0.129
3558				95% t UCL (Assumes normality)		0.177				95% H-Stat UCL		0.178
3559	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
3560												
3561	**Nonparametric Distribution Free UCL Statistics**											
3562	**Detected Data appear Normal Distributed at 1% Significance Level**											
3563												
3564	**Suggested UCL to Use**											
3565				95% KM (t) UCL		0.178						
3566												
3567	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
3568	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
3569	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
3570												
3571												
3572	**Result (dump-sw-copper)**											
3573												
3574	**General Statistics**											
3575				Total Number of Observations		20				Number of Distinct Observations		16
3576										Number of Missing Observations		0
3577				Minimum		1.3				Mean		2.66
3578				Maximum		7.1				Median		2.35
3579				SD		1.293				Std. Error of Mean		0.289
3580				Coefficient of Variation		0.486				Skewness		2.259
3581												
3582	**Normal GOF Test**											
3583				Shapiro Wilk Test Statistic		0.79	**Shapiro Wilk GOF Test**					
3584				1% Shapiro Wilk Critical Value		0.868	Data Not Normal at 1% Significance Level					
3585				Lilliefors Test Statistic		0.176	**Lilliefors GOF Test**					
3586				1% Lilliefors Critical Value		0.223	Data appear Normal at 1% Significance Level					
3587	**Data appear Approximate Normal at 1% Significance Level**											
3588												
3589	**Assuming Normal Distribution**											
3590	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
3591				95% Student's-t UCL		3.16				95% Adjusted-CLT UCL (Chen-1995)		3.292
3592										95% Modified-t UCL (Johnson-1978)		3.184
3593												
3594	**Gamma GOF Test**											
3595				A-D Test Statistic		0.438	**Anderson-Darling Gamma GOF Test**					
3596				5% A-D Critical Value		0.745	Detected data appear Gamma Distributed at 5% Significance Level					
3597				K-S Test Statistic		0.113	**Kolmogorov-Smirnov Gamma GOF Test**					
3598				5% K-S Critical Value		0.194	Detected data appear Gamma Distributed at 5% Significance Level					
3599	**Detected data appear Gamma Distributed at 5% Significance Level**											
3600												
3601	**Gamma Statistics**											
3602				k hat (MLE)		6.037				k star (bias corrected MLE)		5.165
3603				Theta hat (MLE)		0.441				Theta star (bias corrected MLE)		0.515
3604				nu hat (MLE)		241.5				nu star (bias corrected)		206.6
3605				MLE Mean (bias corrected)		2.66				MLE Sd (bias corrected)		1.17
3606										Approximate Chi Square Value (0.05)		174.3
3607				Adjusted Level of Significance		0.038				Adjusted Chi Square Value		172
3608												
3609	**Assuming Gamma Distribution**											
3610				95% Approximate Gamma UCL		3.152				95% Adjusted Gamma UCL		3.195
3611												
3612	**Lognormal GOF Test**											
3613				Shapiro Wilk Test Statistic		0.956	**Shapiro Wilk Lognormal GOF Test**					
3614				10% Shapiro Wilk Critical Value		0.92	Data appear Lognormal at 10% Significance Level					
3615				Lilliefors Test Statistic		0.0962	**Lilliefors Lognormal GOF Test**					
3616				10% Lilliefors Critical Value		0.176	Data appear Lognormal at 10% Significance Level					
3617	**Data appear Lognormal at 10% Significance Level**											

3618												
3619						**Lognormal Statistics**						
3620					Minimum of Logged Data	0.262				Mean of logged Data	0.893	
3621					Maximum of Logged Data	1.96				SD of logged Data	0.403	
3622												
3623						**Assuming Lognormal Distribution**						
3624					95% H-UCL	3.168				90% Chebyshev (MVUE) UCL	3.37	
3625					95% Chebyshev (MVUE) UCL	3.701				97.5% Chebyshev (MVUE) UCL	4.161	
3626					99% Chebyshev (MVUE) UCL	5.064						
3627												
3628						**Nonparametric Distribution Free UCL Statistics**						
3629						**Data appear to follow a Discernible Distribution**						
3630												
3631						**Nonparametric Distribution Free UCLs**						
3632					95% CLT UCL	3.136				95% BCA Bootstrap UCL	3.325	
3633					95% Standard Bootstrap UCL	3.126				95% Bootstrap-t UCL	3.435	
3634					95% Hall's Bootstrap UCL	5.372				95% Percentile Bootstrap UCL	3.175	
3635					90% Chebyshev(Mean, Sd) UCL	3.527				95% Chebyshev(Mean, Sd) UCL	3.92	
3636					97.5% Chebyshev(Mean, Sd) UCL	4.466				99% Chebyshev(Mean, Sd) UCL	5.537	
3637												
3638						**Suggested UCL to Use**						
3639					95% Student's-t UCL	3.16						
3640												
3641						When a data set follows an approximate distribution passing only one of the GOF tests,						
3642						it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL						
3643												
3644						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
3645						Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.						
3646						However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.						
3647												
3648	**Result (dump-sw-iron)**											
3649												
3650						**General Statistics**						
3651					Total Number of Observations	20				Number of Distinct Observations	2	
3652					Number of Detects	0				Number of Non-Detects	20	
3653					Number of Distinct Detects	0				Number of Distinct Non-Detects	2	
3654												
3655						**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**						
3656						**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**						
3657						**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**						
3658												
3659						**The data set for variable Result (dump-sw-iron) was not processed!**						
3660												
3661												
3662	**Result (dump-sw-lead)**											
3663												
3664						**General Statistics**						
3665					Total Number of Observations	20				Number of Distinct Observations	9	
3666					Number of Detects	10				Number of Non-Detects	10	
3667					Number of Distinct Detects	9				Number of Distinct Non-Detects	1	
3668					Minimum Detect	0.2				Minimum Non-Detect	0.7	
3669					Maximum Detect	1				Maximum Non-Detect	0.7	
3670					Variance Detects	0.113				Percent Non-Detects	50%	
3671					Mean Detects	0.529				SD Detects	0.336	
3672					Median Detects	0.385				CV Detects	0.635	
3673					Skewness Detects	0.52				Kurtosis Detects	-1.732	
3674					Mean of Logged Detects	-0.83				SD of Logged Detects	0.661	
3675												
3676						**Normal GOF Test on Detects Only**						
3677					Shapiro Wilk Test Statistic	0.827				**Shapiro Wilk GOF Test**		
3678					1% Shapiro Wilk Critical Value	0.781				Detected Data appear Normal at 1% Significance Level		
3679					Lilliefors Test Statistic	0.252				**Lilliefors GOF Test**		
3680					1% Lilliefors Critical Value	0.304				Detected Data appear Normal at 1% Significance Level		
3681						**Detected Data appear Normal at 1% Significance Level**						
3682												
3683						**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**						
3684					KM Mean	0.406				KM Standard Error of Mean	0.067	
3685					90KM SD	0.264				95% KM (BCA) UCL	0.521	
3686					95% KM (t) UCL	0.522				95% KM (Percentile Bootstrap) UCL	0.521	
3687					95% KM (z) UCL	0.516				95% KM Bootstrap t UCL	0.556	
3688					90% KM Chebyshev UCL	0.607				95% KM Chebyshev UCL	0.698	
3689					97.5% KM Chebyshev UCL	0.824				99% KM Chebyshev UCL	1.072	
3690												
3691						**Gamma GOF Tests on Detected Observations Only**						
3692					A-D Test Statistic	0.663				**Anderson-Darling GOF Test**		
3693					5% A-D Critical Value	0.733				Detected data appear Gamma Distributed at 5% Significance Level		
3694					K-S Test Statistic	0.242				**Kolmogorov-Smirnov GOF**		
3695					5% K-S Critical Value	0.269				Detected data appear Gamma Distributed at 5% Significance Level		
3696						**Detected data appear Gamma Distributed at 5% Significance Level**						
3697												
3698						**Gamma Statistics on Detected Data Only**						
3699					k hat (MLE)	2.746				k star (bias corrected MLE)	1.989	
3700					Theta hat (MLE)	0.193				Theta star (bias corrected MLE)	0.266	

3701					nu hat (MLE)	54.91					nu star (bias corrected)	39.77
3702					Mean (detects)	0.529						
3703												
3704						**Gamma ROS Statistics using Imputed Non-Detects**							
3705						GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
3706						GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)							
3707						For such situations, GROS method may yield incorrect values of UCLs and BTVs							
3708						This is especially true when the sample size is small.							
3709						For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
3710					Minimum	0.0656					Mean	0.416
3711					Maximum	1					Median	0.31
3712					SD	0.281					CV	0.675
3713					k hat (MLE)	2.447					k star (bias corrected MLE)	2.113
3714					Theta hat (MLE)	0.17					Theta star (bias corrected MLE)	0.197
3715					nu hat (MLE)	97.87					nu star (bias corrected)	84.52
3716					Adjusted Level of Significance (β)	0.038						
3717					Approximate Chi Square Value (84.52, α)	64.33					Adjusted Chi Square Value (84.52, β)	62.94
3718					95% Gamma Approximate UCL	0.547					95% Gamma Adjusted UCL	0.559
3719												
3720						**Estimates of Gamma Parameters using KM Estimates**							
3721					Mean (KM)	0.406					SD (KM)	0.264
3722					Variance (KM)	0.0699					SE of Mean (KM)	0.067
3723					k hat (KM)	2.362					k star (KM)	2.041
3724					nu hat (KM)	94.47					nu star (KM)	81.63
3725					theta hat (KM)	0.172					theta star (KM)	0.199
3726					80% gamma percentile (KM)	0.607					90% gamma percentile (KM)	0.786
3727					95% gamma percentile (KM)	0.957					99% gamma percentile (KM)	1.336
3728												
3729						**Gamma Kaplan-Meier (KM) Statistics**							
3730					Approximate Chi Square Value (81.63, α)	61.81					Adjusted Chi Square Value (81.63, β)	60.45
3731					95% KM Approximate Gamma UCL	0.536					95% KM Adjusted Gamma UCL	0.548
3732												
3733						**Lognormal GOF Test on Detected Observations Only**							
3734					Shapiro Wilk Test Statistic	0.863					**Shapiro Wilk GOF Test**	
3735					10% Shapiro Wilk Critical Value	0.869					Detected Data Not Lognormal at 10% Significance Level	
3736					Lilliefors Test Statistic	0.214					**Lilliefors GOF Test**	
3737					10% Lilliefors Critical Value	0.241					Detected Data appear Lognormal at 10% Significance Level	
3738						**Detected Data appear Approximate Lognormal at 10% Significance Level**							
3739												
3740						**Lognormal ROS Statistics Using Imputed Non-Detects**							
3741					Mean in Original Scale	0.417					Mean in Log Scale	-1.048
3742					SD in Original Scale	0.272					SD in Log Scale	0.588
3743					95% t UCL (assumes normality of ROS data)	0.522					95% Percentile Bootstrap UCL	0.52
3744					95% BCA Bootstrap UCL	0.532					95% Bootstrap t UCL	0.552
3745					95% H-UCL (Log ROS)	0.554						
3746												
3747						**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**							
3748					KM Mean (logged)	-1.067					KM Geo Mean	0.344
3749					KM SD (logged)	0.541					95% Critical H Value (KM-Log)	2.06
3750					KM Standard Error of Mean (logged)	0.149					95% H-UCL (KM -Log)	0.514
3751					KM SD (logged)	0.541					95% Critical H Value (KM-Log)	2.06
3752					KM Standard Error of Mean (logged)	0.149						
3753												
3754						**DL/2 Statistics**							
3755					**DL/2 Normal**						**DL/2 Log-Transformed**	
3756					Mean in Original Scale	0.44					Mean in Log Scale	-0.94
3757					SD in Original Scale	0.249					SD in Log Scale	0.469
3758					95% t UCL (Assumes normality)	0.536					95% H-Stat UCL	0.54
3759						**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
3760												
3761						**Nonparametric Distribution Free UCL Statistics**							
3762						**Detected Data appear Normal Distributed at 1% Significance Level**							
3763												
3764						**Suggested UCL to Use**							
3765					95% KM (t) UCL	0.522						
3766												
3767						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
3768						Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.							
3769						However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
3770												
3771												
3772	**Result (dump-sw-magnesium)**											
3773												
3774						**General Statistics**							
3775					Total Number of Observations	20					Number of Distinct Observations	13
3776											Number of Missing Observations	0
3777					Minimum	3700					Mean	5790
3778					Maximum	7800					Median	5950
3779					SD	1296					Std. Error of Mean	289.7
3780					Coefficient of Variation	0.224					Skewness	-0.408
3781												
3782						**Normal GOF Test**							
3783					Shapiro Wilk Test Statistic	0.915					**Shapiro Wilk GOF Test**	

3784				1% Shapiro Wilk Critical Value		0.868		Data appear Normal at 1% Significance Level				
3785				Lilliefors Test Statistic		0.153		**Lilliefors GOF Test**				
3786				1% Lilliefors Critical Value		0.223		Data appear Normal at 1% Significance Level				
3787				**Data appear Normal at 1% Significance Level**								
3788												
3789				**Assuming Normal Distribution**								
3790				**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**				
3791				95% Student's-t UCL		6291		95% Adjusted-CLT UCL (Chen-1995)				6238
3792								95% Modified-t UCL (Johnson-1978)				6287
3793												
3794				**Gamma GOF Test**								
3795				A-D Test Statistic		0.873		**Anderson-Darling Gamma GOF Test**				
3796				5% A-D Critical Value		0.741		Data Not Gamma Distributed at 5% Significance Level				
3797				K-S Test Statistic		0.181		**Kolmogorov-Smirnov Gamma GOF Test**				
3798				5% K-S Critical Value		0.194		Detected data appear Gamma Distributed at 5% Significance Level				
3799				**Detected data follow Appr. Gamma Distribution at 5% Significance Level**								
3800												
3801				**Gamma Statistics**								
3802				k hat (MLE)		19		k star (bias corrected MLE)				16.19
3803				Theta hat (MLE)		304.7		Theta star (bias corrected MLE)				357.7
3804				nu hat (MLE)		760.1		nu star (bias corrected)				647.5
3805				MLE Mean (bias corrected)		5790		MLE Sd (bias corrected)				1439
3806								Approximate Chi Square Value (0.05)				589.4
3807				Adjusted Level of Significance		0.038		Adjusted Chi Square Value				585.1
3808												
3809				**Assuming Gamma Distribution**								
3810				95% Approximate Gamma UCL		6360		95% Adjusted Gamma UCL				6408
3811												
3812				**Lognormal GOF Test**								
3813				Shapiro Wilk Test Statistic		0.873		**Shapiro Wilk Lognormal GOF Test**				
3814				10% Shapiro Wilk Critical Value		0.92		Data Not Lognormal at 10% Significance Level				
3815				Lilliefors Test Statistic		0.2		**Lilliefors Lognormal GOF Test**				
3816				10% Lilliefors Critical Value		0.176		Data Not Lognormal at 10% Significance Level				
3817				**Data Not Lognormal at 10% Significance Level**								
3818												
3819				**Lognormal Statistics**								
3820				Minimum of Logged Data		8.216		Mean of logged Data				8.637
3821				Maximum of Logged Data		8.962		SD of logged Data				0.243
3822												
3823				**Assuming Lognormal Distribution**								
3824				95% H-UCL		6427		90% Chebyshev (MVUE) UCL				6755
3825				95% Chebyshev (MVUE) UCL		7188		97.5% Chebyshev (MVUE) UCL				7788
3826				99% Chebyshev (MVUE) UCL		8969						
3827												
3828				**Nonparametric Distribution Free UCL Statistics**								
3829				**Data appear to follow a Discernible Distribution**								
3830												
3831				**Nonparametric Distribution Free UCLs**								
3832				95% CLT UCL		6267		95% BCA Bootstrap UCL				6215
3833				95% Standard Bootstrap UCL		6253		95% Bootstrap-t UCL				6263
3834				95% Hall's Bootstrap UCL		6242		95% Percentile Bootstrap UCL				6245
3835				90% Chebyshev(Mean, Sd) UCL		6659		95% Chebyshev(Mean, Sd) UCL				7053
3836				97.5% Chebyshev(Mean, Sd) UCL		7599		99% Chebyshev(Mean, Sd) UCL				8673
3837												
3838				**Suggested UCL to Use**								
3839				95% Student's-t UCL		6291						
3840												
3841				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
3842				Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.								
3843				However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.								
3844												
3845				**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**								
3846				**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**								
3847												
3848												
3849	**Result (dump-sw-manganese)**											
3850												
3851				**General Statistics**								
3852				Total Number of Observations		20		Number of Distinct Observations				16
3853								Number of Missing Observations				0
3854				Minimum		1.9		Mean				6.725
3855				Maximum		18		Median				6.3
3856				SD		4.291		Std. Error of Mean				0.959
3857				Coefficient of Variation		0.638		Skewness				1.575
3858												
3859				**Normal GOF Test**								
3860				Shapiro Wilk Test Statistic		0.818		**Shapiro Wilk GOF Test**				
3861				1% Shapiro Wilk Critical Value		0.868		Data Not Normal at 1% Significance Level				
3862				Lilliefors Test Statistic		0.216		**Lilliefors GOF Test**				
3863				1% Lilliefors Critical Value		0.223		Data appear Normal at 1% Significance Level				
3864				**Data appear Approximate Normal at 1% Significance Level**								
3865												
3866				**Assuming Normal Distribution**								

3867	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
3868				95% Student's-t UCL		8.384				95% Adjusted-CLT UCL (Chen-1995)		8.664
3869										95% Modified-t UCL (Johnson-1978)		8.44
3870												
3871	**Gamma GOF Test**											
3872				A-D Test Statistic		0.554	**Anderson-Darling Gamma GOF Test**					
3873				5% A-D Critical Value		0.747	Detected data appear Gamma Distributed at 5% Significance Level					
3874				K-S Test Statistic		0.149	**Kolmogorov-Smirnov Gamma GOF Test**					
3875				5% K-S Critical Value		0.195	Detected data appear Gamma Distributed at 5% Significance Level					
3876	**Detected data appear Gamma Distributed at 5% Significance Level**											
3877												
3878	**Gamma Statistics**											
3879				k hat (MLE)		3.028				k star (bias corrected MLE)		2.607
3880				Theta hat (MLE)		2.221				Theta star (bias corrected MLE)		2.58
3881				nu hat (MLE)		121.1				nu star (bias corrected)		104.3
3882				MLE Mean (bias corrected)		6.725				MLE Sd (bias corrected)		4.165
3883										Approximate Chi Square Value (0.05)		81.72
3884				Adjusted Level of Significance		0.038				Adjusted Chi Square Value		80.14
3885												
3886	**Assuming Gamma Distribution**											
3887				95% Approximate Gamma UCL		8.582				95% Adjusted Gamma UCL		8.751
3888												
3889	**Lognormal GOF Test**											
3890				Shapiro Wilk Test Statistic		0.944	**Shapiro Wilk Lognormal GOF Test**					
3891				10% Shapiro Wilk Critical Value		0.92	Data appear Lognormal at 10% Significance Level					
3892				Lilliefors Test Statistic		0.163	**Lilliefors Lognormal GOF Test**					
3893				10% Lilliefors Critical Value		0.176	Data appear Lognormal at 10% Significance Level					
3894	**Data appear Lognormal at 10% Significance Level**											
3895												
3896	**Lognormal Statistics**											
3897				Minimum of Logged Data		0.642				Mean of logged Data		1.732
3898				Maximum of Logged Data		2.89				SD of logged Data		0.61
3899												
3900	**Assuming Lognormal Distribution**											
3901				95% H-UCL		9.172				90% Chebyshev (MVUE) UCL		9.631
3902				95% Chebyshev (MVUE) UCL		10.94				97.5% Chebyshev (MVUE) UCL		12.77
3903				99% Chebyshev (MVUE) UCL		16.35						
3904												
3905	**Nonparametric Distribution Free UCL Statistics**											
3906	**Data appear to follow a Discernible Distribution**											
3907												
3908	**Nonparametric Distribution Free UCLs**											
3909				95% CLT UCL		8.303				95% BCA Bootstrap UCL		8.555
3910				95% Standard Bootstrap UCL		8.248				95% Bootstrap-t UCL		9.142
3911				95% Hall's Bootstrap UCL		11.31				95% Percentile Bootstrap UCL		8.315
3912				90% Chebyshev(Mean, Sd) UCL		9.603				95% Chebyshev(Mean, Sd) UCL		10.91
3913				97.5% Chebyshev(Mean, Sd) UCL		12.72				99% Chebyshev(Mean, Sd) UCL		16.27
3914												
3915	**Suggested UCL to Use**											
3916				95% Student's-t UCL		8.384						
3917												
3918	When a data set follows an approximate distribution passing only one of the GOF tests,											
3919	it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL											
3920												
3921	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
3922	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
3923	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
3924												
3925	**Result (dump-sw-mercury)**											
3926												
3927	**General Statistics**											
3928				Total Number of Observations		20				Number of Distinct Observations		1
3929				Number of Detects		0				Number of Non-Detects		20
3930				Number of Distinct Detects		0				Number of Distinct Non-Detects		1
3931												
3932	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
3933	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
3934	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
3935												
3936	**The data set for variable Result (dump-sw-mercury) was not processed!**											
3937												
3938												
3939	**Result (dump-sw-nickel)**											
3940												
3941	**General Statistics**											
3942				Total Number of Observations		20				Number of Distinct Observations		13
3943				Number of Detects		16				Number of Non-Detects		4
3944				Number of Distinct Detects		12				Number of Distinct Non-Detects		1
3945				Minimum Detect		0.33				Minimum Non-Detect		1
3946				Maximum Detect		0.63				Maximum Non-Detect		1
3947				Variance Detects		0.00808				Percent Non-Detects		20%
3948				Mean Detects		0.428				SD Detects		0.0899
3949				Median Detects		0.41				CV Detects		0.21

3950				Skewness Detects	0.915					Kurtosis Detects	0.114	
3951				Mean of Logged Detects	-0.868					SD of Logged Detects	0.2	
3952												
3953				**Normal GOF Test on Detects Only**								
3954				Shapiro Wilk Test Statistic	0.904				**Shapiro Wilk GOF Test**			
3955				1% Shapiro Wilk Critical Value	0.844				Detected Data appear Normal at 1% Significance Level			
3956				Lilliefors Test Statistic	0.161				**Lilliefors GOF Test**			
3957				1% Lilliefors Critical Value	0.248				Detected Data appear Normal at 1% Significance Level			
3958				**Detected Data appear Normal at 1% Significance Level**								
3959												
3960				**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**								
3961				KM Mean	0.428					KM Standard Error of Mean	0.0225	
3962				90KM SD	0.0871					95% KM (BCA) UCL	0.47	
3963				95% KM (t) UCL	0.467					95% KM (Percentile Bootstrap) UCL	0.467	
3964				95% KM (z) UCL	0.465					95% KM Bootstrap t UCL	0.475	
3965				90% KM Chebyshev UCL	0.496					95% KM Chebyshev UCL	0.526	
3966				97.5% KM Chebyshev UCL	0.568					99% KM Chebyshev UCL	0.652	
3967												
3968				**Gamma GOF Tests on Detected Observations Only**								
3969				A-D Test Statistic	0.444				**Anderson-Darling GOF Test**			
3970				5% A-D Critical Value	0.736				Detected data appear Gamma Distributed at 5% Significance Level			
3971				K-S Test Statistic	0.138				**Kolmogorov-Smirnov GOF**			
3972				5% K-S Critical Value	0.215				Detected data appear Gamma Distributed at 5% Significance Level			
3973				**Detected data appear Gamma Distributed at 5% Significance Level**								
3974												
3975				**Gamma Statistics on Detected Data Only**								
3976				k hat (MLE)	26.07					k star (bias corrected MLE)	21.22	
3977				Theta hat (MLE)	0.0164					Theta star (bias corrected MLE)	0.0202	
3978				nu hat (MLE)	834.3					nu star (bias corrected)	679.2	
3979				Mean (detects)	0.428							
3980												
3981				**Gamma ROS Statistics using Imputed Non-Detects**								
3982				GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
3983				GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)								
3984				For such situations, GROS method may yield incorrect values of UCLs and BTVs								
3985				This is especially true when the sample size is small.								
3986				For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
3987				Minimum	0.33					Mean	0.428	
3988				Maximum	0.63					Median	0.41	
3989				SD	0.0848					CV	0.198	
3990				k hat (MLE)	28.61					k star (bias corrected MLE)	24.36	
3991				Theta hat (MLE)	0.0149					Theta star (bias corrected MLE)	0.0176	
3992				nu hat (MLE)	1145					nu star (bias corrected)	974.2	
3993				Adjusted Level of Significance (β)	0.038							
3994				Approximate Chi Square Value (974.23, α)	902.8					Adjusted Chi Square Value (974.23, β)	897.4	
3995				95% Gamma Approximate UCL	0.462					95% Gamma Adjusted UCL	0.464	
3996												
3997				**Estimates of Gamma Parameters using KM Estimates**								
3998				Mean (KM)	0.428					SD (KM)	0.0871	
3999				Variance (KM)	0.00758					SE of Mean (KM)	0.0225	
4000				k hat (KM)	24.19					k star (KM)	20.59	
4001				nu hat (KM)	967.5					nu star (KM)	823.7	
4002				theta hat (KM)	0.0177					theta star (KM)	0.0208	
4003				80% gamma percentile (KM)	0.505					90% gamma percentile (KM)	0.553	
4004				95% gamma percentile (KM)	0.594					99% gamma percentile (KM)	0.678	
4005												
4006				**Gamma Kaplan-Meier (KM) Statistics**								
4007				Approximate Chi Square Value (823.73, α)	758.1					Adjusted Chi Square Value (823.73, β)	753.2	
4008				95% KM Approximate Gamma UCL	0.465					95% KM Adjusted Gamma UCL	0.468	
4009												
4010				**Lognormal GOF Test on Detected Observations Only**								
4011				Shapiro Wilk Test Statistic	0.932				**Shapiro Wilk GOF Test**			
4012				10% Shapiro Wilk Critical Value	0.906				Detected Data appear Lognormal at 10% Significance Level			
4013				Lilliefors Test Statistic	0.125				**Lilliefors GOF Test**			
4014				10% Lilliefors Critical Value	0.196				Detected Data appear Lognormal at 10% Significance Level			
4015				**Detected Data appear Lognormal at 10% Significance Level**								
4016												
4017				**Lognormal ROS Statistics Using Imputed Non-Detects**								
4018				Mean in Original Scale	0.427					Mean in Log Scale	-0.868	
4019				SD in Original Scale	0.0843					SD in Log Scale	0.189	
4020				95% t UCL (assumes normality of ROS data)	0.46					95% Percentile Bootstrap UCL	0.46	
4021				95% BCA Bootstrap UCL	0.461					95% Bootstrap t UCL	0.464	
4022				95% H-UCL (Log ROS)	0.462							
4023												
4024				**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**								
4025				KM Mean (logged)	-0.868					KM Geo Mean	0.42	
4026				KM SD (logged)	0.193					95% Critical H Value (KM-Log)	1.782	
4027				KM Standard Error of Mean (logged)	0.0499					95% H-UCL (KM -Log)	0.463	
4028				KM SD (logged)	0.193					95% Critical H Value (KM-Log)	1.782	
4029				KM Standard Error of Mean (logged)	0.0499							
4030												
4031				**DL/2 Statistics**								
4032				**DL/2 Normal**						**DL/2 Log-Transformed**		

4033				Mean in Original Scale	0.443					Mean in Log Scale	-0.833	
4034				SD in Original Scale	0.0852					SD in Log Scale	0.191	
4035				95% t UCL (Assumes normality)	0.475					95% H-Stat UCL	0.479	
4036				**DL/2 is not a recommended method, provided for comparisons and historical reasons**								
4037												
4038				**Nonparametric Distribution Free UCL Statistics**								
4039				**Detected Data appear Normal Distributed at 1% Significance Level**								
4040												
4041				**Suggested UCL to Use**								
4042				95% KM (t) UCL	0.467							
4043												
4044				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
4045				Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.								
4046				However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.								
4047												
4048												
4049	**Result (dump-sw-potassium)**											
4050												
4051				**General Statistics**								
4052				Total Number of Observations	20					Number of Distinct Observations	9	
4053										Number of Missing Observations	0	
4054				Minimum	1400					Mean	2240	
4055				Maximum	3000					Median	2500	
4056				SD	509.3					Std. Error of Mean	113.9	
4057				Coefficient of Variation	0.227					Skewness	-0.49	
4058												
4059				**Normal GOF Test**								
4060				Shapiro Wilk Test Statistic	0.884				**Shapiro Wilk GOF Test**			
4061				1% Shapiro Wilk Critical Value	0.868				Data appear Normal at 1% Significance Level			
4062				Lilliefors Test Statistic	0.245				**Lilliefors GOF Test**			
4063				1% Lilliefors Critical Value	0.223				Data Not Normal at 1% Significance Level			
4064				**Data appear Approximate Normal at 1% Significance Level**								
4065												
4066				**Assuming Normal Distribution**								
4067				**95% Normal UCL**					**95% UCLs (Adjusted for Skewness)**			
4068				95% Student's-t UCL	2437				95% Adjusted-CLT UCL (Chen-1995)		2414	
4069									95% Modified-t UCL (Johnson-1978)		2435	
4070												
4071				**Gamma GOF Test**								
4072				A-D Test Statistic	1.157				**Anderson-Darling Gamma GOF Test**			
4073				5% A-D Critical Value	0.741				Data Not Gamma Distributed at 5% Significance Level			
4074				K-S Test Statistic	0.261				**Kolmogorov-Smirnov Gamma GOF Test**			
4075				5% K-S Critical Value	0.194				Data Not Gamma Distributed at 5% Significance Level			
4076				**Data Not Gamma Distributed at 5% Significance Level**								
4077												
4078				**Gamma Statistics**								
4079				k hat (MLE)	18.3					k star (bias corrected MLE)	15.59	
4080				Theta hat (MLE)	122.4					Theta star (bias corrected MLE)	143.7	
4081				nu hat (MLE)	732					nu star (bias corrected)	623.5	
4082				MLE Mean (bias corrected)	2240					MLE Sd (bias corrected)	567.4	
4083										Approximate Chi Square Value (0.05)	566.6	
4084				Adjusted Level of Significance	0.038					Adjusted Chi Square Value	562.3	
4085												
4086				**Assuming Gamma Distribution**								
4087				95% Approximate Gamma UCL	2465					95% Adjusted Gamma UCL	2484	
4088												
4089				**Lognormal GOF Test**								
4090				Shapiro Wilk Test Statistic	0.858				**Shapiro Wilk Lognormal GOF Test**			
4091				10% Shapiro Wilk Critical Value	0.92				Data Not Lognormal at 10% Significance Level			
4092				Lilliefors Test Statistic	0.26				**Lilliefors Lognormal GOF Test**			
4093				10% Lilliefors Critical Value	0.176				Data Not Lognormal at 10% Significance Level			
4094				**Data Not Lognormal at 10% Significance Level**								
4095												
4096				**Lognormal Statistics**								
4097				Minimum of Logged Data	7.244					Mean of logged Data	7.687	
4098				Maximum of Logged Data	8.006					SD of logged Data	0.248	
4099												
4100				**Assuming Lognormal Distribution**								
4101				95% H-UCL	2492					90% Chebyshev (MVUE) UCL	2621	
4102				95% Chebyshev (MVUE) UCL	2792					97.5% Chebyshev (MVUE) UCL	3029	
4103				99% Chebyshev (MVUE) UCL	3494							
4104												
4105				**Nonparametric Distribution Free UCL Statistics**								
4106				**Data appear to follow a Discernible Distribution**								
4107												
4108				**Nonparametric Distribution Free UCLs**								
4109				95% CLT UCL	2427					95% BCA Bootstrap UCL	2400	
4110				95% Standard Bootstrap UCL	2422					95% Bootstrap-t UCL	2425	
4111				95% Hall's Bootstrap UCL	2413					95% Percentile Bootstrap UCL	2415	
4112				90% Chebyshev(Mean, Sd) UCL	2582					95% Chebyshev(Mean, Sd) UCL	2736	
4113				97.5% Chebyshev(Mean, Sd) UCL	2951					99% Chebyshev(Mean, Sd) UCL	3373	
4114												
4115				**Suggested UCL to Use**								

4116				95% Student's-t UCL	2437							
4117												
4118	When a data set follows an approximate distribution passing only one of the GOF tests,											
4119	it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL											
4120												
4121	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
4122	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
4123	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
4124												
4125	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
4126	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
4127												
4128	**Result (dump-sw-selenium)**											
4129												
4130	**General Statistics**											
4131				Total Number of Observations	20			Number of Distinct Observations	2			
4132				Number of Detects	1			Number of Non-Detects	19			
4133				Number of Distinct Detects	1			Number of Distinct Non-Detects	1			
4134												
4135	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
4136	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**											
4137												
4138	**The data set for variable Result (dump-sw-selenium) was not processed!**											
4139												
4140												
4141	**Result (dump-sw-silver)**											
4142												
4143	**General Statistics**											
4144				Total Number of Observations	20			Number of Distinct Observations	1			
4145				Number of Detects	0			Number of Non-Detects	20			
4146				Number of Distinct Detects	0			Number of Distinct Non-Detects	1			
4147												
4148	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
4149	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
4150	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
4151												
4152	**The data set for variable Result (dump-sw-silver) was not processed!**											
4153												
4154												
4155												
4156	**Result (dump-sw-sodium)**											
4157												
4158	**General Statistics**											
4159				Total Number of Observations	20			Number of Distinct Observations	12			
4160								Number of Missing Observations	0			
4161				Minimum	15000			Mean	25100			
4162				Maximum	37000			Median	26000			
4163				SD	8006			Std. Error of Mean	1790			
4164				Coefficient of Variation	0.319			Skewness	0.00304			
4165												
4166	**Normal GOF Test**											
4167				Shapiro Wilk Test Statistic	0.883			**Shapiro Wilk GOF Test**				
4168				1% Shapiro Wilk Critical Value	0.868			Data appear Normal at 1% Significance Level				
4169				Lilliefors Test Statistic	0.187			**Lilliefors GOF Test**				
4170				1% Lilliefors Critical Value	0.223			Data appear Normal at 1% Significance Level				
4171	**Data appear Normal at 1% Significance Level**											
4172												
4173	**Assuming Normal Distribution**											
4174	**95% Normal UCL**							**95% UCLs (Adjusted for Skewness)**				
4175				95% Student's-t UCL	28195			95% Adjusted-CLT UCL (Chen-1995)	28046			
4176								95% Modified-t UCL (Johnson-1978)	28196			
4177												
4178	**Gamma GOF Test**											
4179				A-D Test Statistic	0.974			**Anderson-Darling Gamma GOF Test**				
4180				5% A-D Critical Value	0.742			Data Not Gamma Distributed at 5% Significance Level				
4181				K-S Test Statistic	0.215			**Kolmogorov-Smirnov Gamma GOF Test**				
4182				5% K-S Critical Value	0.194			Data Not Gamma Distributed at 5% Significance Level				
4183	**Data Not Gamma Distributed at 5% Significance Level**											
4184												
4185	**Gamma Statistics**											
4186				k hat (MLE)	9.783			k star (bias corrected MLE)	8.349			
4187				Theta hat (MLE)	2566			Theta star (bias corrected MLE)	3006			
4188				nu hat (MLE)	391.3			nu star (bias corrected)	334			
4189				MLE Mean (bias corrected)	25100			MLE Sd (bias corrected)	8687			
4190								Approximate Chi Square Value (0.05)	292.6			
4191				Adjusted Level of Significance	0.038			Adjusted Chi Square Value	289.6			
4192												
4193	**Assuming Gamma Distribution**											
4194				95% Approximate Gamma UCL	28646			95% Adjusted Gamma UCL	28948			
4195												
4196	**Lognormal GOF Test**											
4197				Shapiro Wilk Test Statistic	0.872			**Shapiro Wilk Lognormal GOF Test**				
4198				10% Shapiro Wilk Critical Value	0.92			Data Not Lognormal at 10% Significance Level				

4199					Lilliefors Test Statistic	0.22			**Lilliefors Lognormal GOF Test**			
4200					10% Lilliefors Critical Value	0.176			Data Not Lognormal at 10% Significance Level			
4201					**Data Not Lognormal at 10% Significance Level**							
4202												
4203					**Lognormal Statistics**							
4204					Minimum of Logged Data	9.616			Mean of logged Data	10.08		
4205					Maximum of Logged Data	10.52			SD of logged Data	0.337		
4206												
4207					**Assuming Lognormal Distribution**							
4208					95% H-UCL	29156			90% Chebyshev (MVUE) UCL	30922		
4209					95% Chebyshev (MVUE) UCL	33539			97.5% Chebyshev (MVUE) UCL	37171		
4210					99% Chebyshev (MVUE) UCL	44307						
4211												
4212					**Nonparametric Distribution Free UCL Statistics**							
4213					**Data appear to follow a Discernible Distribution**							
4214												
4215					**Nonparametric Distribution Free UCLs**							
4216					95% CLT UCL	28045			95% BCA Bootstrap UCL	27900		
4217					95% Standard Bootstrap UCL	27929			95% Bootstrap-t UCL	28133		
4218					95% Hall's Bootstrap UCL	27905			95% Percentile Bootstrap UCL	27900		
4219					90% Chebyshev(Mean, Sd) UCL	30471			95% Chebyshev(Mean, Sd) UCL	32903		
4220					97.5% Chebyshev(Mean, Sd) UCL	36280			99% Chebyshev(Mean, Sd) UCL	42912		
4221												
4222					**Suggested UCL to Use**							
4223					95% Student's-t UCL	28195						
4224												
4225					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
4226					Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.							
4227					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
4228												
4229	**Result (dump-sw-thallium)**											
4230												
4231					**General Statistics**							
4232					Total Number of Observations	20			Number of Distinct Observations	2		
4233					Number of Detects	1			Number of Non-Detects	19		
4234					Number of Distinct Detects	1			Number of Distinct Non-Detects	1		
4235												
4236					**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**							
4237					**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**							
4238												
4239					**The data set for variable Result (dump-sw-thallium) was not processed!**							
4240												
4241												
4242	**Result (dump-sw-vanadium)**											
4243												
4244					**General Statistics**							
4245					Total Number of Observations	20			Number of Distinct Observations	1		
4246					Number of Detects	0			Number of Non-Detects	20		
4247					Number of Distinct Detects	0			Number of Distinct Non-Detects	1		
4248												
4249					**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**							
4250					**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**							
4251					**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**							
4252												
4253					**The data set for variable Result (dump-sw-vanadium) was not processed!**							
4254												
4255												
4256												
4257	**Result (dump-sw-water hardness)**											
4258												
4259					**General Statistics**							
4260					Total Number of Observations	20			Number of Distinct Observations	11		
4261									Number of Missing Observations	0		
4262					Minimum	53			Mean	67.45		
4263					Maximum	75			Median	67.5		
4264					SD	5			Std. Error of Mean	1.118		
4265					Coefficient of Variation	0.0741			Skewness	-1.369		
4266												
4267					**Normal GOF Test**							
4268					Shapiro Wilk Test Statistic	0.893			**Shapiro Wilk GOF Test**			
4269					1% Shapiro Wilk Critical Value	0.868			Data appear Normal at 1% Significance Level			
4270					Lilliefors Test Statistic	0.186			**Lilliefors GOF Test**			
4271					1% Lilliefors Critical Value	0.223			Data appear Normal at 1% Significance Level			
4272					**Data appear Normal at 1% Significance Level**							
4273												
4274					**Assuming Normal Distribution**							
4275					**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**			
4276					95% Student's-t UCL	69.38			95% Adjusted-CLT UCL (Chen-1995)	68.92		
4277									95% Modified-t UCL (Johnson-1978)	69.33		
4278												
4279					**Gamma GOF Test**							
4280					A-D Test Statistic	0.87			**Anderson-Darling Gamma GOF Test**			
4281					5% A-D Critical Value	0.74			Data Not Gamma Distributed at 5% Significance Level			

4282				K-S Test Statistic	0.196	**Kolmogorov-Smirnov Gamma GOF Test**						
4283				5% K-S Critical Value	0.193	Data Not Gamma Distributed at 5% Significance Level						
4284	**Data Not Gamma Distributed at 5% Significance Level**											
4285												
4286	**Gamma Statistics**											
4287				k hat (MLE)	178.3					k star (bias corrected MLE)	151.6	
4288				Theta hat (MLE)	0.378					Theta star (bias corrected MLE)	0.445	
4289				nu hat (MLE)	7131					nu star (bias corrected)	6063	
4290				MLE Mean (bias corrected)	67.45					MLE Sd (bias corrected)	5.479	
4291										Approximate Chi Square Value (0.05)	5883	
4292				Adjusted Level of Significance	0.038					Adjusted Chi Square Value	5869	
4293												
4294	**Assuming Gamma Distribution**											
4295				95% Approximate Gamma UCL	69.51					95% Adjusted Gamma UCL	69.68	
4296												
4297	**Lognormal GOF Test**											
4298				Shapiro Wilk Test Statistic	0.86	**Shapiro Wilk Lognormal GOF Test**						
4299				10% Shapiro Wilk Critical Value	0.92	Data Not Lognormal at 10% Significance Level						
4300				Lilliefors Test Statistic	0.205	**Lilliefors Lognormal GOF Test**						
4301				10% Lilliefors Critical Value	0.176	Data Not Lognormal at 10% Significance Level						
4302	**Data Not Lognormal at 10% Significance Level**											
4303												
4304	**Lognormal Statistics**											
4305				Minimum of Logged Data	3.97					Mean of logged Data	4.209	
4306				Maximum of Logged Data	4.317					SD of logged Data	0.0784	
4307												
4308	**Assuming Lognormal Distribution**											
4309				95% H-UCL	N/A					90% Chebyshev (MVUE) UCL	71.01	
4310				95% Chebyshev (MVUE) UCL	72.61					97.5% Chebyshev (MVUE) UCL	74.85	
4311				99% Chebyshev (MVUE) UCL	79.23							
4312												
4313	**Nonparametric Distribution Free UCL Statistics**											
4314	**Data appear to follow a Discernible Distribution**											
4315												
4316	**Nonparametric Distribution Free UCLs**											
4317				95% CLT UCL	69.29					95% BCA Bootstrap UCL	68.95	
4318				95% Standard Bootstrap UCL	69.27					95% Bootstrap-t UCL	69.11	
4319				95% Hall's Bootstrap UCL	69.03					95% Percentile Bootstrap UCL	69.2	
4320				90% Chebyshev(Mean, Sd) UCL	70.8					95% Chebyshev(Mean, Sd) UCL	72.32	
4321				97.5% Chebyshev(Mean, Sd) UCL	74.43					99% Chebyshev(Mean, Sd) UCL	78.57	
4322												
4323	**Suggested UCL to Use**											
4324				95% Student's-t UCL	69.38							
4325												
4326	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
4327	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
4328	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
4329												
4330	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
4331	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
4332												
4333	**Result (dump-sw-zinc)**											
4334												
4335	**General Statistics**											
4336				Total Number of Observations	20					Number of Distinct Observations	17	
4337				Number of Detects	19					Number of Non-Detects	1	
4338				Number of Distinct Detects	16					Number of Distinct Non-Detects	1	
4339				Minimum Detect	2					Minimum Non-Detect	8	
4340				Maximum Detect	44					Maximum Non-Detect	8	
4341				Variance Detects	171.8					Percent Non-Detects	5%	
4342				Mean Detects	11.87					SD Detects	13.11	
4343				Median Detects	5.7					CV Detects	1.104	
4344				Skewness Detects	1.622					Kurtosis Detects	1.246	
4345				Mean of Logged Detects	2.024					SD of Logged Detects	0.914	
4346												
4347	**Normal GOF Test on Detects Only**											
4348				Shapiro Wilk Test Statistic	0.694	**Shapiro Wilk GOF Test**						
4349				1% Shapiro Wilk Critical Value	0.863	Detected Data Not Normal at 1% Significance Level						
4350				Lilliefors Test Statistic	0.323	**Lilliefors GOF Test**						
4351				1% Lilliefors Critical Value	0.229	Detected Data Not Normal at 1% Significance Level						
4352	**Detected Data Not Normal at 1% Significance Level**											
4353												
4354	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
4355				KM Mean	11.52					KM Standard Error of Mean	2.881	
4356				90KM SD	12.54					95% KM (BCA) UCL	16.47	
4357				95% KM (t) UCL	16.5					95% KM (Percentile Bootstrap) UCL	16.47	
4358				95% KM (z) UCL	16.26					95% KM Bootstrap t UCL	19.19	
4359				90% KM Chebyshev UCL	20.16					95% KM Chebyshev UCL	24.08	
4360				97.5% KM Chebyshev UCL	29.51					99% KM Chebyshev UCL	40.19	
4361												
4362	**Gamma GOF Tests on Detected Observations Only**											
4363				A-D Test Statistic	1.48	**Anderson-Darling GOF Test**						
4364				5% A-D Critical Value	0.763	Detected Data Not Gamma Distributed at 5% Significance Level						

4365				K-S Test Statistic	0.265	**Kolmogorov-Smirnov GOF**						
4366				5% K-S Critical Value	0.203	Detected Data Not Gamma Distributed at 5% Significance Level						
4367	**Detected Data Not Gamma Distributed at 5% Significance Level**											
4368												
4369	**Gamma Statistics on Detected Data Only**											
4370				k hat (MLE)	1.251				k star (bias corrected MLE)	1.088		
4371				Theta hat (MLE)	9.493				Theta star (bias corrected MLE)	10.91		
4372				nu hat (MLE)	47.53				nu star (bias corrected)	41.36		
4373				Mean (detects)	11.87							
4374												
4375	**Gamma ROS Statistics using Imputed Non-Detects**											
4376	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
4377	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
4378	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
4379	This is especially true when the sample size is small.											
4380	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
4381				Minimum	2				Mean	11.5		
4382				Maximum	44				Median	5.6		
4383				SD	12.87				CV	1.119		
4384				k hat (MLE)	1.262				k star (bias corrected MLE)	1.106		
4385				Theta hat (MLE)	9.112				Theta star (bias corrected MLE)	10.4		
4386				nu hat (MLE)	50.47				nu star (bias corrected)	44.23		
4387				Adjusted Level of Significance (β)	0.038							
4388				Approximate Chi Square Value (44.23, α)	29.98				Adjusted Chi Square Value (44.23, β)	29.05		
4389				95% Gamma Approximate UCL	16.96				95% Gamma Adjusted UCL	17.5		
4390												
4391	**Estimates of Gamma Parameters using KM Estimates**											
4392				Mean (KM)	11.52				SD (KM)	12.54		
4393				Variance (KM)	157.2				SE of Mean (KM)	2.881		
4394				k hat (KM)	0.844				k star (KM)	0.751		
4395				nu hat (KM)	33.76				nu star (KM)	30.03		
4396				theta hat (KM)	13.65				theta star (KM)	15.34		
4397				80% gamma percentile (KM)	18.88				90% gamma percentile (KM)	28.44		
4398				95% gamma percentile (KM)	38.23				99% gamma percentile (KM)	61.46		
4399												
4400	**Gamma Kaplan-Meier (KM) Statistics**											
4401				Approximate Chi Square Value (30.03, α)	18.51				Adjusted Chi Square Value (30.03, β)	17.8		
4402				95% KM Approximate Gamma UCL	18.68				95% KM Adjusted Gamma UCL	19.43		
4403												
4404	**Lognormal GOF Test on Detected Observations Only**											
4405				Shapiro Wilk Test Statistic	0.892	**Shapiro Wilk GOF Test**						
4406				10% Shapiro Wilk Critical Value	0.917	Detected Data Not Lognormal at 10% Significance Level						
4407				Lilliefors Test Statistic	0.206	**Lilliefors GOF Test**						
4408				10% Lilliefors Critical Value	0.18	Detected Data Not Lognormal at 10% Significance Level						
4409	**Detected Data Not Lognormal at 10% Significance Level**											
4410												
4411	**Lognormal ROS Statistics Using Imputed Non-Detects**											
4412				Mean in Original Scale	11.54				Mean in Log Scale	2.004		
4413				SD in Original Scale	12.85				SD in Log Scale	0.894		
4414				95% t UCL (assumes normality of ROS data)	16.5				95% Percentile Bootstrap UCL	16.41		
4415				95% BCA Bootstrap UCL	17.33				95% Bootstrap t UCL	18.6		
4416				95% H-UCL (Log ROS)	18.41							
4417												
4418	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
4419				KM Mean (logged)	1.998				KM Geo Mean	7.372		
4420				KM SD (logged)	0.878				95% Critical H Value (KM-Log)	2.462		
4421				KM Standard Error of Mean (logged)	0.203				95% H-UCL (KM -Log)	17.8		
4422				KM SD (logged)	0.878				95% Critical H Value (KM-Log)	2.462		
4423				KM Standard Error of Mean (logged)	0.203							
4424												
4425	**DL/2 Statistics**											
4426	**DL/2 Normal**								**DL/2 Log-Transformed**			
4427				Mean in Original Scale	11.48				Mean in Log Scale	1.992		
4428				SD in Original Scale	12.88				SD in Log Scale	0.901		
4429				95% t UCL (Assumes normality)	16.46				95% H-Stat UCL	18.42		
4430	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
4431												
4432	**Nonparametric Distribution Free UCL Statistics**											
4433	**Data do not follow a Discernible Distribution**											
4434												
4435	**Suggested UCL to Use**											
4436				95% KM (t) UCL	16.5							
4437												
4438	**The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.**											
4439	**Please verify the data were collected from random locations.**											
4440	**If the data were collected using judgmental or other non-random methods,**											
4441	**then contact a statistician to correctly calculate UCLs.**											
4442												
4443	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
4444	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
4445	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
4446												
4447	**Result (ihrs-sw-aluminum)**											

4448												
4449						**General Statistics**						
4450					Total Number of Observations	20			Number of Distinct Observations	5		
4451					Number of Detects	6			Number of Non-Detects	14		
4452					Number of Distinct Detects	4			Number of Distinct Non-Detects	1		
4453					Minimum Detect	19			Minimum Non-Detect	70		
4454					Maximum Detect	26			Maximum Non-Detect	70		
4455					Variance Detects	5.767			Percent Non-Detects	70%		
4456					Mean Detects	21.83			SD Detects	2.401		
4457					Median Detects	22			CV Detects	0.11		
4458					Skewness Detects	0.941			Kurtosis Detects	1.689		
4459					Mean of Logged Detects	3.079			SD of Logged Detects	0.107		
4460												
4461						**Normal GOF Test on Detects Only**							
4462					Shapiro Wilk Test Statistic	0.889			**Shapiro Wilk GOF Test**			
4463					1% Shapiro Wilk Critical Value	0.713			Detected Data appear Normal at 1% Significance Level			
4464					Lilliefors Test Statistic	0.306			**Lilliefors GOF Test**			
4465					1% Lilliefors Critical Value	0.373			Detected Data appear Normal at 1% Significance Level			
4466						**Detected Data appear Normal at 1% Significance Level**						
4467						**Note GOF tests may be unreliable for small sample sizes**						
4468												
4469						**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**						
4470					KM Mean	21.83			KM Standard Error of Mean	0.98		
4471					90KM SD	2.192			95% KM (BCA) UCL	N/A		
4472					95% KM (t) UCL	23.53			95% KM (Percentile Bootstrap) UCL	N/A		
4473					95% KM (z) UCL	23.45			95% KM Bootstrap t UCL	N/A		
4474					90% KM Chebyshev UCL	24.77			95% KM Chebyshev UCL	26.11		
4475					97.5% KM Chebyshev UCL	27.96			99% KM Chebyshev UCL	31.59		
4476												
4477						**Gamma GOF Tests on Detected Observations Only**							
4478					A-D Test Statistic	0.442			**Anderson-Darling GOF Test**			
4479					5% A-D Critical Value	0.696			Detected data appear Gamma Distributed at 5% Significance Level			
4480					K-S Test Statistic	0.29			**Kolmogorov-Smirnov GOF**			
4481					5% K-S Critical Value	0.332			Detected data appear Gamma Distributed at 5% Significance Level			
4482						**Detected data appear Gamma Distributed at 5% Significance Level**						
4483						**Note GOF tests may be unreliable for small sample sizes**						
4484												
4485						**Gamma Statistics on Detected Data Only**						
4486					k hat (MLE)	102.8			k star (bias corrected MLE)	51.51		
4487					Theta hat (MLE)	0.212			Theta star (bias corrected MLE)	0.424		
4488					nu hat (MLE)	1234			nu star (bias corrected)	618.1		
4489					Mean (detects)	21.83						
4490												
4491						**Gamma ROS Statistics using Imputed Non-Detects**							
4492						GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
4493						GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)							
4494						For such situations, GROS method may yield incorrect values of UCLs and BTVs							
4495						This is especially true when the sample size is small.							
4496						For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
4497					Minimum	17.66			Mean	21.85		
4498					Maximum	26.34			Median	22		
4499					SD	2.405			CV	0.11		
4500					k hat (MLE)	87.37			k star (bias corrected MLE)	74.3		
4501					Theta hat (MLE)	0.25			Theta star (bias corrected MLE)	0.294		
4502					nu hat (MLE)	3495			nu star (bias corrected)	2972		
4503					Adjusted Level of Significance (β)	0.038						
4504					Approximate Chi Square Value (N/A, α)	2846			Adjusted Chi Square Value (N/A, β)	2837		
4505					95% Gamma Approximate UCL	22.81			95% Gamma Adjusted UCL	22.89		
4506												
4507						**Estimates of Gamma Parameters using KM Estimates**							
4508					Mean (KM)	21.83			SD (KM)	2.192		
4509					Variance (KM)	4.806			SE of Mean (KM)	0.98		
4510					k hat (KM)	99.2			k star (KM)	84.35		
4511					nu hat (KM)	3968			nu star (KM)	3374		
4512					theta hat (KM)	0.22			theta star (KM)	0.259		
4513					80% gamma percentile (KM)	23.8			90% gamma percentile (KM)	24.93		
4514					95% gamma percentile (KM)	25.89			99% gamma percentile (KM)	27.74		
4515												
4516						**Gamma Kaplan-Meier (KM) Statistics**							
4517					Approximate Chi Square Value (N/A, α)	3240			Adjusted Chi Square Value (N/A, β)	3230		
4518					95% KM Approximate Gamma UCL	22.74			95% KM Adjusted Gamma UCL	22.81		
4519												
4520						**Lognormal GOF Test on Detected Observations Only**							
4521					Shapiro Wilk Test Statistic	0.907			**Shapiro Wilk GOF Test**			
4522					10% Shapiro Wilk Critical Value	0.826			Detected Data appear Lognormal at 10% Significance Level			
4523					Lilliefors Test Statistic	0.287			**Lilliefors GOF Test**			
4524					10% Lilliefors Critical Value	0.298			Detected Data appear Lognormal at 10% Significance Level			
4525						**Detected Data appear Lognormal at 10% Significance Level**						
4526						**Note GOF tests may be unreliable for small sample sizes**						
4527												
4528						**Lognormal ROS Statistics Using Imputed Non-Detects**							
4529					Mean in Original Scale	21.85			Mean in Log Scale	3.079		
4530					SD in Original Scale	2.376			SD in Log Scale	0.108		

4531				95% t UCL (assumes normality of ROS data)		22.77				95% Percentile Bootstrap UCL		22.71
4532				95% BCA Bootstrap UCL		22.68				95% Bootstrap t UCL		22.83
4533				95% H-UCL (Log ROS)		22.82						
4534												
4535						**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**							
4536				KM Mean (logged)		3.079				KM Geo Mean		21.73
4537				KM SD (logged)		0.0979				95% Critical H Value (KM-Log)		N/A
4538				KM Standard Error of Mean (logged)		0.0438				95% H-UCL (KM -Log)		N/A
4539				KM SD (logged)		0.0979				95% Critical H Value (KM-Log)		N/A
4540				KM Standard Error of Mean (logged)		0.0438						
4541												
4542						**DL/2 Statistics**						
4543				**DL/2 Normal**						**DL/2 Log-Transformed**		
4544				Mean in Original Scale		31.05				Mean in Log Scale		3.412
4545				SD in Original Scale		6.312				SD in Log Scale		0.231
4546				95% t UCL (Assumes normality)		33.49				95% H-Stat UCL		34.28
4547				**DL/2 is not a recommended method, provided for comparisons and historical reasons**								
4548												
4549						**Nonparametric Distribution Free UCL Statistics**							
4550						**Detected Data appear Normal Distributed at 1% Significance Level**							
4551												
4552						**Suggested UCL to Use**						
4553				95% KM (t) UCL		23.53						
4554												
4555						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
4556						Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.						
4557						However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.						
4558												
4559	**Result (ihrs-sw-antimony)**											
4560												
4561						**General Statistics**						
4562				Total Number of Observations		20				Number of Distinct Observations		5
4563				Number of Detects		5				Number of Non-Detects		15
4564				Number of Distinct Detects		4				Number of Distinct Non-Detects		1
4565				Minimum Detect		0.48				Minimum Non-Detect		1
4566				Maximum Detect		0.95				Maximum Non-Detect		1
4567				Variance Detects		0.0386				Percent Non-Detects		75%
4568				Mean Detects		0.622				SD Detects		0.196
4569				Median Detects		0.51				CV Detects		0.316
4570				Skewness Detects		1.632				Kurtosis Detects		2.333
4571				Mean of Logged Detects		-0.509				SD of Logged Detects		0.284
4572												
4573						**Normal GOF Test on Detects Only**							
4574				Shapiro Wilk Test Statistic		0.787				**Shapiro Wilk GOF Test**		
4575				1% Shapiro Wilk Critical Value		0.686				Detected Data appear Normal at 1% Significance Level		
4576				Lilliefors Test Statistic		0.316				**Lilliefors GOF Test**		
4577				1% Lilliefors Critical Value		0.396				Detected Data appear Normal at 1% Significance Level		
4578						**Detected Data appear Normal at 1% Significance Level**							
4579						**Note GOF tests may be unreliable for small sample sizes**							
4580												
4581						**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**							
4582				KM Mean		0.622				KM Standard Error of Mean		0.0878
4583				90KM SD		0.176				95% KM (BCA) UCL		N/A
4584				95% KM (t) UCL		0.774				95% KM (Percentile Bootstrap) UCL		N/A
4585				95% KM (z) UCL		0.766				95% KM Bootstrap t UCL		N/A
4586				90% KM Chebyshev UCL		0.885				95% KM Chebyshev UCL		1.005
4587				97.5% KM Chebyshev UCL		1.17				99% KM Chebyshev UCL		1.496
4588												
4589						**Gamma GOF Tests on Detected Observations Only**							
4590				A-D Test Statistic		0.583				**Anderson-Darling GOF Test**		
4591				5% A-D Critical Value		0.679				Detected data appear Gamma Distributed at 5% Significance Level		
4592				K-S Test Statistic		0.341				**Kolmogorov-Smirnov GOF**		
4593				5% K-S Critical Value		0.357				Detected data appear Gamma Distributed at 5% Significance Level		
4594						**Detected data appear Gamma Distributed at 5% Significance Level**						
4595						**Note GOF tests may be unreliable for small sample sizes**						
4596												
4597						**Gamma Statistics on Detected Data Only**							
4598				k hat (MLE)		14.58				k star (bias corrected MLE)		5.967
4599				Theta hat (MLE)		0.0427				Theta star (bias corrected MLE)		0.104
4600				nu hat (MLE)		145.8				nu star (bias corrected)		59.67
4601				Mean (detects)		0.622						
4602												
4603						**Gamma ROS Statistics using Imputed Non-Detects**							
4604						GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
4605						GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)							
4606						For such situations, GROS method may yield incorrect values of UCLs and BTVs							
4607						This is especially true when the sample size is small.							
4608						For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
4609				Minimum		0.297				Mean		0.626
4610				Maximum		1.027				Median		0.594
4611				SD		0.199				CV		0.318
4612				k hat (MLE)		10.33				k star (bias corrected MLE)		8.816
4613				Theta hat (MLE)		0.0606				Theta star (bias corrected MLE)		0.071

4614					nu hat (MLE)	413.3				nu star (bias corrected)		352.6
4615					Adjusted Level of Significance (β)	0.038						
4616					Approximate Chi Square Value (352.63, α)	310.1				Adjusted Chi Square Value (352.63, β)		307
4617					95% Gamma Approximate UCL	0.712				95% Gamma Adjusted UCL		0.719
4618												
4619					**Estimates of Gamma Parameters using KM Estimates**							
4620					Mean (KM)	0.622				SD (KM)		0.176
4621					Variance (KM)	0.0309				SE of Mean (KM)		0.0878
4622					k hat (KM)	12.54				k star (KM)		10.69
4623					nu hat (KM)	501.5				nu star (KM)		427.6
4624					theta hat (KM)	0.0496				theta star (KM)		0.0582
4625					80% gamma percentile (KM)	0.774				90% gamma percentile (KM)		0.875
4626					95% gamma percentile (KM)	0.964				99% gamma percentile (KM)		1.148
4627												
4628					**Gamma Kaplan-Meier (KM) Statistics**							
4629					Approximate Chi Square Value (427.64, α)	380.7				Adjusted Chi Square Value (427.64, β)		377.2
4630					95% KM Approximate Gamma UCL	0.699				95% KM Adjusted Gamma UCL		0.705
4631												
4632					**Lognormal GOF Test on Detected Observations Only**							
4633					Shapiro Wilk Test Statistic	0.824				**Shapiro Wilk GOF Test**		
4634					10% Shapiro Wilk Critical Value	0.806				Detected Data appear Lognormal at 10% Significance Level		
4635					Lilliefors Test Statistic	0.318				**Lilliefors GOF Test**		
4636					10% Lilliefors Critical Value	0.319				Detected Data appear Lognormal at 10% Significance Level		
4637					**Detected Data appear Lognormal at 10% Significance Level**							
4638					**Note GOF tests may be unreliable for small sample sizes**							
4639												
4640					**Lognormal ROS Statistics Using Imputed Non-Detects**							
4641					Mean in Original Scale	0.625				Mean in Log Scale		-0.509
4642					SD in Original Scale	0.184				SD in Log Scale		0.288
4643					95% t UCL (assumes normality of ROS data)	0.696				95% Percentile Bootstrap UCL		0.694
4644					95% BCA Bootstrap UCL	0.696				95% Bootstrap t UCL		0.702
4645					95% H-UCL (Log ROS)	0.707						
4646												
4647					**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**							
4648					KM Mean (logged)	-0.509				KM Geo Mean		0.601
4649					KM SD (logged)	0.254				95% Critical H Value (KM-Log)		1.82
4650					KM Standard Error of Mean (logged)	0.127				95% H-UCL (KM -Log)		0.69
4651					KM SD (logged)	0.254				95% Critical H Value (KM-Log)		1.82
4652					KM Standard Error of Mean (logged)	0.127						
4653												
4654					**DL/2 Statistics**							
4655					**DL/2 Normal**					**DL/2 Log-Transformed**		
4656					Mean in Original Scale	0.531				Mean in Log Scale		-0.647
4657					SD in Original Scale	0.105				SD in Log Scale		0.154
4658					95% t UCL (Assumes normality)	0.571				95% H-Stat UCL		0.564
4659					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
4660												
4661					**Nonparametric Distribution Free UCL Statistics**							
4662					**Detected Data appear Normal Distributed at 1% Significance Level**							
4663												
4664					**Suggested UCL to Use**							
4665					95% KM (t) UCL	0.774						
4666												
4667					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
4668					Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.							
4669					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
4670												
4671												
4672	**Result (ihrs-sw-arsenic)**											
4673												
4674					**General Statistics**							
4675					Total Number of Observations	20				Number of Distinct Observations		14
4676										Number of Missing Observations		0
4677					Minimum	0.4				Mean		0.491
4678					Maximum	0.64				Median		0.48
4679					SD	0.065				Std. Error of Mean		0.0145
4680					Coefficient of Variation	0.132				Skewness		0.75
4681												
4682					**Normal GOF Test**							
4683					Shapiro Wilk Test Statistic	0.935				**Shapiro Wilk GOF Test**		
4684					1% Shapiro Wilk Critical Value	0.868				Data appear Normal at 1% Significance Level		
4685					Lilliefors Test Statistic	0.136				**Lilliefors GOF Test**		
4686					1% Lilliefors Critical Value	0.223				Data appear Normal at 1% Significance Level		
4687					**Data appear Normal at 1% Significance Level**							
4688												
4689					**Assuming Normal Distribution**							
4690					**95% Normal UCL**					**95% UCLs (Adjusted for Skewness)**		
4691					95% Student's-t UCL	0.516				95% Adjusted-CLT UCL (Chen-1995)		0.518
4692										95% Modified-t UCL (Johnson-1978)		0.517
4693												
4694					**Gamma GOF Test**							
4695					A-D Test Statistic	0.414				**Anderson-Darling Gamma GOF Test**		
4696					5% A-D Critical Value	0.74				Detected data appear Gamma Distributed at 5% Significance Level		

4697				K-S Test Statistic	0.138	**Kolmogorov-Smirnov Gamma GOF Test**						
4698				5% K-S Critical Value	0.193	Detected data appear Gamma Distributed at 5% Significance Level						
4699	**Detected data appear Gamma Distributed at 5% Significance Level**											
4700												
4701	**Gamma Statistics**											
4702				k hat (MLE)	62.64					k star (bias corrected MLE)	53.27	
4703				Theta hat (MLE)	0.00784					Theta star (bias corrected MLE)	0.00922	
4704				nu hat (MLE)	2505					nu star (bias corrected)	2131	
4705				MLE Mean (bias corrected)	0.491					MLE Sd (bias corrected)	0.0673	
4706										Approximate Chi Square Value (0.05)	2025	
4707				Adjusted Level of Significance	0.038					Adjusted Chi Square Value	2017	
4708												
4709	**Assuming Gamma Distribution**											
4710				95% Approximate Gamma UCL	0.517					95% Adjusted Gamma UCL	0.519	
4711												
4712	**Lognormal GOF Test**											
4713				Shapiro Wilk Test Statistic	0.953	**Shapiro Wilk Lognormal GOF Test**						
4714				10% Shapiro Wilk Critical Value	0.92	Data appear Lognormal at 10% Significance Level						
4715				Lilliefors Test Statistic	0.131	**Lilliefors Lognormal GOF Test**						
4716				10% Lilliefors Critical Value	0.176	Data appear Lognormal at 10% Significance Level						
4717	**Data appear Lognormal at 10% Significance Level**											
4718												
4719	**Lognormal Statistics**											
4720				Minimum of Logged Data	-0.916					Mean of logged Data	-0.719	
4721				Maximum of Logged Data	-0.446					SD of logged Data	0.129	
4722												
4723	**Assuming Lognormal Distribution**											
4724				95% H-UCL	0.517					90% Chebyshev (MVUE) UCL	0.533	
4725				95% Chebyshev (MVUE) UCL	0.553					97.5% Chebyshev (MVUE) UCL	0.579	
4726				99% Chebyshev (MVUE) UCL	0.632							
4727												
4728	**Nonparametric Distribution Free UCL Statistics**											
4729	**Data appear to follow a Discernible Distribution**											
4730												
4731	**Nonparametric Distribution Free UCLs**											
4732				95% CLT UCL	0.515					95% BCA Bootstrap UCL	0.516	
4733				95% Standard Bootstrap UCL	0.514					95% Bootstrap-t UCL	0.517	
4734				95% Hall's Bootstrap UCL	0.517					95% Percentile Bootstrap UCL	0.516	
4735				90% Chebyshev(Mean, Sd) UCL	0.535					95% Chebyshev(Mean, Sd) UCL	0.554	
4736				97.5% Chebyshev(Mean, Sd) UCL	0.582					99% Chebyshev(Mean, Sd) UCL	0.636	
4737												
4738	**Suggested UCL to Use**											
4739				95% Student's-t UCL	0.516							
4740												
4741	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
4742	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
4743	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
4744												
4745												
4746	**Result (ihrs-sw-barium)**											
4747												
4748	**General Statistics**											
4749				Total Number of Observations	20					Number of Distinct Observations	8	
4750										Number of Missing Observations	0	
4751				Minimum	13					Mean	16.35	
4752				Maximum	23					Median	15.5	
4753				SD	2.834					Std. Error of Mean	0.634	
4754				Coefficient of Variation	0.173					Skewness	0.838	
4755												
4756	**Normal GOF Test**											
4757				Shapiro Wilk Test Statistic	0.863	**Shapiro Wilk GOF Test**						
4758				1% Shapiro Wilk Critical Value	0.868	Data Not Normal at 1% Significance Level						
4759				Lilliefors Test Statistic	0.247	**Lilliefors GOF Test**						
4760				1% Lilliefors Critical Value	0.223	Data Not Normal at 1% Significance Level						
4761	**Data Not Normal at 1% Significance Level**											
4762												
4763	**Assuming Normal Distribution**											
4764	**95% Normal UCL**									**95% UCLs (Adjusted for Skewness)**		
4765				95% Student's-t UCL	17.45					95% Adjusted-CLT UCL (Chen-1995)	17.52	
4766										95% Modified-t UCL (Johnson-1978)	17.47	
4767												
4768	**Gamma GOF Test**											
4769				A-D Test Statistic	1.164	**Anderson-Darling Gamma GOF Test**						
4770				5% A-D Critical Value	0.74	Data Not Gamma Distributed at 5% Significance Level						
4771				K-S Test Statistic	0.258	**Kolmogorov-Smirnov Gamma GOF Test**						
4772				5% K-S Critical Value	0.193	Data Not Gamma Distributed at 5% Significance Level						
4773	**Data Not Gamma Distributed at 5% Significance Level**											
4774												
4775	**Gamma Statistics**											
4776				k hat (MLE)	37.33					k star (bias corrected MLE)	31.76	
4777				Theta hat (MLE)	0.438					Theta star (bias corrected MLE)	0.515	
4778				nu hat (MLE)	1493					nu star (bias corrected)	1270	
4779				MLE Mean (bias corrected)	16.35					MLE Sd (bias corrected)	2.901	

4780											Approximate Chi Square Value (0.05)	1189
4781					Adjusted Level of Significance	0.038					Adjusted Chi Square Value	1182
4782												
4783						**Assuming Gamma Distribution**						
4784					95% Approximate Gamma UCL	17.47					95% Adjusted Gamma UCL	17.57
4785												
4786						**Lognormal GOF Test**						
4787					Shapiro Wilk Test Statistic	0.876	**Shapiro Wilk Lognormal GOF Test**					
4788					10% Shapiro Wilk Critical Value	0.92	Data Not Lognormal at 10% Significance Level					
4789					Lilliefors Test Statistic	0.253	**Lilliefors Lognormal GOF Test**					
4790					10% Lilliefors Critical Value	0.176	Data Not Lognormal at 10% Significance Level					
4791						**Data Not Lognormal at 10% Significance Level**						
4792												
4793						**Lognormal Statistics**						
4794					Minimum of Logged Data	2.565					Mean of logged Data	2.781
4795					Maximum of Logged Data	3.135					SD of logged Data	0.166
4796												
4797						**Assuming Lognormal Distribution**						
4798					95% H-UCL	17.49					90% Chebyshev (MVUE) UCL	18.17
4799					95% Chebyshev (MVUE) UCL	19					97.5% Chebyshev (MVUE) UCL	20.15
4800					99% Chebyshev (MVUE) UCL	22.41						
4801												
4802						**Nonparametric Distribution Free UCL Statistics**						
4803						**Data do not follow a Discernible Distribution**						
4804												
4805						**Nonparametric Distribution Free UCLs**						
4806					95% CLT UCL	17.39					95% BCA Bootstrap UCL	17.4
4807					95% Standard Bootstrap UCL	17.38					95% Bootstrap-t UCL	17.59
4808					95% Hall's Bootstrap UCL	17.49					95% Percentile Bootstrap UCL	17.4
4809					90% Chebyshev(Mean, Sd) UCL	18.25					95% Chebyshev(Mean, Sd) UCL	19.11
4810					97.5% Chebyshev(Mean, Sd) UCL	20.31					99% Chebyshev(Mean, Sd) UCL	22.65
4811												
4812						**Suggested UCL to Use**						
4813					95% Student's-t UCL	17.45						
4814												
4815						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
4816						Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.						
4817						However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.						
4818												
4819	**Result (ihrs-sw-beryllium)**											
4820												
4821						**General Statistics**						
4822					Total Number of Observations	20					Number of Distinct Observations	1
4823					Number of Detects	0					Number of Non-Detects	20
4824					Number of Distinct Detects	0					Number of Distinct Non-Detects	1
4825												
4826						**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**						
4827						**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**						
4828						**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**						
4829												
4830						**The data set for variable Result (ihrs-sw-beryllium) was not processed!**						
4831												
4832												
4833	**Result (ihrs-sw-cadmium)**											
4834												
4835						**General Statistics**						
4836					Total Number of Observations	20					Number of Distinct Observations	1
4837					Number of Detects	0					Number of Non-Detects	20
4838					Number of Distinct Detects	0					Number of Distinct Non-Detects	1
4839												
4840						**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**						
4841						**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**						
4842						**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**						
4843												
4844						**The data set for variable Result (ihrs-sw-cadmium) was not processed!**						
4845												
4846												
4847												
4848	**Result (ihrs-sw-calcium)**											
4849												
4850						**General Statistics**						
4851					Total Number of Observations	20					Number of Distinct Observations	3
4852											Number of Missing Observations	0
4853					Minimum	14000					Mean	22250
4854					Maximum	23000					Median	23000
4855					SD	1997					Std. Error of Mean	446.5
4856					Coefficient of Variation	0.0897					Skewness	-4.085
4857												
4858						**Normal GOF Test**						
4859					Shapiro Wilk Test Statistic	0.392	**Shapiro Wilk GOF Test**					
4860					1% Shapiro Wilk Critical Value	0.868	Data Not Normal at 1% Significance Level					
4861					Lilliefors Test Statistic	0.4	**Lilliefors GOF Test**					
4862					1% Lilliefors Critical Value	0.223	Data Not Normal at 1% Significance Level					

4863	**Data Not Normal at 1% Significance Level**											
4864												
4865	**Assuming Normal Distribution**											
4866	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
4867	95% Student's-t UCL				23022		95% Adjusted-CLT UCL (Chen-1995)				22549	
4868							95% Modified-t UCL (Johnson-1978)				22954	
4869												
4870	**Gamma GOF Test**											
4871	A-D Test Statistic				4.915		**Anderson-Darling Gamma GOF Test**					
4872	5% A-D Critical Value				0.74		Data Not Gamma Distributed at 5% Significance Level					
4873	K-S Test Statistic				0.418		**Kolmogorov-Smirnov Gamma GOF Test**					
4874	5% K-S Critical Value				0.193		Data Not Gamma Distributed at 5% Significance Level					
4875	**Data Not Gamma Distributed at 5% Significance Level**											
4876												
4877	**Gamma Statistics**											
4878	k hat (MLE)				100.1		k star (bias corrected MLE)				85.09	
4879	Theta hat (MLE)				222.4		Theta star (bias corrected MLE)				261.5	
4880	nu hat (MLE)				4003		nu star (bias corrected)				3403	
4881	MLE Mean (bias corrected)				22250		MLE Sd (bias corrected)				2412	
4882							Approximate Chi Square Value (0.05)				3269	
4883	Adjusted Level of Significance				0.038		Adjusted Chi Square Value				3259	
4884												
4885	**Assuming Gamma Distribution**											
4886	95% Approximate Gamma UCL				23166		95% Adjusted Gamma UCL				23240	
4887												
4888	**Lognormal GOF Test**											
4889	Shapiro Wilk Test Statistic				0.362		**Shapiro Wilk Lognormal GOF Test**					
4890	10% Shapiro Wilk Critical Value				0.92		Data Not Lognormal at 10% Significance Level					
4891	Lilliefors Test Statistic				0.427		**Lilliefors Lognormal GOF Test**					
4892	10% Lilliefors Critical Value				0.176		Data Not Lognormal at 10% Significance Level					
4893	**Data Not Lognormal at 10% Significance Level**											
4894												
4895	**Lognormal Statistics**											
4896	Minimum of Logged Data				9.547		Mean of logged Data				10.01	
4897	Maximum of Logged Data				10.04		SD of logged Data				0.11	
4898												
4899	**Assuming Lognormal Distribution**											
4900	95% H-UCL				23269		90% Chebyshev (MVUE) UCL				23910	
4901	95% Chebyshev (MVUE) UCL				24654		97.5% Chebyshev (MVUE) UCL				25687	
4902	99% Chebyshev (MVUE) UCL				27717							
4903												
4904	**Nonparametric Distribution Free UCL Statistics**											
4905	**Data do not follow a Discernible Distribution**											
4906												
4907	**Nonparametric Distribution Free UCLs**											
4908	95% CLT UCL				22984		95% BCA Bootstrap UCL				N/A	
4909	95% Standard Bootstrap UCL				N/A		95% Bootstrap-t UCL				N/A	
4910	95% Hall's Bootstrap UCL				N/A		95% Percentile Bootstrap UCL				N/A	
4911	90% Chebyshev(Mean, Sd) UCL				23589		95% Chebyshev(Mean, Sd) UCL				24196	
4912	97.5% Chebyshev(Mean, Sd) UCL				25038		99% Chebyshev(Mean, Sd) UCL				26692	
4913												
4914	**Suggested UCL to Use**											
4915	95% Student's-t UCL				23022							
4916	**Recommended UCL exceeds the maximum observation**											
4917												
4918	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
4919	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
4920	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
4921												
4922	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
4923	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
4924												
4925	**Result (ihrs-sw-chromium)**											
4926												
4927	**General Statistics**											
4928	Total Number of Observations				20		Number of Distinct Observations				2	
4929	Number of Detects				1		Number of Non-Detects				19	
4930	Number of Distinct Detects				1		Number of Distinct Non-Detects				1	
4931												
4932	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
4933	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**											
4934												
4935	**The data set for variable Result (ihrs-sw-chromium) was not processed!**											
4936												
4937												
4938	**Result (ihrs-sw-cobalt)**											
4939												
4940	**General Statistics**											
4941	Total Number of Observations				20		Number of Distinct Observations				1	
4942	Number of Detects				0		Number of Non-Detects				20	
4943	Number of Distinct Detects				0		Number of Distinct Non-Detects				1	
4944												
4945	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											

4946	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
4947	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
4948												
4949	The data set for variable Result (ihrs-sw-cobalt) was not processed!											
4950												
4951												
4952												
4953	Result (ihrs-sw-copper)											
4954												
4955	General Statistics											
4956				Total Number of Observations	20				Number of Distinct Observations	17		
4957									Number of Missing Observations	0		
4958				Minimum	2.7				Mean	5.93		
4959				Maximum	11				Median	5.1		
4960				SD	2.753				Std. Error of Mean	0.616		
4961				Coefficient of Variation	0.464				Skewness	0.377		
4962												
4963	Normal GOF Test											
4964				Shapiro Wilk Test Statistic	0.881				Shapiro Wilk GOF Test			
4965				1% Shapiro Wilk Critical Value	0.868				Data appear Normal at 1% Significance Level			
4966				Lilliefors Test Statistic	0.191				Lilliefors GOF Test			
4967				1% Lilliefors Critical Value	0.223				Data appear Normal at 1% Significance Level			
4968	Data appear Normal at 1% Significance Level											
4969												
4970	Assuming Normal Distribution											
4971				95% Normal UCL					95% UCLs (Adjusted for Skewness)			
4972				95% Student's-t UCL	6.995				95% Adjusted-CLT UCL (Chen-1995)	6.998		
4973									95% Modified-t UCL (Johnson-1978)	7.003		
4974												
4975	Gamma GOF Test											
4976				A-D Test Statistic	0.954				Anderson-Darling Gamma GOF Test			
4977				5% A-D Critical Value	0.745				Data Not Gamma Distributed at 5% Significance Level			
4978				K-S Test Statistic	0.2				Kolmogorov-Smirnov Gamma GOF Test			
4979				5% K-S Critical Value	0.194				Data Not Gamma Distributed at 5% Significance Level			
4980	Data Not Gamma Distributed at 5% Significance Level											
4981												
4982	Gamma Statistics											
4983				k hat (MLE)	4.826				k star (bias corrected MLE)	4.136		
4984				Theta hat (MLE)	1.229				Theta star (bias corrected MLE)	1.434		
4985				nu hat (MLE)	193.1				nu star (bias corrected)	165.4		
4986				MLE Mean (bias corrected)	5.93				MLE Sd (bias corrected)	2.916		
4987									Approximate Chi Square Value (0.05)	136.7		
4988				Adjusted Level of Significance	0.038				Adjusted Chi Square Value	134.6		
4989												
4990	Assuming Gamma Distribution											
4991				95% Approximate Gamma UCL	7.177				95% Adjusted Gamma UCL	7.287		
4992												
4993	Lognormal GOF Test											
4994				Shapiro Wilk Test Statistic	0.892				Shapiro Wilk Lognormal GOF Test			
4995				10% Shapiro Wilk Critical Value	0.92				Data Not Lognormal at 10% Significance Level			
4996				Lilliefors Test Statistic	0.202				Lilliefors Lognormal GOF Test			
4997				10% Lilliefors Critical Value	0.176				Data Not Lognormal at 10% Significance Level			
4998	Data Not Lognormal at 10% Significance Level											
4999												
5000	Lognormal Statistics											
5001				Minimum of Logged Data	0.993				Mean of logged Data	1.673		
5002				Maximum of Logged Data	2.398				SD of logged Data	0.48		
5003												
5004	Assuming Lognormal Distribution											
5005				95% H-UCL	7.45				90% Chebyshev (MVUE) UCL	7.917		
5006				95% Chebyshev (MVUE) UCL	8.812				97.5% Chebyshev (MVUE) UCL	10.06		
5007				99% Chebyshev (MVUE) UCL	12.5							
5008												
5009	Nonparametric Distribution Free UCL Statistics											
5010	Data appear to follow a Discernible Distribution											
5011												
5012	Nonparametric Distribution Free UCLs											
5013				95% CLT UCL	6.943				95% BCA Bootstrap UCL	6.925		
5014				95% Standard Bootstrap UCL	6.928				95% Bootstrap-t UCL	7.102		
5015				95% Hall's Bootstrap UCL	6.97				95% Percentile Bootstrap UCL	6.95		
5016				90% Chebyshev(Mean, Sd) UCL	7.777				95% Chebyshev(Mean, Sd) UCL	8.613		
5017				97.5% Chebyshev(Mean, Sd) UCL	9.775				99% Chebyshev(Mean, Sd) UCL	12.06		
5018												
5019	Suggested UCL to Use											
5020				95% Student's-t UCL	6.995							
5021												
5022	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
5023	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
5024	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
5025												
5026	Result (ihrs-sw-iron)											
5027												
5028	General Statistics											

5029				Total Number of Observations	20				Number of Distinct Observations			3
5030				Number of Detects	1				Number of Non-Detects			19
5031				Number of Distinct Detects	1				Number of Distinct Non-Detects			2
5032												
5033				**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**								
5034				**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**								
5035												
5036				**The data set for variable Result (ihrs-sw-iron) was not processed!**								
5037												
5038												
5039	**Result (ihrs-sw-lead)**											
5040												
5041				**General Statistics**								
5042				Total Number of Observations	20				Number of Distinct Observations			9
5043				Number of Detects	8				Number of Non-Detects			12
5044				Number of Distinct Detects	7				Number of Distinct Non-Detects			2
5045				Minimum Detect	0.2				Minimum Non-Detect			0.7
5046				Maximum Detect	0.46				Maximum Non-Detect			3
5047				Variance Detects	0.00637				Percent Non-Detects			60%
5048				Mean Detects	0.31				SD Detects			0.0798
5049				Median Detects	0.305				CV Detects			0.257
5050				Skewness Detects	0.706				Kurtosis Detects			0.933
5051				Mean of Logged Detects	-1.2				SD of Logged Detects			0.255
5052												
5053				**Normal GOF Test on Detects Only**								
5054				Shapiro Wilk Test Statistic	0.962				**Shapiro Wilk GOF Test**			
5055				1% Shapiro Wilk Critical Value	0.749				Detected Data appear Normal at 1% Significance Level			
5056				Lilliefors Test Statistic	0.2				**Lilliefors GOF Test**			
5057				1% Lilliefors Critical Value	0.333				Detected Data appear Normal at 1% Significance Level			
5058				**Detected Data appear Normal at 1% Significance Level**								
5059				**Note GOF tests may be unreliable for small sample sizes**								
5060												
5061				**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**								
5062				KM Mean	0.31				KM Standard Error of Mean			0.0282
5063				90KM SD	0.0747				95% KM (BCA) UCL			0.356
5064				95% KM (t) UCL	0.359				95% KM (Percentile Bootstrap) UCL			0.358
5065				95% KM (z) UCL	0.356				95% KM Bootstrap t UCL			0.38
5066				90% KM Chebyshev UCL	0.395				95% KM Chebyshev UCL			0.433
5067				97.5% KM Chebyshev UCL	0.486				99% KM Chebyshev UCL			0.591
5068				**Note: KM UCLs may be biased low with this dataset. Other substitution method recommended**								
5069												
5070				**Gamma GOF Tests on Detected Observations Only**								
5071				A-D Test Statistic	0.182				**Anderson-Darling GOF Test**			
5072				5% A-D Critical Value	0.716				Detected data appear Gamma Distributed at 5% Significance Level			
5073				K-S Test Statistic	0.165				**Kolmogorov-Smirnov GOF**			
5074				5% K-S Critical Value	0.294				Detected data appear Gamma Distributed at 5% Significance Level			
5075				**Detected data appear Gamma Distributed at 5% Significance Level**								
5076				**Note GOF tests may be unreliable for small sample sizes**								
5077												
5078				**Gamma Statistics on Detected Data Only**								
5079				k hat (MLE)	17.74				k star (bias corrected MLE)			11.17
5080				Theta hat (MLE)	0.0175				Theta star (bias corrected MLE)			0.0277
5081				nu hat (MLE)	283.9				nu star (bias corrected)			178.7
5082				Mean (detects)	0.31							
5083												
5084				**Gamma ROS Statistics using Imputed Non-Detects**								
5085				GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
5086				GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)								
5087				For such situations, GROS method may yield incorrect values of UCLs and BTVs								
5088				This is especially true when the sample size is small.								
5089				For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
5090				Minimum	0.187				Mean			0.31
5091				Maximum	0.46				Median			0.306
5092				SD	0.0764				CV			0.246
5093				k hat (MLE)	17.32				k star (bias corrected MLE)			14.76
5094				Theta hat (MLE)	0.0179				Theta star (bias corrected MLE)			0.021
5095				nu hat (MLE)	693				nu star (bias corrected)			590.3
5096				Adjusted Level of Significance (β)	0.038							
5097				Approximate Chi Square Value (590.35, α)	535				Adjusted Chi Square Value (590.35, β)			530.8
5098				95% Gamma Approximate UCL	0.342				95% Gamma Adjusted UCL			0.345
5099												
5100				**Estimates of Gamma Parameters using KM Estimates**								
5101				Mean (KM)	0.31				SD (KM)			0.0747
5102				Variance (KM)	0.00558				SE of Mean (KM)			0.0282
5103				k hat (KM)	17.24				k star (KM)			14.69
5104				nu hat (KM)	689.5				nu star (KM)			587.4
5105				theta hat (KM)	0.018				theta star (KM)			0.0211
5106				80% gamma percentile (KM)	0.375				90% gamma percentile (KM)			0.417
5107				95% gamma percentile (KM)	0.454				99% gamma percentile (KM)			0.528
5108												
5109				**Gamma Kaplan-Meier (KM) Statistics**								
5110				Approximate Chi Square Value (587.41, α)	532.2				Adjusted Chi Square Value (587.41, β)			528
5111				95% KM Approximate Gamma UCL	0.342				95% KM Adjusted Gamma UCL			0.345

5112	**Note: KM UCLs may be biased low with this dataset. Other substitution method recommended**											
5113												
5114	**Lognormal GOF Test on Detected Observations Only**											
5115					Shapiro Wilk Test Statistic	0.986	**Shapiro Wilk GOF Test**					
5116					10% Shapiro Wilk Critical Value	0.851	Detected Data appear Lognormal at 10% Significance Level					
5117					Lilliefors Test Statistic	0.157	**Lilliefors GOF Test**					
5118					10% Lilliefors Critical Value	0.265	Detected Data appear Lognormal at 10% Significance Level					
5119	**Detected Data appear Lognormal at 10% Significance Level**											
5120	**Note GOF tests may be unreliable for small sample sizes**											
5121												
5122	**Lognormal ROS Statistics Using Imputed Non-Detects**											
5123					Mean in Original Scale	0.31				Mean in Log Scale	-1.2	
5124					SD in Original Scale	0.0763				SD in Log Scale	0.245	
5125					95% t UCL (assumes normality of ROS data)	0.34				95% Percentile Bootstrap UCL	0.338	
5126					95% BCA Bootstrap UCL	0.338				95% Bootstrap t UCL	0.342	
5127					95% H-UCL (Log ROS)	0.344						
5128												
5129	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
5130					KM Mean (logged)	-1.2				KM Geo Mean	0.301	
5131					KM SD (logged)	0.238				95% Critical H Value (KM-Log)	1.81	
5132					KM Standard Error of Mean (logged)	0.0901				95% H-UCL (KM -Log)	0.342	
5133					KM SD (logged)	0.238				95% Critical H Value (KM-Log)	1.81	
5134					KM Standard Error of Mean (logged)	0.0901						
5135	**Note: KM UCLs may be biased low with this dataset. Other substitution method recommended**											
5136												
5137	**DL/2 Statistics**											
5138	**DL/2 Normal**									**DL/2 Log-Transformed**		
5139					Mean in Original Scale	0.392				Mean in Log Scale	-1.037	
5140					SD in Original Scale	0.266				SD in Log Scale	0.38	
5141					95% t UCL (Assumes normality)	0.494				95% H-Stat UCL	0.45	
5142	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
5143												
5144	**Nonparametric Distribution Free UCL Statistics**											
5145	**Detected Data appear Normal Distributed at 1% Significance Level**											
5146												
5147	**Suggested UCL to Use**											
5148					95% KM (t) UCL	0.359						
5149												
5150	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
5151	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
5152	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
5153												
5154												
5155	**Result (ihrs-sw-magnesium)**											
5156												
5157	**General Statistics**											
5158					Total Number of Observations	20				Number of Distinct Observations	13	
5159										Number of Missing Observations	0	
5160					Minimum	3700				Mean	4450	
5161					Maximum	5900				Median	4100	
5162					SD	740.9				Std. Error of Mean	165.7	
5163					Coefficient of Variation	0.166				Skewness	0.842	
5164												
5165	**Normal GOF Test**											
5166					Shapiro Wilk Test Statistic	0.849	**Shapiro Wilk GOF Test**					
5167					1% Shapiro Wilk Critical Value	0.868	Data Not Normal at 1% Significance Level					
5168					Lilliefors Test Statistic	0.228	**Lilliefors GOF Test**					
5169					1% Lilliefors Critical Value	0.223	Data Not Normal at 1% Significance Level					
5170	**Data Not Normal at 1% Significance Level**											
5171												
5172	**Assuming Normal Distribution**											
5173	**95% Normal UCL**									**95% UCLs (Adjusted for Skewness)**		
5174					95% Student's-t UCL	4736				95% Adjusted-CLT UCL (Chen-1995)	4756	
5175										95% Modified-t UCL (Johnson-1978)	4742	
5176												
5177	**Gamma GOF Test**											
5178					A-D Test Statistic	1.125	**Anderson-Darling Gamma GOF Test**					
5179					5% A-D Critical Value	0.74	Data Not Gamma Distributed at 5% Significance Level					
5180					K-S Test Statistic	0.23	**Kolmogorov-Smirnov Gamma GOF Test**					
5181					5% K-S Critical Value	0.193	Data Not Gamma Distributed at 5% Significance Level					
5182	**Data Not Gamma Distributed at 5% Significance Level**											
5183												
5184	**Gamma Statistics**											
5185					k hat (MLE)	40.53				k star (bias corrected MLE)	34.48	
5186					Theta hat (MLE)	109.8				Theta star (bias corrected MLE)	129.1	
5187					nu hat (MLE)	1621				nu star (bias corrected)	1379	
5188					MLE Mean (bias corrected)	4450				MLE Sd (bias corrected)	757.8	
5189										Approximate Chi Square Value (0.05)	1294	
5190					Adjusted Level of Significance	0.038				Adjusted Chi Square Value	1287	
5191												
5192	**Assuming Gamma Distribution**											
5193					95% Approximate Gamma UCL	4743				95% Adjusted Gamma UCL	4767	
5194												

5195						**Lognormal GOF Test**						
5196					Shapiro Wilk Test Statistic	0.865		**Shapiro Wilk Lognormal GOF Test**				
5197					10% Shapiro Wilk Critical Value	0.92		Data Not Lognormal at 10% Significance Level				
5198					Lilliefors Test Statistic	0.224		**Lilliefors Lognormal GOF Test**				
5199					10% Lilliefors Critical Value	0.176		Data Not Lognormal at 10% Significance Level				
5200					**Data Not Lognormal at 10% Significance Level**							
5201												
5202						**Lognormal Statistics**						
5203					Minimum of Logged Data	8.216		Mean of logged Data	8.388			
5204					Maximum of Logged Data	8.683		SD of logged Data	0.159			
5205												
5206						**Assuming Lognormal Distribution**						
5207					95% H-UCL	4747		90% Chebyshev (MVUE) UCL	4925			
5208					95% Chebyshev (MVUE) UCL	5141		97.5% Chebyshev (MVUE) UCL	5440			
5209					99% Chebyshev (MVUE) UCL	6029						
5210												
5211						**Nonparametric Distribution Free UCL Statistics**						
5212						**Data do not follow a Discernible Distribution**						
5213												
5214						**Nonparametric Distribution Free UCLs**						
5215					95% CLT UCL	4723		95% BCA Bootstrap UCL	4755			
5216					95% Standard Bootstrap UCL	4719		95% Bootstrap-t UCL	4794			
5217					95% Hall's Bootstrap UCL	4739		95% Percentile Bootstrap UCL	4730			
5218					90% Chebyshev(Mean, Sd) UCL	4947		95% Chebyshev(Mean, Sd) UCL	5172			
5219					97.5% Chebyshev(Mean, Sd) UCL	5485		99% Chebyshev(Mean, Sd) UCL	6098			
5220												
5221						**Suggested UCL to Use**						
5222					95% Student's-t UCL	4736						
5223												
5224					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
5225					Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.							
5226					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
5227												
5228												
5229	**Result (ihrs-sw-manganese)**											
5230												
5231						**General Statistics**						
5232					Total Number of Observations	20		Number of Distinct Observations	15			
5233								Number of Missing Observations	0			
5234					Minimum	6.9		Mean	9.315			
5235					Maximum	16		Median	8.4			
5236					SD	2.21		Std. Error of Mean	0.494			
5237					Coefficient of Variation	0.237		Skewness	1.621			
5238												
5239						**Normal GOF Test**						
5240					Shapiro Wilk Test Statistic	0.845		**Shapiro Wilk GOF Test**				
5241					1% Shapiro Wilk Critical Value	0.868		Data Not Normal at 1% Significance Level				
5242					Lilliefors Test Statistic	0.227		**Lilliefors GOF Test**				
5243					1% Lilliefors Critical Value	0.223		Data Not Normal at 1% Significance Level				
5244					**Data Not Normal at 1% Significance Level**							
5245												
5246						**Assuming Normal Distribution**						
5247					**95% Normal UCL**			**95% UCLs (Adjusted for Skewness)**				
5248					95% Student's-t UCL	10.17		95% Adjusted-CLT UCL (Chen-1995)	10.32			
5249								95% Modified-t UCL (Johnson-1978)	10.2			
5250												
5251						**Gamma GOF Test**						
5252					A-D Test Statistic	0.756		**Anderson-Darling Gamma GOF Test**				
5253					5% A-D Critical Value	0.741		Data Not Gamma Distributed at 5% Significance Level				
5254					K-S Test Statistic	0.217		**Kolmogorov-Smirnov Gamma GOF Test**				
5255					5% K-S Critical Value	0.193		Data Not Gamma Distributed at 5% Significance Level				
5256					**Data Not Gamma Distributed at 5% Significance Level**							
5257												
5258						**Gamma Statistics**						
5259					k hat (MLE)	21.87		k star (bias corrected MLE)	18.62			
5260					Theta hat (MLE)	0.426		Theta star (bias corrected MLE)	0.5			
5261					nu hat (MLE)	874.7		nu star (bias corrected)	744.8			
5262					MLE Mean (bias corrected)	9.315		MLE Sd (bias corrected)	2.159			
5263								Approximate Chi Square Value (0.05)	682.5			
5264					Adjusted Level of Significance	0.038		Adjusted Chi Square Value	677.8			
5265												
5266						**Assuming Gamma Distribution**						
5267					95% Approximate Gamma UCL	10.17		95% Adjusted Gamma UCL	10.24			
5268												
5269						**Lognormal GOF Test**						
5270					Shapiro Wilk Test Statistic	0.912		**Shapiro Wilk Lognormal GOF Test**				
5271					10% Shapiro Wilk Critical Value	0.92		Data Not Lognormal at 10% Significance Level				
5272					Lilliefors Test Statistic	0.205		**Lilliefors Lognormal GOF Test**				
5273					10% Lilliefors Critical Value	0.176		Data Not Lognormal at 10% Significance Level				
5274					**Data Not Lognormal at 10% Significance Level**							
5275												
5276						**Lognormal Statistics**						
5277					Minimum of Logged Data	1.932		Mean of logged Data	2.209			

5278				Maximum of Logged Data		2.773					SD of logged Data	0.213
5279												
5280						**Assuming Lognormal Distribution**							
5281					95% H-UCL	10.16					90% Chebyshev (MVUE) UCL	10.64
5282				95% Chebyshev (MVUE) UCL		11.25					97.5% Chebyshev (MVUE) UCL	12.09
5283				99% Chebyshev (MVUE) UCL		13.74						
5284												
5285						**Nonparametric Distribution Free UCL Statistics**							
5286						**Data do not follow a Discernible Distribution**							
5287												
5288						**Nonparametric Distribution Free UCLs**							
5289					95% CLT UCL	10.13					95% BCA Bootstrap UCL	10.31
5290				95% Standard Bootstrap UCL		10.11					95% Bootstrap-t UCL	10.49
5291				95% Hall's Bootstrap UCL		10.65					95% Percentile Bootstrap UCL	10.2
5292				90% Chebyshev(Mean, Sd) UCL		10.8					95% Chebyshev(Mean, Sd) UCL	11.47
5293				97.5% Chebyshev(Mean, Sd) UCL		12.4					99% Chebyshev(Mean, Sd) UCL	14.23
5294												
5295						**Suggested UCL to Use**							
5296					95% Student's-t UCL	10.17						
5297												
5298						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
5299						Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.							
5300						However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
5301												
5302	**Result (ihrs-sw-mercury)**											
5303												
5304						**General Statistics**							
5305				Total Number of Observations		20					Number of Distinct Observations	1
5306				Number of Detects		0					Number of Non-Detects	20
5307				Number of Distinct Detects		0					Number of Distinct Non-Detects	1
5308												
5309						**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**							
5310						**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**							
5311						**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**							
5312												
5313						**The data set for variable Result (ihrs-sw-mercury) was not processed!**							
5314												
5315												
5316	**Result (ihrs-sw-nickel)**											
5317												
5318						**General Statistics**							
5319				Total Number of Observations		20					Number of Distinct Observations	13
5320				Number of Detects		18					Number of Non-Detects	2
5321				Number of Distinct Detects		12					Number of Distinct Non-Detects	1
5322				Minimum Detect		0.31					Minimum Non-Detect	1
5323				Maximum Detect		0.54					Maximum Non-Detect	1
5324				Variance Detects		0.00642					Percent Non-Detects	10%
5325				Mean Detects		0.432					SD Detects	0.0801
5326				Median Detects		0.46					CV Detects	0.185
5327				Skewness Detects		-0.349					Kurtosis Detects	-1.35
5328				Mean of Logged Detects		-0.856					SD of Logged Detects	0.195
5329												
5330						**Normal GOF Test on Detects Only**							
5331				Shapiro Wilk Test Statistic		0.901					**Shapiro Wilk GOF Test**	
5332				1% Shapiro Wilk Critical Value		0.858					Detected Data appear Normal at 1% Significance Level	
5333				Lilliefors Test Statistic		0.181					**Lilliefors GOF Test**	
5334				1% Lilliefors Critical Value		0.235					Detected Data appear Normal at 1% Significance Level	
5335						**Detected Data appear Normal at 1% Significance Level**							
5336												
5337						**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**							
5338					KM Mean	0.432					KM Standard Error of Mean	0.0189
5339					90KM SD	0.0779					95% KM (BCA) UCL	0.463
5340					95% KM (t) UCL	0.465					95% KM (Percentile Bootstrap) UCL	0.462
5341					95% KM (z) UCL	0.463					95% KM Bootstrap t UCL	0.463
5342					90% KM Chebyshev UCL	0.489					95% KM Chebyshev UCL	0.515
5343					97.5% KM Chebyshev UCL	0.55					99% KM Chebyshev UCL	0.62
5344												
5345						**Gamma GOF Tests on Detected Observations Only**							
5346					A-D Test Statistic	0.797					**Anderson-Darling GOF Test**	
5347					5% A-D Critical Value	0.739					Detected Data Not Gamma Distributed at 5% Significance Level	
5348					K-S Test Statistic	0.198					**Kolmogorov-Smirnov GOF**	
5349					5% K-S Critical Value	0.203					Detected data appear Gamma Distributed at 5% Significance Level	
5350						**Detected data follow Appr. Gamma Distribution at 5% Significance Level**							
5351												
5352						**Gamma Statistics on Detected Data Only**							
5353					k hat (MLE)	28.99					k star (bias corrected MLE)	24.19
5354					Theta hat (MLE)	0.0149					Theta star (bias corrected MLE)	0.0179
5355					nu hat (MLE)	1044					nu star (bias corrected)	871
5356					Mean (detects)	0.432						
5357												
5358						**Gamma ROS Statistics using Imputed Non-Detects**							
5359						GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
5360						GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)							

5361	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
5362	This is especially true when the sample size is small.											
5363	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
5364					Minimum	0.31				Mean	0.432	
5365					Maximum	0.54				Median	0.458	
5366					SD	0.0767				CV	0.178	
5367					k hat (MLE)	31.43				k star (bias corrected MLE)	26.75	
5368					Theta hat (MLE)	0.0137				Theta star (bias corrected MLE)	0.0161	
5369					nu hat (MLE)	1257				nu star (bias corrected)	1070	
5370					Adjusted Level of Significance (β)	0.038						
5371					Approximate Chi Square Value (N/A, α)	995				Adjusted Chi Square Value (N/A, β)	989.3	
5372					95% Gamma Approximate UCL	0.464				95% Gamma Adjusted UCL	0.467	
5373												
5374	**Estimates of Gamma Parameters using KM Estimates**											
5375					Mean (KM)	0.432				SD (KM)	0.0779	
5376					Variance (KM)	0.00606				SE of Mean (KM)	0.0189	
5377					k hat (KM)	30.82				k star (KM)	26.23	
5378					nu hat (KM)	1233				nu star (KM)	1049	
5379					theta hat (KM)	0.014				theta star (KM)	0.0165	
5380					80% gamma percentile (KM)	0.501				90% gamma percentile (KM)	0.543	
5381					95% gamma percentile (KM)	0.58				99% gamma percentile (KM)	0.652	
5382												
5383	**Gamma Kaplan-Meier (KM) Statistics**											
5384					Approximate Chi Square Value (N/A, α)	975				Adjusted Chi Square Value (N/A, β)	969.3	
5385					95% KM Approximate Gamma UCL	0.465				95% KM Adjusted Gamma UCL	0.468	
5386												
5387	**Lognormal GOF Test on Detected Observations Only**											
5388					Shapiro Wilk Test Statistic	0.884				**Shapiro Wilk GOF Test**		
5389					10% Shapiro Wilk Critical Value	0.914				Detected Data Not Lognormal at 10% Significance Level		
5390					Lilliefors Test Statistic	0.198				**Lilliefors GOF Test**		
5391					10% Lilliefors Critical Value	0.185				Detected Data Not Lognormal at 10% Significance Level		
5392	**Detected Data Not Lognormal at 10% Significance Level**											
5393												
5394	**Lognormal ROS Statistics Using Imputed Non-Detects**											
5395					Mean in Original Scale	0.432				Mean in Log Scale	-0.856	
5396					SD in Original Scale	0.0768				SD in Log Scale	0.187	
5397					95% t UCL (assumes normality of ROS data)	0.461				95% Percentile Bootstrap UCL	0.459	
5398					95% BCA Bootstrap UCL	0.459				95% Bootstrap t UCL	0.461	
5399					95% H-UCL (Log ROS)	0.466						
5400												
5401	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
5402					KM Mean (logged)	-0.856				KM Geo Mean	0.425	
5403					KM SD (logged)	0.189				95% Critical H Value (KM-Log)	1.78	
5404					KM Standard Error of Mean (logged)	0.0459				95% H-UCL (KM -Log)	0.467	
5405					KM SD (logged)	0.189				95% Critical H Value (KM-Log)	1.78	
5406					KM Standard Error of Mean (logged)	0.0459						
5407												
5408	**DL/2 Statistics**											
5409	**DL/2 Normal**									**DL/2 Log-Transformed**		
5410					Mean in Original Scale	0.439				Mean in Log Scale	-0.84	
5411					SD in Original Scale	0.0786				SD in Log Scale	0.191	
5412					95% t UCL (Assumes normality)	0.469				95% H-Stat UCL	0.475	
5413	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
5414												
5415	**Nonparametric Distribution Free UCL Statistics**											
5416	**Detected Data appear Normal Distributed at 1% Significance Level**											
5417												
5418	**Suggested UCL to Use**											
5419					95% KM (t) UCL	0.465						
5420												
5421	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
5422	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
5423	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
5424												
5425												
5426	**Result (ihrs-sw-potassium)**											
5427												
5428	**General Statistics**											
5429					Total Number of Observations	20				Number of Distinct Observations	7	
5430										Number of Missing Observations	0	
5431					Minimum	1500				Mean	1730	
5432					Maximum	2500				Median	1600	
5433					SD	304.5				Std. Error of Mean	68.09	
5434					Coefficient of Variation	0.176				Skewness	1.335	
5435												
5436	**Normal GOF Test**											
5437					Shapiro Wilk Test Statistic	0.777				**Shapiro Wilk GOF Test**		
5438					1% Shapiro Wilk Critical Value	0.868				Data Not Normal at 1% Significance Level		
5439					Lilliefors Test Statistic	0.265				**Lilliefors GOF Test**		
5440					1% Lilliefors Critical Value	0.223				Data Not Normal at 1% Significance Level		
5441	**Data Not Normal at 1% Significance Level**											
5442												
5443	**Assuming Normal Distribution**											

5444	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
5445				95% Student's-t UCL		1848				95% Adjusted-CLT UCL (Chen-1995)		1864
5446										95% Modified-t UCL (Johnson-1978)		1851
5447												
5448	**Gamma GOF Test**											
5449				A-D Test Statistic		1.696	**Anderson-Darling Gamma GOF Test**					
5450				5% A-D Critical Value		0.74	Data Not Gamma Distributed at 5% Significance Level					
5451				K-S Test Statistic		0.263	**Kolmogorov-Smirnov Gamma GOF Test**					
5452				5% K-S Critical Value		0.193	Data Not Gamma Distributed at 5% Significance Level					
5453	**Data Not Gamma Distributed at 5% Significance Level**											
5454												
5455	**Gamma Statistics**											
5456				k hat (MLE)		37.98				k star (bias corrected MLE)		32.32
5457				Theta hat (MLE)		45.55				Theta star (bias corrected MLE)		53.53
5458				nu hat (MLE)		1519				nu star (bias corrected)		1293
5459				MLE Mean (bias corrected)		1730				MLE Sd (bias corrected)		304.3
5460										Approximate Chi Square Value (0.05)		1210
5461				Adjusted Level of Significance		0.038				Adjusted Chi Square Value		1204
5462												
5463	**Assuming Gamma Distribution**											
5464				95% Approximate Gamma UCL		1848				95% Adjusted Gamma UCL		1858
5465												
5466	**Lognormal GOF Test**											
5467				Shapiro Wilk Test Statistic		0.796	**Shapiro Wilk Lognormal GOF Test**					
5468				10% Shapiro Wilk Critical Value		0.92	Data Not Lognormal at 10% Significance Level					
5469				Lilliefors Test Statistic		0.255	**Lilliefors Lognormal GOF Test**					
5470				10% Lilliefors Critical Value		0.176	Data Not Lognormal at 10% Significance Level					
5471	**Data Not Lognormal at 10% Significance Level**											
5472												
5473	**Lognormal Statistics**											
5474				Minimum of Logged Data		7.313				Mean of logged Data		7.443
5475				Maximum of Logged Data		7.824				SD of logged Data		0.163
5476												
5477	**Assuming Lognormal Distribution**											
5478				95% H-UCL		1848				90% Chebyshev (MVUE) UCL		1918
5479				95% Chebyshev (MVUE) UCL		2004				97.5% Chebyshev (MVUE) UCL		2123
5480				99% Chebyshev (MVUE) UCL		2357						
5481												
5482	**Nonparametric Distribution Free UCL Statistics**											
5483	**Data do not follow a Discernible Distribution**											
5484												
5485	**Nonparametric Distribution Free UCLs**											
5486				95% CLT UCL		1842				95% BCA Bootstrap UCL		1855
5487				95% Standard Bootstrap UCL		1840				95% Bootstrap-t UCL		1889
5488				95% Hall's Bootstrap UCL		1864				95% Percentile Bootstrap UCL		1845
5489				90% Chebyshev(Mean, Sd) UCL		1934				95% Chebyshev(Mean, Sd) UCL		2027
5490				97.5% Chebyshev(Mean, Sd) UCL		2155				99% Chebyshev(Mean, Sd) UCL		2408
5491												
5492	**Suggested UCL to Use**											
5493				95% Student's-t UCL		1848						
5494												
5495	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
5496	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
5497	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
5498												
5499	**Result (ihrs-sw-selenium)**											
5500												
5501	**General Statistics**											
5502				Total Number of Observations		20				Number of Distinct Observations		1
5503				Number of Detects		0				Number of Non-Detects		20
5504				Number of Distinct Detects		0				Number of Distinct Non-Detects		1
5505												
5506	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
5507	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
5508	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
5509												
5510	**The data set for variable Result (ihrs-sw-selenium) was not processed!**											
5511												
5512												
5513	**Result (ihrs-sw-silver)**											
5514												
5515	**General Statistics**											
5516				Total Number of Observations		20				Number of Distinct Observations		3
5517				Number of Detects		2				Number of Non-Detects		18
5518				Number of Distinct Detects		2				Number of Distinct Non-Detects		1
5519				Minimum Detect		0.046				Minimum Non-Detect		0.1
5520				Maximum Detect		0.46				Maximum Non-Detect		0.1
5521				Variance Detects		0.0857				Percent Non-Detects		90%
5522				Mean Detects		0.253				SD Detects		0.293
5523				Median Detects		0.253				CV Detects		1.157
5524				Skewness Detects		N/A				Kurtosis Detects		N/A
5525				Mean of Logged Detects		-1.928				SD of Logged Detects		1.628
5526												

5527	Warning: Data set has only 2 Detected Values.										
5528	This is not enough to compute meaningful or reliable statistics and estimates.										
5529											
5530											
5531	Normal GOF Test on Detects Only										
5532	Not Enough Data to Perform GOF Test										
5533											
5534	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs										
5535				KM Mean	0.0667			KM Standard Error of Mean	0.0285		
5536				90KM SD	0.0902			95% KM (BCA) UCL	N/A		
5537				95% KM (t) UCL	0.116			95% KM (Percentile Bootstrap) UCL	N/A		
5538				95% KM (z) UCL	0.114			95% KM Bootstrap t UCL	N/A		
5539				90% KM Chebyshev UCL	0.152			95% KM Chebyshev UCL	0.191		
5540				97.5% KM Chebyshev UCL	0.245			99% KM Chebyshev UCL	0.351		
5541											
5542	Gamma GOF Tests on Detected Observations Only										
5543	Not Enough Data to Perform GOF Test										
5544											
5545	Gamma Statistics on Detected Data Only										
5546				k hat (MLE)	1.038			k star (bias corrected MLE)	N/A		
5547				Theta hat (MLE)	0.244			Theta star (bias corrected MLE)	N/A		
5548				nu hat (MLE)	4.154			nu star (bias corrected)	N/A		
5549				Mean (detects)	0.253						
5550											
5551	Estimates of Gamma Parameters using KM Estimates										
5552				Mean (KM)	0.0667			SD (KM)	0.0902		
5553				Variance (KM)	0.00814			SE of Mean (KM)	0.0285		
5554				k hat (KM)	0.546			k star (KM)	0.498		
5555				nu hat (KM)	21.86			nu star (KM)	19.91		
5556				theta hat (KM)	0.122			theta star (KM)	0.134		
5557				80% gamma percentile (KM)	0.11			90% gamma percentile (KM)	0.181		
5558				95% gamma percentile (KM)	0.257			99% gamma percentile (KM)	0.444		
5559											
5560	Gamma Kaplan-Meier (KM) Statistics										
5561								Adjusted Level of Significance (β)	0.038		
5562				Approximate Chi Square Value (19.91, α)	10.79			Adjusted Chi Square Value (19.91, β)	10.26		
5563				95% KM Approximate Gamma UCL	0.123			95% KM Adjusted Gamma UCL	0.129		
5564											
5565	Lognormal GOF Test on Detected Observations Only										
5566	Not Enough Data to Perform GOF Test										
5567											
5568	Lognormal ROS Statistics Using Imputed Non-Detects										
5569				Mean in Original Scale	0.0834			Mean in Log Scale	-2.993		
5570				SD in Original Scale	0.104			SD in Log Scale	1.022		
5571				95% t UCL (assumes normality of ROS data)	0.123			95% Percentile Bootstrap UCL	0.124		
5572				95% BCA Bootstrap UCL	0.138			95% Bootstrap t UCL	0.162		
5573				95% H-UCL (Log ROS)	0.158						
5574											
5575	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution										
5576				KM Mean (logged)	-2.964			KM Geo Mean	0.0516		
5577				KM SD (logged)	0.502			95% Critical H Value (KM-Log)	2.021		
5578				KM Standard Error of Mean (logged)	0.159			95% H-UCL (KM -Log)	0.0739		
5579				KM SD (logged)	0.502			95% Critical H Value (KM-Log)	2.021		
5580				KM Standard Error of Mean (logged)	0.159						
5581											
5582	DL/2 Statistics										
5583	DL/2 Normal							DL/2 Log-Transformed			
5584				Mean in Original Scale	0.0703			Mean in Log Scale	-2.889		
5585				SD in Original Scale	0.0917			SD in Log Scale	0.498		
5586				95% t UCL (Assumes normality)	0.106			95% H-Stat UCL	0.0793		
5587	DL/2 is not a recommended method, provided for comparisons and historical reasons										
5588											
5589	Nonparametric Distribution Free UCL Statistics										
5590	Data do not follow a Discernible Distribution										
5591											
5592	Suggested UCL to Use										
5593				95% KM (t) UCL	0.116						
5594											
5595	The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.										
5596	Please verify the data were collected from random locations.										
5597	If the data were collected using judgmental or other non-random methods,										
5598	then contact a statistician to correctly calculate UCLs.										
5599											
5600	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
5601	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.										
5602	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
5603											
5604											
5605	Result (ihrs-sw-sodium)										
5606											
5607	General Statistics										
5608				Total Number of Observations	20			Number of Distinct Observations	11		
5609								Number of Missing Observations	0		

5610					Minimum	15000					Mean	20400
5611					Maximum	34000					Median	18000
5612					SD	6065					Std. Error of Mean	1356
5613					Coefficient of Variation	0.297					Skewness	0.957
5614												
5615					**Normal GOF Test**							
5616					Shapiro Wilk Test Statistic	0.843	**Shapiro Wilk GOF Test**					
5617					1% Shapiro Wilk Critical Value	0.868	Data Not Normal at 1% Significance Level					
5618					Lilliefors Test Statistic	0.216	**Lilliefors GOF Test**					
5619					1% Lilliefors Critical Value	0.223	Data appear Normal at 1% Significance Level					
5620					**Data appear Approximate Normal at 1% Significance Level**							
5621												
5622					**Assuming Normal Distribution**							
5623					**95% Normal UCL**		**95% UCLs (Adjusted for Skewness)**					
5624					95% Student's-t UCL	22745	95% Adjusted-CLT UCL (Chen-1995)	22941				
5625							95% Modified-t UCL (Johnson-1978)	22793				
5626												
5627					**Gamma GOF Test**							
5628					A-D Test Statistic	1.086	**Anderson-Darling Gamma GOF Test**					
5629					5% A-D Critical Value	0.741	Data Not Gamma Distributed at 5% Significance Level					
5630					K-S Test Statistic	0.225	**Kolmogorov-Smirnov Gamma GOF Test**					
5631					5% K-S Critical Value	0.194	Data Not Gamma Distributed at 5% Significance Level					
5632					**Data Not Gamma Distributed at 5% Significance Level**							
5633												
5634					**Gamma Statistics**							
5635					k hat (MLE)	13.25	k star (bias corrected MLE)	11.29				
5636					Theta hat (MLE)	1540	Theta star (bias corrected MLE)	1806				
5637					nu hat (MLE)	529.9	nu star (bias corrected)	451.7				
5638					MLE Mean (bias corrected)	20400	MLE Sd (bias corrected)	6070				
5639							Approximate Chi Square Value (0.05)	403.5				
5640					Adjusted Level of Significance	0.038	Adjusted Chi Square Value	399.9				
5641												
5642					**Assuming Gamma Distribution**							
5643					95% Approximate Gamma UCL	22841	95% Adjusted Gamma UCL	23047				
5644												
5645					**Lognormal GOF Test**							
5646					Shapiro Wilk Test Statistic	0.863	**Shapiro Wilk Lognormal GOF Test**					
5647					10% Shapiro Wilk Critical Value	0.92	Data Not Lognormal at 10% Significance Level					
5648					Lilliefors Test Statistic	0.22	**Lilliefors Lognormal GOF Test**					
5649					10% Lilliefors Critical Value	0.176	Data Not Lognormal at 10% Significance Level					
5650					**Data Not Lognormal at 10% Significance Level**							
5651												
5652					**Lognormal Statistics**							
5653					Minimum of Logged Data	9.616	Mean of logged Data	9.885				
5654					Maximum of Logged Data	10.43	SD of logged Data	0.277				
5655												
5656					**Assuming Lognormal Distribution**							
5657					95% H-UCL	22933	90% Chebyshev (MVUE) UCL	24199				
5658					95% Chebyshev (MVUE) UCL	25935	97.5% Chebyshev (MVUE) UCL	28346				
5659					99% Chebyshev (MVUE) UCL	33081						
5660												
5661					**Nonparametric Distribution Free UCL Statistics**							
5662					**Data appear to follow a Discernible Distribution**							
5663												
5664					**Nonparametric Distribution Free UCLs**							
5665					95% CLT UCL	22631	95% BCA Bootstrap UCL	22800				
5666					95% Standard Bootstrap UCL	22619	95% Bootstrap-t UCL	23208				
5667					95% Hall's Bootstrap UCL	22815	95% Percentile Bootstrap UCL	22750				
5668					90% Chebyshev(Mean, Sd) UCL	24468	95% Chebyshev(Mean, Sd) UCL	26311				
5669					97.5% Chebyshev(Mean, Sd) UCL	28869	99% Chebyshev(Mean, Sd) UCL	33893				
5670												
5671					**Suggested UCL to Use**							
5672					95% Student's-t UCL	22745						
5673												
5674					When a data set follows an approximate distribution passing only one of the GOF tests,							
5675					it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL							
5676												
5677					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
5678					Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.							
5679					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
5680												
5681	**Result (ihrs-sw-thallium)**											
5682												
5683					**General Statistics**							
5684					Total Number of Observations	20	Number of Distinct Observations	1				
5685					Number of Detects	0	Number of Non-Detects	20				
5686					Number of Distinct Detects	0	Number of Distinct Non-Detects	1				
5687												
5688					**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**							
5689					**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**							
5690					**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**							
5691												
5692					**The data set for variable Result (ihrs-sw-thallium) was not processed!**							

5693											
5694											
5695	**Result (ihrs-sw-vanadium)**										
5696											
5697						**General Statistics**					
5698					Total Number of Observations	20			Number of Distinct Observations	1	
5699					Number of Detects	0			Number of Non-Detects	20	
5700					Number of Distinct Detects	0			Number of Distinct Non-Detects	1	
5701											
5702					**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**						
5703					**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**						
5704					**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**						
5705											
5706					**The data set for variable Result (ihrs-sw-vanadium) was not processed!**						
5707											
5708											
5709											
5710	**Result (ihrs-sw-water hardness)**										
5711											
5712						**General Statistics**					
5713					Total Number of Observations	20			Number of Distinct Observations	9	
5714									Number of Missing Observations	0	
5715					Minimum	59			Mean	73.8	
5716					Maximum	82			Median	73	
5717					SD	4.629			Std. Error of Mean	1.035	
5718					Coefficient of Variation	0.0627			Skewness	-1.368	
5719											
5720						**Normal GOF Test**					
5721					Shapiro Wilk Test Statistic	0.839			**Shapiro Wilk GOF Test**		
5722					1% Shapiro Wilk Critical Value	0.868			Data Not Normal at 1% Significance Level		
5723					Lilliefors Test Statistic	0.223			**Lilliefors GOF Test**		
5724					1% Lilliefors Critical Value	0.223			Data Not Normal at 1% Significance Level		
5725						**Data Not Normal at 1% Significance Level**					
5726											
5727						**Assuming Normal Distribution**					
5728					**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**		
5729					95% Student's-t UCL	75.59			95% Adjusted-CLT UCL (Chen-1995)	75.16	
5730									95% Modified-t UCL (Johnson-1978)	75.54	
5731											
5732						**Gamma GOF Test**					
5733					A-D Test Statistic	1.171			**Anderson-Darling Gamma GOF Test**		
5734					5% A-D Critical Value	0.74			Data Not Gamma Distributed at 5% Significance Level		
5735					K-S Test Statistic	0.228			**Kolmogorov-Smirnov Gamma GOF Test**		
5736					5% K-S Critical Value	0.193			Data Not Gamma Distributed at 5% Significance Level		
5737						**Data Not Gamma Distributed at 5% Significance Level**					
5738											
5739						**Gamma Statistics**					
5740					k hat (MLE)	251.2			k star (bias corrected MLE)	213.5	
5741					Theta hat (MLE)	0.294			Theta star (bias corrected MLE)	0.346	
5742					nu hat (MLE)	10046			nu star (bias corrected)	8541	
5743					MLE Mean (bias corrected)	73.8			MLE Sd (bias corrected)	5.051	
5744									Approximate Chi Square Value (0.05)	8327	
5745					Adjusted Level of Significance	0.038			Adjusted Chi Square Value	8310	
5746											
5747						**Assuming Gamma Distribution**					
5748					95% Approximate Gamma UCL	75.7			95% Adjusted Gamma UCL	75.85	
5749											
5750						**Lognormal GOF Test**					
5751					Shapiro Wilk Test Statistic	0.803			**Shapiro Wilk Lognormal GOF Test**		
5752					10% Shapiro Wilk Critical Value	0.92			Data Not Lognormal at 10% Significance Level		
5753					Lilliefors Test Statistic	0.239			**Lilliefors Lognormal GOF Test**		
5754					10% Lilliefors Critical Value	0.176			Data Not Lognormal at 10% Significance Level		
5755						**Data Not Lognormal at 10% Significance Level**					
5756											
5757						**Lognormal Statistics**					
5758					Minimum of Logged Data	4.078			Mean of logged Data	4.299	
5759					Maximum of Logged Data	4.407			SD of logged Data	0.0659	
5760											
5761						**Assuming Lognormal Distribution**					
5762					95% H-UCL	N/A			90% Chebyshev (MVUE) UCL	77.07	
5763					95% Chebyshev (MVUE) UCL	78.55			97.5% Chebyshev (MVUE) UCL	80.6	
5764					99% Chebyshev (MVUE) UCL	84.63					
5765											
5766						**Nonparametric Distribution Free UCL Statistics**					
5767						**Data do not follow a Discernible Distribution**					
5768											
5769						**Nonparametric Distribution Free UCLs**					
5770					95% CLT UCL	75.5			95% BCA Bootstrap UCL	75.15	
5771					95% Standard Bootstrap UCL	75.44			95% Bootstrap-t UCL	75.31	
5772					95% Hall's Bootstrap UCL	75.29			95% Percentile Bootstrap UCL	75.45	
5773					90% Chebyshev(Mean, Sd) UCL	76.91			95% Chebyshev(Mean, Sd) UCL	78.31	
5774					97.5% Chebyshev(Mean, Sd) UCL	80.26			99% Chebyshev(Mean, Sd) UCL	84.1	
5775											

5776					**Suggested UCL to Use**							
5777					95% Student's-t UCL	75.59						
5778												
5779					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
5780					Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.							
5781					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
5782												
5783					**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**							
5784					**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**							
5785												
5786	**Result (ihrs-sw-zinc)**											
5787												
5788					**General Statistics**							
5789					Total Number of Observations	20				Number of Distinct Observations	15	
5790					Number of Detects	17				Number of Non-Detects	3	
5791					Number of Distinct Detects	14				Number of Distinct Non-Detects	1	
5792					Minimum Detect	2.3				Minimum Non-Detect	8	
5793					Maximum Detect	60				Maximum Non-Detect	8	
5794					Variance Detects	189.4				Percent Non-Detects	15%	
5795					Mean Detects	7.882				SD Detects	13.76	
5796					Median Detects	3.8				CV Detects	1.746	
5797					Skewness Detects	3.823				Kurtosis Detects	15.09	
5798					Mean of Logged Detects	1.561				SD of Logged Detects	0.796	
5799												
5800					**Normal GOF Test on Detects Only**							
5801					Shapiro Wilk Test Statistic	0.407				**Shapiro Wilk GOF Test**		
5802					1% Shapiro Wilk Critical Value	0.851				Detected Data Not Normal at 1% Significance Level		
5803					Lilliefors Test Statistic	0.388				**Lilliefors GOF Test**		
5804					1% Lilliefors Critical Value	0.241				Detected Data Not Normal at 1% Significance Level		
5805					**Detected Data Not Normal at 1% Significance Level**							
5806												
5807					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**							
5808					KM Mean	7.29				KM Standard Error of Mean	2.862	
5809					90KM SD	12.4				95% KM (BCA) UCL	12.36	
5810					95% KM (t) UCL	12.24				95% KM (Percentile Bootstrap) UCL	12.37	
5811					95% KM (z) UCL	12				95% KM Bootstrap t UCL	38.65	
5812					90% KM Chebyshev UCL	15.88				95% KM Chebyshev UCL	19.76	
5813					97.5% KM Chebyshev UCL	25.16				99% KM Chebyshev UCL	35.77	
5814												
5815					**Gamma GOF Tests on Detected Observations Only**							
5816					A-D Test Statistic	2.677				**Anderson-Darling GOF Test**		
5817					5% A-D Critical Value	0.763				Detected Data Not Gamma Distributed at 5% Significance Level		
5818					K-S Test Statistic	0.323				**Kolmogorov-Smirnov GOF**		
5819					5% K-S Critical Value	0.215				Detected Data Not Gamma Distributed at 5% Significance Level		
5820					**Detected Data Not Gamma Distributed at 5% Significance Level**							
5821												
5822					**Gamma Statistics on Detected Data Only**							
5823					k hat (MLE)	1.13				k star (bias corrected MLE)	0.97	
5824					Theta hat (MLE)	6.973				Theta star (bias corrected MLE)	8.125	
5825					nu hat (MLE)	38.44				nu star (bias corrected)	32.99	
5826					Mean (detects)	7.882						
5827												
5828					**Gamma ROS Statistics using Imputed Non-Detects**							
5829					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
5830					GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)							
5831					For such situations, GROS method may yield incorrect values of UCLs and BTVs							
5832					This is especially true when the sample size is small.							
5833					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
5834					Minimum	0.01				Mean	7.351	
5835					Maximum	60				Median	3.7	
5836					SD	12.79				CV	1.74	
5837					k hat (MLE)	0.818				k star (bias corrected MLE)	0.728	
5838					Theta hat (MLE)	8.991				Theta star (bias corrected MLE)	10.09	
5839					nu hat (MLE)	32.71				nu star (bias corrected)	29.13	
5840					Adjusted Level of Significance (β)	0.038						
5841					Approximate Chi Square Value (29.13, α)	17.81				Adjusted Chi Square Value (29.13, β)	17.11	
5842					95% Gamma Approximate UCL	12.02				95% Gamma Adjusted UCL	12.51	
5843												
5844					**Estimates of Gamma Parameters using KM Estimates**							
5845					Mean (KM)	7.29				SD (KM)	12.4	
5846					Variance (KM)	153.8				SE of Mean (KM)	2.862	
5847					k hat (KM)	0.346				k star (KM)	0.327	
5848					nu hat (KM)	13.82				nu star (KM)	13.08	
5849					theta hat (KM)	21.1				theta star (KM)	22.29	
5850					80% gamma percentile (KM)	11.4				90% gamma percentile (KM)	21.26	
5851					95% gamma percentile (KM)	32.43				99% gamma percentile (KM)	61.14	
5852												
5853					**Gamma Kaplan-Meier (KM) Statistics**							
5854					Approximate Chi Square Value (13.08, α)	5.947				Adjusted Chi Square Value (13.08, β)	5.57	
5855					95% KM Approximate Gamma UCL	16.03				95% KM Adjusted Gamma UCL	17.12	
5856												
5857					**Lognormal GOF Test on Detected Observations Only**							
5858					Shapiro Wilk Test Statistic	0.731				**Shapiro Wilk GOF Test**		

5859				10% Shapiro Wilk Critical Value	0.91	Detected Data Not Lognormal at 10% Significance Level						
5860				Lilliefors Test Statistic	0.281	**Lilliefors GOF Test**						
5861				10% Lilliefors Critical Value	0.19	Detected Data Not Lognormal at 10% Significance Level						
5862	**Detected Data Not Lognormal at 10% Significance Level**											
5863												
5864	**Lognormal ROS Statistics Using Imputed Non-Detects**											
5865				Mean in Original Scale	7.364	Mean in Log Scale	1.54					
5866				SD in Original Scale	12.71	SD in Log Scale	0.746					
5867				95% t UCL (assumes normality of ROS data)	12.28	95% Percentile Bootstrap UCL	12.51					
5868				95% BCA Bootstrap UCL	16.09	95% Bootstrap t UCL	37.95					
5869				95% H-UCL (Log ROS)	9.124							
5870												
5871	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
5872				KM Mean (logged)	1.524	KM Geo Mean	4.592					
5873				KM SD (logged)	0.728	95% Critical H Value (KM-Log)	2.269					
5874				KM Standard Error of Mean (logged)	0.171	95% H-UCL (KM -Log)	8.738					
5875				KM SD (logged)	0.728	95% Critical H Value (KM-Log)	2.269					
5876				KM Standard Error of Mean (logged)	0.171							
5877												
5878	**DL/2 Statistics**											
5879	**DL/2 Normal**					**DL/2 Log-Transformed**						
5880				Mean in Original Scale	7.3	Mean in Log Scale	1.535					
5881				SD in Original Scale	12.71	SD in Log Scale	0.733					
5882				95% t UCL (Assumes normality)	12.21	95% H-Stat UCL	8.902					
5883	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
5884												
5885	**Nonparametric Distribution Free UCL Statistics**											
5886	**Data do not follow a Discernible Distribution**											
5887												
5888	**Suggested UCL to Use**											
5889				95% KM (t) UCL	12.24							
5890												
5891	**The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.**											
5892	**Please verify the data were collected from random locations.**											
5893	**If the data were collected using judgmental or other non-random methods,**											
5894	**then contact a statistician to correctly calculate UCLs.**											
5895												
5896	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
5897	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
5898	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
5899												
5900	**Result (rrds-sw-aluminum)**											
5901												
5902	**General Statistics**											
5903				Total Number of Observations	10	Number of Distinct Observations	6					
5904				Number of Detects	8	Number of Non-Detects	2					
5905				Number of Distinct Detects	5	Number of Distinct Non-Detects	1					
5906				Minimum Detect	18	Minimum Non-Detect	70					
5907				Maximum Detect	26	Maximum Non-Detect	70					
5908				Variance Detects	8.411	Percent Non-Detects	20%					
5909				Mean Detects	20.88	SD Detects	2.9					
5910				Median Detects	20	CV Detects	0.139					
5911				Skewness Detects	0.727	Kurtosis Detects	-0.577					
5912				Mean of Logged Detects	3.03	SD of Logged Detects	0.135					
5913												
5914	**Normal GOF Test on Detects Only**											
5915				Shapiro Wilk Test Statistic	0.889	**Shapiro Wilk GOF Test**						
5916				1% Shapiro Wilk Critical Value	0.749	Detected Data appear Normal at 1% Significance Level						
5917				Lilliefors Test Statistic	0.241	**Lilliefors GOF Test**						
5918				1% Lilliefors Critical Value	0.333	Detected Data appear Normal at 1% Significance Level						
5919	**Detected Data appear Normal at 1% Significance Level**											
5920	**Note GOF tests may be unreliable for small sample sizes**											
5921												
5922	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
5923				KM Mean	20.88	KM Standard Error of Mean	1.025					
5924				90KM SD	2.713	95% KM (BCA) UCL	22.5					
5925				95% KM (t) UCL	22.75	95% KM (Percentile Bootstrap) UCL	22.5					
5926				95% KM (z) UCL	22.56	95% KM Bootstrap t UCL	23.23					
5927				90% KM Chebyshev UCL	23.95	95% KM Chebyshev UCL	25.34					
5928				97.5% KM Chebyshev UCL	27.28	99% KM Chebyshev UCL	31.08					
5929	**Note: KM UCLs may be biased low with this dataset. Other substitution method recommended**											
5930												
5931	**Gamma GOF Tests on Detected Observations Only**											
5932				A-D Test Statistic	0.449	**Anderson-Darling GOF Test**						
5933				5% A-D Critical Value	0.715	Detected data appear Gamma Distributed at 5% Significance Level						
5934				K-S Test Statistic	0.253	**Kolmogorov-Smirnov GOF**						
5935				5% K-S Critical Value	0.293	Detected data appear Gamma Distributed at 5% Significance Level						
5936	**Detected data appear Gamma Distributed at 5% Significance Level**											
5937	**Note GOF tests may be unreliable for small sample sizes**											
5938												
5939	**Gamma Statistics on Detected Data Only**											
5940				k hat (MLE)	61.53	k star (bias corrected MLE)	38.54					
5941				Theta hat (MLE)	0.339	Theta star (bias corrected MLE)	0.542					

5942					nu hat (MLE)	984.4				nu star (bias corrected)		616.6
5943					Mean (detects)	20.88						
5944												
5945						**Gamma ROS Statistics using Imputed Non-Detects**							
5946						GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
5947						GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)							
5948						For such situations, GROS method may yield incorrect values of UCLs and BTVs							
5949						This is especially true when the sample size is small.							
5950						For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
5951					Minimum	18				Mean		20.86
5952					Maximum	26				Median		20.17
5953					SD	2.652				CV		0.127
5954					k hat (MLE)	71.31				k star (bias corrected MLE)		49.99
5955					Theta hat (MLE)	0.293				Theta star (bias corrected MLE)		0.417
5956					nu hat (MLE)	1426				nu star (bias corrected)		999.7
5957					Adjusted Level of Significance (β)	0.0267						
5958					Approximate Chi Square Value (999.70, α)	927.3				Adjusted Chi Square Value (999.70, β)		915.2
5959					95% Gamma Approximate UCL	22.49				95% Gamma Adjusted UCL		22.79
5960												
5961						**Estimates of Gamma Parameters using KM Estimates**							
5962					Mean (KM)	20.88				SD (KM)		2.713
5963					Variance (KM)	7.359				SE of Mean (KM)		1.025
5964					k hat (KM)	59.21				k star (KM)		41.52
5965					nu hat (KM)	1184				nu star (KM)		830.3
5966					theta hat (KM)	0.353				theta star (KM)		0.503
5967					80% gamma percentile (KM)	23.54				90% gamma percentile (KM)		25.12
5968					95% gamma percentile (KM)	26.47				99% gamma percentile (KM)		29.14
5969												
5970						**Gamma Kaplan-Meier (KM) Statistics**							
5971					Approximate Chi Square Value (830.31, α)	764.4				Adjusted Chi Square Value (830.31, β)		753.4
5972					95% KM Approximate Gamma UCL	22.67				95% KM Adjusted Gamma UCL		23.01
5973						**Note: KM UCLs may be biased low with this dataset. Other substitution method recommended**						
5974												
5975						**Lognormal GOF Test on Detected Observations Only**							
5976					Shapiro Wilk Test Statistic	0.897				**Shapiro Wilk GOF Test**		
5977					10% Shapiro Wilk Critical Value	0.851				Detected Data appear Lognormal at 10% Significance Level		
5978					Lilliefors Test Statistic	0.237				**Lilliefors GOF Test**		
5979					10% Lilliefors Critical Value	0.265				Detected Data appear Lognormal at 10% Significance Level		
5980						**Detected Data appear Lognormal at 10% Significance Level**						
5981						**Note GOF tests may be unreliable for small sample sizes**						
5982												
5983						**Lognormal ROS Statistics Using Imputed Non-Detects**						
5984					Mean in Original Scale	20.85				Mean in Log Scale		3.03
5985					SD in Original Scale	2.646				SD in Log Scale		0.124
5986					95% t UCL (assumes normality of ROS data)	22.38				95% Percentile Bootstrap UCL		22.23
5987					95% BCA Bootstrap UCL	22.32				95% Bootstrap t UCL		22.7
5988					95% H-UCL (Log ROS)	22.49						
5989												
5990						**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**						
5991					KM Mean (logged)	3.03				KM Geo Mean		20.71
5992					KM SD (logged)	0.127				95% Critical H Value (KM-Log)		1.821
5993					KM Standard Error of Mean (logged)	0.0478				95% H-UCL (KM -Log)		22.54
5994					KM SD (logged)	0.127				95% Critical H Value (KM-Log)		1.821
5995					KM Standard Error of Mean (logged)	0.0478						
5996						**Note: KM UCLs may be biased low with this dataset. Other substitution method recommended**						
5997												
5998						**DL/2 Statistics**						
5999					**DL/2 Normal**					**DL/2 Log-Transformed**		
6000					Mean in Original Scale	23.7				Mean in Log Scale		3.135
6001					SD in Original Scale	6.482				SD in Log Scale		0.251
6002					95% t UCL (Assumes normality)	27.46				95% H-Stat UCL		27.9
6003						**DL/2 is not a recommended method, provided for comparisons and historical reasons**						
6004												
6005						**Nonparametric Distribution Free UCL Statistics**						
6006						**Detected Data appear Normal Distributed at 1% Significance Level**						
6007												
6008						**Suggested UCL to Use**						
6009					95% KM (t) UCL	22.75						
6010												
6011						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
6012						Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.						
6013						However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.						
6014												
6015	**Result (rrds-sw-antimony)**											
6016												
6017						**General Statistics**						
6018					Total Number of Observations	10				Number of Distinct Observations		2
6019					Number of Detects	1				Number of Non-Detects		9
6020					Number of Distinct Detects	1				Number of Distinct Non-Detects		1
6021												
6022						**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**						
6023						**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**						
6024												

6025	**The data set for variable Result (rrds-sw-antimony) was not processed!**											
6026												
6027												
6028												
6029	**Result (rrds-sw-arsenic)**											
6030												
6031	**General Statistics**											
6032					Total Number of Observations	10			Number of Distinct Observations	8		
6033									Number of Missing Observations	0		
6034					Minimum	0.43			Mean	0.559		
6035					Maximum	1.2			Median	0.495		
6036					SD	0.229			Std. Error of Mean	0.0724		
6037					Coefficient of Variation	0.409			Skewness	2.981		
6038												
6039	**Normal GOF Test**											
6040					Shapiro Wilk Test Statistic	0.534			**Shapiro Wilk GOF Test**			
6041					1% Shapiro Wilk Critical Value	0.781			Data Not Normal at 1% Significance Level			
6042					Lilliefors Test Statistic	0.398			**Lilliefors GOF Test**			
6043					1% Lilliefors Critical Value	0.304			Data Not Normal at 1% Significance Level			
6044	**Data Not Normal at 1% Significance Level**											
6045												
6046	**Assuming Normal Distribution**											
6047					**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**			
6048					95% Student's-t UCL	0.692			95% Adjusted-CLT UCL (Chen-1995)	0.751		
6049									95% Modified-t UCL (Johnson-1978)	0.703		
6050												
6051	**Gamma GOF Test**											
6052					A-D Test Statistic	1.744			**Anderson-Darling Gamma GOF Test**			
6053					5% A-D Critical Value	0.725			Data Not Gamma Distributed at 5% Significance Level			
6054					K-S Test Statistic	0.356			**Kolmogorov-Smirnov Gamma GOF Test**			
6055					5% K-S Critical Value	0.267			Data Not Gamma Distributed at 5% Significance Level			
6056	**Data Not Gamma Distributed at 5% Significance Level**											
6057												
6058	**Gamma Statistics**											
6059					k hat (MLE)	10.3			k star (bias corrected MLE)	7.277		
6060					Theta hat (MLE)	0.0543			Theta star (bias corrected MLE)	0.0768		
6061					nu hat (MLE)	206			nu star (bias corrected)	145.5		
6062					MLE Mean (bias corrected)	0.559			MLE Sd (bias corrected)	0.207		
6063									Approximate Chi Square Value (0.05)	118.7		
6064					Adjusted Level of Significance	0.0267			Adjusted Chi Square Value	114.4		
6065												
6066	**Assuming Gamma Distribution**											
6067					95% Approximate Gamma UCL	0.686			95% Adjusted Gamma UCL	0.711		
6068												
6069	**Lognormal GOF Test**											
6070					Shapiro Wilk Test Statistic	0.631			**Shapiro Wilk Lognormal GOF Test**			
6071					10% Shapiro Wilk Critical Value	0.869			Data Not Lognormal at 10% Significance Level			
6072					Lilliefors Test Statistic	0.332			**Lilliefors Lognormal GOF Test**			
6073					10% Lilliefors Critical Value	0.241			Data Not Lognormal at 10% Significance Level			
6074	**Data Not Lognormal at 10% Significance Level**											
6075												
6076	**Lognormal Statistics**											
6077					Minimum of Logged Data	-0.844			Mean of logged Data	-0.631		
6078					Maximum of Logged Data	0.182			SD of logged Data	0.297		
6079												
6080	**Assuming Lognormal Distribution**											
6081					95% H-UCL	0.676			90% Chebyshev (MVUE) UCL	0.711		
6082					95% Chebyshev (MVUE) UCL	0.782			97.5% Chebyshev (MVUE) UCL	0.881		
6083					99% Chebyshev (MVUE) UCL	1.075						
6084												
6085	**Nonparametric Distribution Free UCL Statistics**											
6086	**Data do not follow a Discernible Distribution**											
6087												
6088	**Nonparametric Distribution Free UCLs**											
6089					95% CLT UCL	0.678			95% BCA Bootstrap UCL	0.77		
6090					95% Standard Bootstrap UCL	0.672			95% Bootstrap-t UCL	1.143		
6091					95% Hall's Bootstrap UCL	1.172			95% Percentile Bootstrap UCL	0.694		
6092					90% Chebyshev(Mean, Sd) UCL	0.776			95% Chebyshev(Mean, Sd) UCL	0.874		
6093					97.5% Chebyshev(Mean, Sd) UCL	1.011			99% Chebyshev(Mean, Sd) UCL	1.279		
6094												
6095	**Suggested UCL to Use**											
6096					95% Student's-t UCL	0.692						
6097												
6098	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
6099	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
6100	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
6101												
6102												
6103	**Result (rrds-sw-barium)**											
6104												
6105	**General Statistics**											
6106					Total Number of Observations	10			Number of Distinct Observations	4		
6107									Number of Missing Observations	0		

6108					Minimum	13				Mean		14.1
6109					Maximum	16				Median		14
6110					SD	1.101				Std. Error of Mean		0.348
6111					Coefficient of Variation	0.078				Skewness		0.388
6112												
6113						**Normal GOF Test**						
6114					Shapiro Wilk Test Statistic	0.855			**Shapiro Wilk GOF Test**			
6115					1% Shapiro Wilk Critical Value	0.781			Data appear Normal at 1% Significance Level			
6116					Lilliefors Test Statistic	0.241			**Lilliefors GOF Test**			
6117					1% Lilliefors Critical Value	0.304			Data appear Normal at 1% Significance Level			
6118						**Data appear Normal at 1% Significance Level**						
6119												
6120						**Assuming Normal Distribution**						
6121					**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**			
6122					95% Student's-t UCL	14.74			95% Adjusted-CLT UCL (Chen-1995)			14.72
6123									95% Modified-t UCL (Johnson-1978)			14.75
6124												
6125						**Gamma GOF Test**						
6126					A-D Test Statistic	0.714			**Anderson-Darling Gamma GOF Test**			
6127					5% A-D Critical Value	0.724			Detected data appear Gamma Distributed at 5% Significance Level			
6128					K-S Test Statistic	0.256			**Kolmogorov-Smirnov Gamma GOF Test**			
6129					5% K-S Critical Value	0.266			Detected data appear Gamma Distributed at 5% Significance Level			
6130						**Detected data appear Gamma Distributed at 5% Significance Level**						
6131												
6132						**Gamma Statistics**						
6133					k hat (MLE)	184.7			k star (bias corrected MLE)			129.4
6134					Theta hat (MLE)	0.0763			Theta star (bias corrected MLE)			0.109
6135					nu hat (MLE)	3694			nu star (bias corrected)			2587
6136					MLE Mean (bias corrected)	14.1			MLE Sd (bias corrected)			1.24
6137									Approximate Chi Square Value (0.05)			2470
6138					Adjusted Level of Significance	0.0267			Adjusted Chi Square Value			2450
6139												
6140						**Assuming Gamma Distribution**						
6141					95% Approximate Gamma UCL	14.77			95% Adjusted Gamma UCL			14.89
6142												
6143						**Lognormal GOF Test**						
6144					Shapiro Wilk Test Statistic	0.853			**Shapiro Wilk Lognormal GOF Test**			
6145					10% Shapiro Wilk Critical Value	0.869			Data Not Lognormal at 10% Significance Level			
6146					Lilliefors Test Statistic	0.245			**Lilliefors Lognormal GOF Test**			
6147					10% Lilliefors Critical Value	0.241			Data Not Lognormal at 10% Significance Level			
6148						**Data Not Lognormal at 10% Significance Level**						
6149												
6150						**Lognormal Statistics**						
6151					Minimum of Logged Data	2.565			Mean of logged Data			2.643
6152					Maximum of Logged Data	2.773			SD of logged Data			0.0774
6153												
6154						**Assuming Lognormal Distribution**						
6155					95% H-UCL	N/A			90% Chebyshev (MVUE) UCL			15.14
6156					95% Chebyshev (MVUE) UCL	15.6			97.5% Chebyshev (MVUE) UCL			16.26
6157					99% Chebyshev (MVUE) UCL	17.53						
6158												
6159						**Nonparametric Distribution Free UCL Statistics**						
6160						**Data appear to follow a Discernible Distribution**						
6161												
6162						**Nonparametric Distribution Free UCLs**						
6163					95% CLT UCL	14.67			95% BCA Bootstrap UCL			N/A
6164					95% Standard Bootstrap UCL	N/A			95% Bootstrap-t UCL			N/A
6165					95% Hall's Bootstrap UCL	N/A			95% Percentile Bootstrap UCL			N/A
6166					90% Chebyshev(Mean, Sd) UCL	15.14			95% Chebyshev(Mean, Sd) UCL			15.62
6167					97.5% Chebyshev(Mean, Sd) UCL	16.27			99% Chebyshev(Mean, Sd) UCL			17.56
6168												
6169						**Suggested UCL to Use**						
6170					95% Student's-t UCL	14.74						
6171												
6172						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
6173						Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.						
6174						However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.						
6175												
6176	**Result (rrds-sw-beryllium)**											
6177												
6178						**General Statistics**						
6179					Total Number of Observations	10			Number of Distinct Observations			1
6180					Number of Detects	0			Number of Non-Detects			10
6181					Number of Distinct Detects	0			Number of Distinct Non-Detects			1
6182												
6183						**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**						
6184						**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**						
6185						**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**						
6186												
6187						**The data set for variable Result (rrds-sw-beryllium) was not processed!**						
6188												
6189												
6190	**Result (rrds-sw-cadmium)**											

6191												
6192						**General Statistics**						
6193					Total Number of Observations	10			Number of Distinct Observations	1		
6194					Number of Detects	0			Number of Non-Detects	10		
6195					Number of Distinct Detects	0			Number of Distinct Non-Detects	1		
6196												
6197					**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**							
6198					**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**							
6199					**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**							
6200												
6201					**The data set for variable Result (rrds-sw-cadmium) was not processed!**							
6202												
6203												
6204												
6205	**Result (rrds-sw-calcium)**											
6206												
6207						**General Statistics**						
6208					Total Number of Observations	10			Number of Distinct Observations	3		
6209									Number of Missing Observations	0		
6210					Minimum	21000			Mean	21600		
6211					Maximum	23000			Median	21500		
6212					SD	699.2			Std. Error of Mean	221.1		
6213					Coefficient of Variation	0.0324			Skewness	0.78		
6214												
6215						**Normal GOF Test**						
6216					Shapiro Wilk Test Statistic	0.781			**Shapiro Wilk GOF Test**			
6217					1% Shapiro Wilk Critical Value	0.781			Data Not Normal at 1% Significance Level			
6218					Lilliefors Test Statistic	0.305			**Lilliefors GOF Test**			
6219					1% Lilliefors Critical Value	0.304			Data Not Normal at 1% Significance Level			
6220					**Data Not Normal at 1% Significance Level**							
6221												
6222						**Assuming Normal Distribution**						
6223					**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**			
6224					95% Student's-t UCL	22005			95% Adjusted-CLT UCL (Chen-1995)	22022		
6225									95% Modified-t UCL (Johnson-1978)	22014		
6226												
6227						**Gamma GOF Test**						
6228					A-D Test Statistic	1.107			**Anderson-Darling Gamma GOF Test**			
6229					5% A-D Critical Value	0.724			Data Not Gamma Distributed at 5% Significance Level			
6230					K-S Test Statistic	0.318			**Kolmogorov-Smirnov Gamma GOF Test**			
6231					5% K-S Critical Value	0.266			Data Not Gamma Distributed at 5% Significance Level			
6232					**Data Not Gamma Distributed at 5% Significance Level**							
6233												
6234						**Gamma Statistics**						
6235					k hat (MLE)	1074			k star (bias corrected MLE)	751.8		
6236					Theta hat (MLE)	20.11			Theta star (bias corrected MLE)	28.73		
6237					nu hat (MLE)	21477			nu star (bias corrected)	15035		
6238					MLE Mean (bias corrected)	21600			MLE Sd (bias corrected)	787.8		
6239									Approximate Chi Square Value (0.05)	14751		
6240					Adjusted Level of Significance	0.0267			Adjusted Chi Square Value	14702		
6241												
6242						**Assuming Gamma Distribution**						
6243					95% Approximate Gamma UCL	22016			95% Adjusted Gamma UCL	22089		
6244												
6245						**Lognormal GOF Test**						
6246					Shapiro Wilk Test Statistic	0.781			**Shapiro Wilk Lognormal GOF Test**			
6247					10% Shapiro Wilk Critical Value	0.869			Data Not Lognormal at 10% Significance Level			
6248					Lilliefors Test Statistic	0.306			**Lilliefors Lognormal GOF Test**			
6249					10% Lilliefors Critical Value	0.241			Data Not Lognormal at 10% Significance Level			
6250					**Data Not Lognormal at 10% Significance Level**							
6251												
6252						**Lognormal Statistics**						
6253					Minimum of Logged Data	9.952			Mean of logged Data	9.98		
6254					Maximum of Logged Data	10.04			SD of logged Data	0.0321		
6255												
6256						**Assuming Lognormal Distribution**						
6257					95% H-UCL	N/A			90% Chebyshev (MVUE) UCL	22257		
6258					95% Chebyshev (MVUE) UCL	22555			97.5% Chebyshev (MVUE) UCL	22968		
6259					99% Chebyshev (MVUE) UCL	23780						
6260												
6261						**Nonparametric Distribution Free UCL Statistics**							
6262					**Data do not follow a Discernible Distribution**							
6263												
6264						**Nonparametric Distribution Free UCLs**							
6265					95% CLT UCL	21964			95% BCA Bootstrap UCL	N/A		
6266					95% Standard Bootstrap UCL	N/A			95% Bootstrap-t UCL	N/A		
6267					95% Hall's Bootstrap UCL	N/A			95% Percentile Bootstrap UCL	N/A		
6268					90% Chebyshev(Mean, Sd) UCL	22263			95% Chebyshev(Mean, Sd) UCL	22564		
6269					97.5% Chebyshev(Mean, Sd) UCL	22981			99% Chebyshev(Mean, Sd) UCL	23800		
6270												
6271						**Suggested UCL to Use**							
6272					95% Student's-t UCL	22005						
6273												

6274	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
6275	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
6276	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
6277												
6278	**Result (rrds-sw-chromium)**											
6279												
6280	**General Statistics**											
6281				Total Number of Observations	10			Number of Distinct Observations	1			
6282				Number of Detects	0			Number of Non-Detects	10			
6283				Number of Distinct Detects	0			Number of Distinct Non-Detects	1			
6284												
6285	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
6286	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
6287	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
6288												
6289	**The data set for variable Result (rrds-sw-chromium) was not processed!**											
6290												
6291												
6292	**Result (rrds-sw-cobalt)**											
6293												
6294	**General Statistics**											
6295				Total Number of Observations	10			Number of Distinct Observations	3			
6296				Number of Detects	2			Number of Non-Detects	8			
6297				Number of Distinct Detects	2			Number of Distinct Non-Detects	1			
6298				Minimum Detect	0.094			Minimum Non-Detect	0.35			
6299				Maximum Detect	0.097			Maximum Non-Detect	0.35			
6300				Variance Detects	4.5000E-6			Percent Non-Detects	80%			
6301				Mean Detects	0.0955			SD Detects	0.00212			
6302				Median Detects	0.0955			CV Detects	0.0222			
6303				Skewness Detects	N/A			Kurtosis Detects	N/A			
6304				Mean of Logged Detects	-2.349			SD of Logged Detects	0.0222			
6305												
6306	**Warning: Data set has only 2 Detected Values.**											
6307	**This is not enough to compute meaningful or reliable statistics and estimates.**											
6308												
6309												
6310	**Normal GOF Test on Detects Only**											
6311	**Not Enough Data to Perform GOF Test**											
6312												
6313	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
6314				KM Mean	0.0955			KM Standard Error of Mean	0.0015			
6315				90KM SD	0.0015			95% KM (BCA) UCL	N/A			
6316				95% KM (t) UCL	0.0982			95% KM (Percentile Bootstrap) UCL	N/A			
6317				95% KM (z) UCL	0.098			95% KM Bootstrap t UCL	N/A			
6318				90% KM Chebyshev UCL	0.1			95% KM Chebyshev UCL	0.102			
6319				97.5% KM Chebyshev UCL	0.105			99% KM Chebyshev UCL	0.11			
6320												
6321	**Gamma GOF Tests on Detected Observations Only**											
6322	**Not Enough Data to Perform GOF Test**											
6323												
6324	**Gamma Statistics on Detected Data Only**											
6325				k hat (MLE)	4053			k star (bias corrected MLE)	N/A			
6326				Theta hat (MLE)	2.3562E-5			Theta star (bias corrected MLE)	N/A			
6327				nu hat (MLE)	16212			nu star (bias corrected)	N/A			
6328				Mean (detects)	0.0955							
6329												
6330	**Estimates of Gamma Parameters using KM Estimates**											
6331				Mean (KM)	0.0955			SD (KM)	0.0015			
6332				Variance (KM)	2.2500E-6			SE of Mean (KM)	0.0015			
6333				k hat (KM)	4053			k star (KM)	2837			
6334				nu hat (KM)	81069			nu star (KM)	56750			
6335				theta hat (KM)	2.3560E-5			theta star (KM)	3.3657E-5			
6336				80% gamma percentile (KM)	0.097			90% gamma percentile (KM)	0.0978			
6337				95% gamma percentile (KM)	0.0985			99% gamma percentile (KM)	0.0997			
6338												
6339	**Gamma Kaplan-Meier (KM) Statistics**											
6340								Adjusted Level of Significance (β)	0.0267			
6341				Approximate Chi Square Value (N/A, α)	56197			Adjusted Chi Square Value (N/A, β)	56101			
6342				95% KM Approximate Gamma UCL	0.0964			95% KM Adjusted Gamma UCL	0.0966			
6343												
6344	**Lognormal GOF Test on Detected Observations Only**											
6345	**Not Enough Data to Perform GOF Test**											
6346												
6347	**Lognormal ROS Statistics Using Imputed Non-Detects**											
6348				Mean in Original Scale	0.0955			Mean in Log Scale	-2.349			
6349				SD in Original Scale	0.00258			SD in Log Scale	0.027			
6350				95% t UCL (assumes normality of ROS data)	0.097			95% Percentile Bootstrap UCL	0.0968			
6351				95% BCA Bootstrap UCL	0.0969			95% Bootstrap t UCL	0.097			
6352				95% H-UCL (Log ROS)	N/A							
6353												
6354	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
6355				KM Mean (logged)	-2.349			KM Geo Mean	0.0955			
6356				KM SD (logged)	0.0157			95% Critical H Value (KM-Log)	N/A			

KM Standard Error of Mean (logged)					0.0157	95% H-UCL (KM -Log)					N/A
KM SD (logged)					0.0157	95% Critical H Value (KM-Log)					N/A
KM Standard Error of Mean (logged)					0.0157						
DL/2 Statistics												
DL/2 Normal						**DL/2 Log-Transformed**						
Mean in Original Scale					0.159	Mean in Log Scale					-1.864
SD in Original Scale					0.0335	SD in Log Scale					0.256
95% t UCL (Assumes normality)					0.179	95% H-Stat UCL					0.189
DL/2 is not a recommended method, provided for comparisons and historical reasons												
Nonparametric Distribution Free UCL Statistics												
Data do not follow a Discernible Distribution												
Suggested UCL to Use												
95% KM (t) UCL					0.0982							
Warning: Recommended UCL exceeds the maximum observation												
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.												
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
Result (rrds-sw-copper)												
General Statistics												
Total Number of Observations					10	Number of Distinct Observations					3
						Number of Missing Observations					0
Minimum					1.2	Mean					1.28
Maximum					1.4	Median					1.3
SD					0.0789	Std. Error of Mean					0.0249
Coefficient of Variation					0.0616	Skewness					0.407
Normal GOF Test												
Shapiro Wilk Test Statistic					0.82	**Shapiro Wilk GOF Test**						
1% Shapiro Wilk Critical Value					0.781	Data appear Normal at 1% Significance Level						
Lilliefors Test Statistic					0.245	**Lilliefors GOF Test**						
1% Lilliefors Critical Value					0.304	Data appear Normal at 1% Significance Level						
Data appear Normal at 1% Significance Level												
Assuming Normal Distribution												
95% Normal UCL						**95% UCLs (Adjusted for Skewness)**						
95% Student's-t UCL					1.326	95% Adjusted-CLT UCL (Chen-1995)					1.324	
						95% Modified-t UCL (Johnson-1978)					1.326	
Gamma GOF Test												
A-D Test Statistic					0.855	**Anderson-Darling Gamma GOF Test**						
5% A-D Critical Value					0.724	Data Not Gamma Distributed at 5% Significance Level						
K-S Test Statistic					0.26	**Kolmogorov-Smirnov Gamma GOF Test**						
5% K-S Critical Value					0.266	Detected data appear Gamma Distributed at 5% Significance Level						
Detected data follow Appr. Gamma Distribution at 5% Significance Level												
Gamma Statistics												
k hat (MLE)					295.8	k star (bias corrected MLE)					207.1	
Theta hat (MLE)					0.00433	Theta star (bias corrected MLE)					0.00618	
nu hat (MLE)					5916	nu star (bias corrected)					4142	
MLE Mean (bias corrected)					1.28	MLE Sd (bias corrected)					0.0889	
						Approximate Chi Square Value (0.05)					3994	
Adjusted Level of Significance					0.0267	Adjusted Chi Square Value					3968	
Assuming Gamma Distribution												
95% Approximate Gamma UCL					1.328	95% Adjusted Gamma UCL					1.336	
Lognormal GOF Test												
Shapiro Wilk Test Statistic					0.82	**Shapiro Wilk Lognormal GOF Test**						
10% Shapiro Wilk Critical Value					0.869	Data Not Lognormal at 10% Significance Level						
Lilliefors Test Statistic					0.248	**Lilliefors Lognormal GOF Test**						
10% Lilliefors Critical Value					0.241	Data Not Lognormal at 10% Significance Level						
Data Not Lognormal at 10% Significance Level												
Lognormal Statistics												
Minimum of Logged Data					0.182	Mean of logged Data					0.245	
Maximum of Logged Data					0.336	SD of logged Data					0.0612	
Assuming Lognormal Distribution												
95% H-UCL					N/A	90% Chebyshev (MVUE) UCL					1.354	
95% Chebyshev (MVUE) UCL					1.388	97.5% Chebyshev (MVUE) UCL					1.435	
99% Chebyshev (MVUE) UCL					1.526							
Nonparametric Distribution Free UCL Statistics												
Data appear to follow a Discernible Distribution												
Nonparametric Distribution Free UCLs												

6440					95% CLT UCL	1.321				95% BCA Bootstrap UCL		N/A
6441					95% Standard Bootstrap UCL	N/A				95% Bootstrap-t UCL		N/A
6442					95% Hall's Bootstrap UCL	N/A				95% Percentile Bootstrap UCL		N/A
6443					90% Chebyshev(Mean, Sd) UCL	1.355				95% Chebyshev(Mean, Sd) UCL		1.389
6444					97.5% Chebyshev(Mean, Sd) UCL	1.436				99% Chebyshev(Mean, Sd) UCL		1.528
6445												
6446						**Suggested UCL to Use**						
6447					95% Student's-t UCL	1.326						
6448												
6449						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
6450						Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.						
6451						However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.						
6452												
6453	**Result (rrds-sw-iron)**											
6454												
6455						**General Statistics**						
6456					Total Number of Observations	10				Number of Distinct Observations		1
6457					Number of Detects	0				Number of Non-Detects		10
6458					Number of Distinct Detects	0				Number of Distinct Non-Detects		1
6459												
6460						**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**						
6461						**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**						
6462						**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**						
6463												
6464						**The data set for variable Result (rrds-sw-iron) was not processed!**						
6465												
6466												
6467	**Result (rrds-sw-lead)**											
6468												
6469						**General Statistics**						
6470					Total Number of Observations	10				Number of Distinct Observations		1
6471					Number of Detects	0				Number of Non-Detects		10
6472					Number of Distinct Detects	0				Number of Distinct Non-Detects		1
6473												
6474						**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**						
6475						**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**						
6476						**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**						
6477												
6478						**The data set for variable Result (rrds-sw-lead) was not processed!**						
6479												
6480												
6481												
6482	**Result (rrds-sw-magnesium)**											
6483												
6484						**General Statistics**						
6485					Total Number of Observations	10				Number of Distinct Observations		6
6486										Number of Missing Observations		0
6487					Minimum	3500				Mean		4290
6488					Maximum	8500				Median		3900
6489					SD	1487				Std. Error of Mean		470.3
6490					Coefficient of Variation	0.347				Skewness		3.097
6491												
6492						**Normal GOF Test**						
6493					Shapiro Wilk Test Statistic	0.466				**Shapiro Wilk GOF Test**		
6494					1% Shapiro Wilk Critical Value	0.781				Data Not Normal at 1% Significance Level		
6495					Lilliefors Test Statistic	0.477				**Lilliefors GOF Test**		
6496					1% Lilliefors Critical Value	0.304				Data Not Normal at 1% Significance Level		
6497						**Data Not Normal at 1% Significance Level**						
6498												
6499						**Assuming Normal Distribution**						
6500						**95% Normal UCL**					**95% UCLs (Adjusted for Skewness)**	
6501					95% Student's-t UCL	5152				95% Adjusted-CLT UCL (Chen-1995)		5556
6502										95% Modified-t UCL (Johnson-1978)		5229
6503												
6504						**Gamma GOF Test**						
6505					A-D Test Statistic	2.359				**Anderson-Darling Gamma GOF Test**		
6506					5% A-D Critical Value	0.725				Data Not Gamma Distributed at 5% Significance Level		
6507					K-S Test Statistic	0.467				**Kolmogorov-Smirnov Gamma GOF Test**		
6508					5% K-S Critical Value	0.266				Data Not Gamma Distributed at 5% Significance Level		
6509						**Data Not Gamma Distributed at 5% Significance Level**						
6510												
6511						**Gamma Statistics**						
6512					k hat (MLE)	13.94				k star (bias corrected MLE)		9.828
6513					Theta hat (MLE)	307.7				Theta star (bias corrected MLE)		436.5
6514					nu hat (MLE)	278.9				nu star (bias corrected)		196.6
6515					MLE Mean (bias corrected)	4290				MLE Sd (bias corrected)		1368
6516										Approximate Chi Square Value (0.05)		165.1
6517					Adjusted Level of Significance	0.0267				Adjusted Chi Square Value		160.1
6518												
6519						**Assuming Gamma Distribution**						
6520					95% Approximate Gamma UCL	5107				95% Adjusted Gamma UCL		5266
6521												
6522						**Lognormal GOF Test**						

6523				Shapiro Wilk Test Statistic	0.52	**Shapiro Wilk Lognormal GOF Test**						
6524				10% Shapiro Wilk Critical Value	0.869	Data Not Lognormal at 10% Significance Level						
6525				Lilliefors Test Statistic	0.452	**Lilliefors Lognormal GOF Test**						
6526				10% Lilliefors Critical Value	0.241	Data Not Lognormal at 10% Significance Level						
6527				**Data Not Lognormal at 10% Significance Level**								
6528												
6529				**Lognormal Statistics**								
6530				Minimum of Logged Data	8.161	Mean of logged Data	8.328					
6531				Maximum of Logged Data	9.048	SD of logged Data	0.256					
6532												
6533				**Assuming Lognormal Distribution**								
6534				95% H-UCL	5043	90% Chebyshev (MVUE) UCL	5302					
6535				95% Chebyshev (MVUE) UCL	5774	97.5% Chebyshev (MVUE) UCL	6429					
6536				99% Chebyshev (MVUE) UCL	7715							
6537												
6538				**Nonparametric Distribution Free UCL Statistics**								
6539				**Data do not follow a Discernible Distribution**								
6540												
6541				**Nonparametric Distribution Free UCLs**								
6542				95% CLT UCL	5064	95% BCA Bootstrap UCL	5680					
6543				95% Standard Bootstrap UCL	5020	95% Bootstrap-t UCL	10239					
6544				95% Hall's Bootstrap UCL	10164	95% Percentile Bootstrap UCL	5200					
6545				90% Chebyshev(Mean, Sd) UCL	5701	95% Chebyshev(Mean, Sd) UCL	6340					
6546				97.5% Chebyshev(Mean, Sd) UCL	7227	99% Chebyshev(Mean, Sd) UCL	8970					
6547												
6548				**Suggested UCL to Use**								
6549				95% Student's-t UCL	5152							
6550												
6551				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
6552				Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.								
6553				However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.								
6554												
6555												
6556	**Result (rrds-sw-manganese)**											
6557												
6558				**General Statistics**								
6559				Total Number of Observations	10	Number of Distinct Observations	7					
6560						Number of Missing Observations	0					
6561				Minimum	16	Mean	30.7					
6562				Maximum	130	Median	20					
6563				SD	34.98	Std. Error of Mean	11.06					
6564				Coefficient of Variation	1.14	Skewness	3.131					
6565												
6566				**Normal GOF Test**								
6567				Shapiro Wilk Test Statistic	0.434	**Shapiro Wilk GOF Test**						
6568				1% Shapiro Wilk Critical Value	0.781	Data Not Normal at 1% Significance Level						
6569				Lilliefors Test Statistic	0.487	**Lilliefors GOF Test**						
6570				1% Lilliefors Critical Value	0.304	Data Not Normal at 1% Significance Level						
6571				**Data Not Normal at 1% Significance Level**								
6572												
6573				**Assuming Normal Distribution**								
6574				**95% Normal UCL**		**95% UCLs (Adjusted for Skewness)**						
6575				95% Student's-t UCL	50.98	95% Adjusted-CLT UCL (Chen-1995)	60.6					
6576						95% Modified-t UCL (Johnson-1978)	52.8					
6577												
6578				**Gamma GOF Test**								
6579				A-D Test Statistic	2.28	**Anderson-Darling Gamma GOF Test**						
6580				5% A-D Critical Value	0.735	Data Not Gamma Distributed at 5% Significance Level						
6581				K-S Test Statistic	0.461	**Kolmogorov-Smirnov Gamma GOF Test**						
6582				5% K-S Critical Value	0.27	Data Not Gamma Distributed at 5% Significance Level						
6583				**Data Not Gamma Distributed at 5% Significance Level**								
6584												
6585				**Gamma Statistics**								
6586				k hat (MLE)	2.044	k star (bias corrected MLE)	1.497					
6587				Theta hat (MLE)	15.02	Theta star (bias corrected MLE)	20.5					
6588				nu hat (MLE)	40.88	nu star (bias corrected)	29.95					
6589				MLE Mean (bias corrected)	30.7	MLE Sd (bias corrected)	25.09					
6590						Approximate Chi Square Value (0.05)	18.45					
6591				Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	16.9					
6592												
6593				**Assuming Gamma Distribution**								
6594				95% Approximate Gamma UCL	49.83	95% Adjusted Gamma UCL	54.4					
6595												
6596				**Lognormal GOF Test**								
6597				Shapiro Wilk Test Statistic	0.571	**Shapiro Wilk Lognormal GOF Test**						
6598				10% Shapiro Wilk Critical Value	0.869	Data Not Lognormal at 10% Significance Level						
6599				Lilliefors Test Statistic	0.416	**Lilliefors Lognormal GOF Test**						
6600				10% Lilliefors Critical Value	0.241	Data Not Lognormal at 10% Significance Level						
6601				**Data Not Lognormal at 10% Significance Level**								
6602												
6603				**Lognormal Statistics**								
6604				Minimum of Logged Data	2.773	Mean of logged Data	3.16					
6605				Maximum of Logged Data	4.868	SD of logged Data	0.614					

6606												
6607						**Assuming Lognormal Distribution**							
6608						95% H-UCL	46.44				90% Chebyshev (MVUE) UCL	44.51
6609						95% Chebyshev (MVUE) UCL	52.05				97.5% Chebyshev (MVUE) UCL	62.51
6610						99% Chebyshev (MVUE) UCL	83.07					
6611												
6612						**Nonparametric Distribution Free UCL Statistics**							
6613						**Data do not follow a Discernible Distribution**							
6614												
6615						**Nonparametric Distribution Free UCLs**							
6616						95% CLT UCL	48.9				95% BCA Bootstrap UCL	63.4
6617						95% Standard Bootstrap UCL	47.93				95% Bootstrap-t UCL	222.6
6618						95% Hall's Bootstrap UCL	168				95% Percentile Bootstrap UCL	52.5
6619						90% Chebyshev(Mean, Sd) UCL	63.89				95% Chebyshev(Mean, Sd) UCL	78.92
6620						97.5% Chebyshev(Mean, Sd) UCL	99.79				99% Chebyshev(Mean, Sd) UCL	140.8
6621												
6622						**Suggested UCL to Use**							
6623						95% Student's-t UCL	50.98					
6624												
6625						**The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.**							
6626						**Please verify the data were collected from random locations.**							
6627						**If the data were collected using judgmental or other non-random methods,**							
6628						**then contact a statistician to correctly calculate UCLs.**							
6629												
6630						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
6631						Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.							
6632						However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
6633												
6634	**Result (rrds-sw-mercury)**											
6635												
6636						**General Statistics**							
6637						Total Number of Observations	10				Number of Distinct Observations	1
6638						Number of Detects	0				Number of Non-Detects	10
6639						Number of Distinct Detects	0				Number of Distinct Non-Detects	1
6640												
6641						**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**							
6642						**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**							
6643						**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**							
6644												
6645						**The data set for variable Result (rrds-sw-mercury) was not processed!**							
6646												
6647												
6648												
6649	**Result (rrds-sw-nickel)**											
6650												
6651						**General Statistics**							
6652						Total Number of Observations	10				Number of Distinct Observations	9
6653											Number of Missing Observations	0
6654						Minimum	0.37				Mean	0.444
6655						Maximum	0.56				Median	0.445
6656						SD	0.0636				Std. Error of Mean	0.0201
6657						Coefficient of Variation	0.143				Skewness	0.452
6658												
6659						**Normal GOF Test**							
6660						Shapiro Wilk Test Statistic	0.941				**Shapiro Wilk GOF Test**	
6661						1% Shapiro Wilk Critical Value	0.781				Data appear Normal at 1% Significance Level	
6662						Lilliefors Test Statistic	0.143				**Lilliefors GOF Test**	
6663						1% Lilliefors Critical Value	0.304				Data appear Normal at 1% Significance Level	
6664						**Data appear Normal at 1% Significance Level**							
6665												
6666						**Assuming Normal Distribution**							
6667						**95% Normal UCL**					**95% UCLs (Adjusted for Skewness)**	
6668						95% Student's-t UCL	0.481				95% Adjusted-CLT UCL (Chen-1995)	0.48
6669											95% Modified-t UCL (Johnson-1978)	0.481
6670												
6671						**Gamma GOF Test**							
6672						A-D Test Statistic	0.261				**Anderson-Darling Gamma GOF Test**	
6673						5% A-D Critical Value	0.724				Detected data appear Gamma Distributed at 5% Significance Level	
6674						K-S Test Statistic	0.16				**Kolmogorov-Smirnov Gamma GOF Test**	
6675						5% K-S Critical Value	0.266				Detected data appear Gamma Distributed at 5% Significance Level	
6676						**Detected data appear Gamma Distributed at 5% Significance Level**							
6677												
6678						**Gamma Statistics**							
6679						k hat (MLE)	55.17				k star (bias corrected MLE)	38.68
6680						Theta hat (MLE)	0.00805				Theta star (bias corrected MLE)	0.0115
6681						nu hat (MLE)	1103				nu star (bias corrected)	773.7
6682						MLE Mean (bias corrected)	0.444				MLE Sd (bias corrected)	0.0714
6683											Approximate Chi Square Value (0.05)	710.1
6684						Adjusted Level of Significance	0.0267				Adjusted Chi Square Value	699.5
6685												
6686						**Assuming Gamma Distribution**							
6687						95% Approximate Gamma UCL	0.484				95% Adjusted Gamma UCL	0.491
6688												

6689					**Lognormal GOF Test**							
6690				Shapiro Wilk Test Statistic	0.944		**Shapiro Wilk Lognormal GOF Test**					
6691				10% Shapiro Wilk Critical Value	0.869		Data appear Lognormal at 10% Significance Level					
6692				Lilliefors Test Statistic	0.15		**Lilliefors Lognormal GOF Test**					
6693				10% Lilliefors Critical Value	0.241		Data appear Lognormal at 10% Significance Level					
6694					**Data appear Lognormal at 10% Significance Level**							
6695												
6696					**Lognormal Statistics**							
6697				Minimum of Logged Data	-0.994		Mean of logged Data	-0.821				
6698				Maximum of Logged Data	-0.58		SD of logged Data	0.142				
6699												
6700					**Assuming Lognormal Distribution**							
6701				95% H-UCL	0.485		90% Chebyshev (MVUE) UCL	0.504				
6702				95% Chebyshev (MVUE) UCL	0.531		97.5% Chebyshev (MVUE) UCL	0.568				
6703				99% Chebyshev (MVUE) UCL	0.642							
6704												
6705					**Nonparametric Distribution Free UCL Statistics**							
6706					**Data appear to follow a Discernible Distribution**							
6707												
6708					**Nonparametric Distribution Free UCLs**							
6709				95% CLT UCL	0.477		95% BCA Bootstrap UCL	0.475				
6710				95% Standard Bootstrap UCL	0.475		95% Bootstrap-t UCL	0.487				
6711				95% Hall's Bootstrap UCL	0.484		95% Percentile Bootstrap UCL	0.475				
6712				90% Chebyshev(Mean, Sd) UCL	0.504		95% Chebyshev(Mean, Sd) UCL	0.532				
6713				97.5% Chebyshev(Mean, Sd) UCL	0.57		99% Chebyshev(Mean, Sd) UCL	0.644				
6714												
6715					**Suggested UCL to Use**							
6716				95% Student's-t UCL	0.481							
6717												
6718					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
6719					Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.							
6720					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
6721												
6722												
6723	**Result (rrds-sw-potassium)**											
6724												
6725					**General Statistics**							
6726				Total Number of Observations	10		Number of Distinct Observations	4				
6727							Number of Missing Observations	0				
6728				Minimum	1300		Mean	1580				
6729				Maximum	3100		Median	1400				
6730				SD	537.1		Std. Error of Mean	169.8				
6731				Coefficient of Variation	0.34		Skewness	3.097				
6732												
6733					**Normal GOF Test**							
6734				Shapiro Wilk Test Statistic	0.455		**Shapiro Wilk GOF Test**					
6735				1% Shapiro Wilk Critical Value	0.781		Data Not Normal at 1% Significance Level					
6736				Lilliefors Test Statistic	0.459		**Lilliefors GOF Test**					
6737				1% Lilliefors Critical Value	0.304		Data Not Normal at 1% Significance Level					
6738					**Data Not Normal at 1% Significance Level**							
6739												
6740					**Assuming Normal Distribution**							
6741				**95% Normal UCL**			**95% UCLs (Adjusted for Skewness)**					
6742				95% Student's-t UCL	1891		95% Adjusted-CLT UCL (Chen-1995)	2037				
6743							95% Modified-t UCL (Johnson-1978)	1919				
6744												
6745					**Gamma GOF Test**							
6746				A-D Test Statistic	2.482		**Anderson-Darling Gamma GOF Test**					
6747				5% A-D Critical Value	0.725		Data Not Gamma Distributed at 5% Significance Level					
6748				K-S Test Statistic	0.443		**Kolmogorov-Smirnov Gamma GOF Test**					
6749				5% K-S Critical Value	0.266		Data Not Gamma Distributed at 5% Significance Level					
6750					**Data Not Gamma Distributed at 5% Significance Level**							
6751												
6752					**Gamma Statistics**							
6753				k hat (MLE)	14.42		k star (bias corrected MLE)	10.16				
6754				Theta hat (MLE)	109.6		Theta star (bias corrected MLE)	155.5				
6755				nu hat (MLE)	288.4		nu star (bias corrected)	203.2				
6756				MLE Mean (bias corrected)	1580		MLE Sd (bias corrected)	495.7				
6757							Approximate Chi Square Value (0.05)	171.2				
6758				Adjusted Level of Significance	0.0267		Adjusted Chi Square Value	166.1				
6759												
6760					**Assuming Gamma Distribution**							
6761				95% Approximate Gamma UCL	1875		95% Adjusted Gamma UCL	1933				
6762												
6763					**Lognormal GOF Test**							
6764				Shapiro Wilk Test Statistic	0.502		**Shapiro Wilk Lognormal GOF Test**					
6765				10% Shapiro Wilk Critical Value	0.869		Data Not Lognormal at 10% Significance Level					
6766				Lilliefors Test Statistic	0.427		**Lilliefors Lognormal GOF Test**					
6767				10% Lilliefors Critical Value	0.241		Data Not Lognormal at 10% Significance Level					
6768					**Data Not Lognormal at 10% Significance Level**							
6769												
6770					**Lognormal Statistics**							
6771				Minimum of Logged Data	7.17		Mean of logged Data	7.33				

6772				Maximum of Logged Data	8.039					SD of logged Data	0.252	
6773												
6774				**Assuming Lognormal Distribution**								
6775				95% H-UCL	1852					90% Chebyshev (MVUE) UCL	1947	
6776				95% Chebyshev (MVUE) UCL	2119					97.5% Chebyshev (MVUE) UCL	2356	
6777				99% Chebyshev (MVUE) UCL	2823							
6778												
6779				**Nonparametric Distribution Free UCL Statistics**								
6780				**Data do not follow a Discernible Distribution**								
6781												
6782				**Nonparametric Distribution Free UCLs**								
6783				95% CLT UCL	1859					95% BCA Bootstrap UCL	N/A	
6784				95% Standard Bootstrap UCL	N/A					95% Bootstrap-t UCL	N/A	
6785				95% Hall's Bootstrap UCL	N/A					95% Percentile Bootstrap UCL	N/A	
6786				90% Chebyshev(Mean, Sd) UCL	2090					95% Chebyshev(Mean, Sd) UCL	2320	
6787				97.5% Chebyshev(Mean, Sd) UCL	2641					99% Chebyshev(Mean, Sd) UCL	3270	
6788												
6789				**Suggested UCL to Use**								
6790				95% Student's-t UCL	1891							
6791												
6792				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
6793				Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.								
6794				However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.								
6795												
6796	**Result (rrds-sw-selenium)**											
6797												
6798				**General Statistics**								
6799				Total Number of Observations	10					Number of Distinct Observations	1	
6800				Number of Detects	0					Number of Non-Detects	10	
6801				Number of Distinct Detects	0					Number of Distinct Non-Detects	1	
6802												
6803				**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**								
6804				**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**								
6805				**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**								
6806												
6807				**The data set for variable Result (rrds-sw-selenium) was not processed!**								
6808												
6809												
6810	**Result (rrds-sw-silver)**											
6811												
6812				**General Statistics**								
6813				Total Number of Observations	10					Number of Distinct Observations	1	
6814				Number of Detects	0					Number of Non-Detects	10	
6815				Number of Distinct Detects	0					Number of Distinct Non-Detects	1	
6816												
6817				**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**								
6818				**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**								
6819				**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**								
6820												
6821				**The data set for variable Result (rrds-sw-silver) was not processed!**								
6822												
6823												
6824												
6825	**Result (rrds-sw-sodium)**											
6826												
6827				**General Statistics**								
6828				Total Number of Observations	10					Number of Distinct Observations	4	
6829										Number of Missing Observations	0	
6830				Minimum	16000					Mean	20200	
6831				Maximum	51000					Median	17000	
6832				SD	10840					Std. Error of Mean	3428	
6833				Coefficient of Variation	0.537					Skewness	3.142	
6834												
6835				**Normal GOF Test**								
6836				Shapiro Wilk Test Statistic	0.415					**Shapiro Wilk GOF Test**		
6837				1% Shapiro Wilk Critical Value	0.781					Data Not Normal at 1% Significance Level		
6838				Lilliefors Test Statistic	0.48					**Lilliefors GOF Test**		
6839				1% Lilliefors Critical Value	0.304					Data Not Normal at 1% Significance Level		
6840				**Data Not Normal at 1% Significance Level**								
6841												
6842				**Assuming Normal Distribution**								
6843				**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**		
6844				95% Student's-t UCL	26484					95% Adjusted-CLT UCL (Chen-1995)	29478	
6845										95% Modified-t UCL (Johnson-1978)	27052	
6846												
6847				**Gamma GOF Test**								
6848				A-D Test Statistic	2.738					**Anderson-Darling Gamma GOF Test**		
6849				5% A-D Critical Value	0.728					Data Not Gamma Distributed at 5% Significance Level		
6850				K-S Test Statistic	0.466					**Kolmogorov-Smirnov Gamma GOF Test**		
6851				5% K-S Critical Value	0.267					Data Not Gamma Distributed at 5% Significance Level		
6852				**Data Not Gamma Distributed at 5% Significance Level**								
6853												
6854				**Gamma Statistics**								

6855					k hat (MLE)	6.822					k star (bias corrected MLE)	4.842
6856					Theta hat (MLE)	2961					Theta star (bias corrected MLE)	4172
6857					nu hat (MLE)	136.4					nu star (bias corrected)	96.84
6858					MLE Mean (bias corrected)	20200					MLE Sd (bias corrected)	9180
6859											Approximate Chi Square Value (0.05)	75.14
6860					Adjusted Level of Significance	0.0267					Adjusted Chi Square Value	71.83
6861												
6862						**Assuming Gamma Distribution**							
6863					95% Approximate Gamma UCL	26033					95% Adjusted Gamma UCL	27235
6864												
6865						**Lognormal GOF Test**						
6866					Shapiro Wilk Test Statistic	0.456	**Shapiro Wilk Lognormal GOF Test**					
6867					10% Shapiro Wilk Critical Value	0.869	Data Not Lognormal at 10% Significance Level					
6868					Lilliefors Test Statistic	0.445	**Lilliefors Lognormal GOF Test**					
6869					10% Lilliefors Critical Value	0.241	Data Not Lognormal at 10% Significance Level					
6870						**Data Not Lognormal at 10% Significance Level**							
6871												
6872						**Lognormal Statistics**						
6873					Minimum of Logged Data	9.68					Mean of logged Data	9.838
6874					Maximum of Logged Data	10.84					SD of logged Data	0.354
6875												
6876						**Assuming Lognormal Distribution**							
6877					95% H-UCL	25360					90% Chebyshev (MVUE) UCL	26534
6878					95% Chebyshev (MVUE) UCL	29576					97.5% Chebyshev (MVUE) UCL	33798
6879					99% Chebyshev (MVUE) UCL	42091						
6880												
6881						**Nonparametric Distribution Free UCL Statistics**							
6882						**Data do not follow a Discernible Distribution**							
6883												
6884						**Nonparametric Distribution Free UCLs**							
6885					95% CLT UCL	25839					95% BCA Bootstrap UCL	N/A
6886					95% Standard Bootstrap UCL	N/A					95% Bootstrap-t UCL	N/A
6887					95% Hall's Bootstrap UCL	N/A					95% Percentile Bootstrap UCL	N/A
6888					90% Chebyshev(Mean, Sd) UCL	30484					95% Chebyshev(Mean, Sd) UCL	35142
6889					97.5% Chebyshev(Mean, Sd) UCL	41608					99% Chebyshev(Mean, Sd) UCL	54308
6890												
6891						**Suggested UCL to Use**							
6892					95% Student's-t UCL	26484						
6893												
6894						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
6895						Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.							
6896						However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
6897												
6898	**Result (rrds-sw-thallium)**											
6899												
6900						**General Statistics**							
6901					Total Number of Observations	10					Number of Distinct Observations	1
6902					Number of Detects	0					Number of Non-Detects	10
6903					Number of Distinct Detects	0					Number of Distinct Non-Detects	1
6904												
6905						**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**							
6906						**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**							
6907						**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**							
6908												
6909						**The data set for variable Result (rrds-sw-thallium) was not processed!**							
6910												
6911												
6912	**Result (rrds-sw-vanadium)**											
6913												
6914						**General Statistics**							
6915					Total Number of Observations	10					Number of Distinct Observations	2
6916					Number of Detects	1					Number of Non-Detects	9
6917					Number of Distinct Detects	1					Number of Distinct Non-Detects	1
6918												
6919						**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**							
6920						**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**							
6921												
6922						**The data set for variable Result (rrds-sw-vanadium) was not processed!**							
6923												
6924												
6925												
6926	**Result (rrds-sw-water hardness)**											
6927												
6928						**General Statistics**							
6929					Total Number of Observations	10					Number of Distinct Observations	6
6930											Number of Missing Observations	0
6931					Minimum	67					Mean	71.7
6932					Maximum	93					Median	70
6933					SD	7.573					Std. Error of Mean	2.395
6934					Coefficient of Variation	0.106					Skewness	3.022
6935												
6936						**Normal GOF Test**						
6937					Shapiro Wilk Test Statistic	0.511	**Shapiro Wilk GOF Test**					

6938				1% Shapiro Wilk Critical Value		0.781		Data Not Normal at 1% Significance Level				
6939				Lilliefors Test Statistic		0.437		**Lilliefors GOF Test**				
6940				1% Lilliefors Critical Value		0.304		Data Not Normal at 1% Significance Level				
6941				**Data Not Normal at 1% Significance Level**								
6942												
6943				**Assuming Normal Distribution**								
6944				**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**				
6945				95% Student's-t UCL		76.09		95% Adjusted-CLT UCL (Chen-1995)				78.08
6946								95% Modified-t UCL (Johnson-1978)				76.47
6947												
6948				**Gamma GOF Test**								
6949				A-D Test Statistic		2.193		**Anderson-Darling Gamma GOF Test**				
6950				5% A-D Critical Value		0.724		Data Not Gamma Distributed at 5% Significance Level				
6951				K-S Test Statistic		0.43		**Kolmogorov-Smirnov Gamma GOF Test**				
6952				5% K-S Critical Value		0.266		Data Not Gamma Distributed at 5% Significance Level				
6953				**Data Not Gamma Distributed at 5% Significance Level**								
6954												
6955				**Gamma Statistics**								
6956				k hat (MLE)		115.8		k star (bias corrected MLE)				81.14
6957				Theta hat (MLE)		0.619		Theta star (bias corrected MLE)				0.884
6958				nu hat (MLE)		2316		nu star (bias corrected)				1623
6959				MLE Mean (bias corrected)		71.7		MLE Sd (bias corrected)				7.96
6960								Approximate Chi Square Value (0.05)				1530
6961				Adjusted Level of Significance		0.0267		Adjusted Chi Square Value				1515
6962												
6963				**Assuming Gamma Distribution**								
6964				95% Approximate Gamma UCL		76.04		95% Adjusted Gamma UCL				76.82
6965												
6966				**Lognormal GOF Test**								
6967				Shapiro Wilk Test Statistic		0.535		**Shapiro Wilk Lognormal GOF Test**				
6968				10% Shapiro Wilk Critical Value		0.869		Data Not Lognormal at 10% Significance Level				
6969				Lilliefors Test Statistic		0.423		**Lilliefors Lognormal GOF Test**				
6970				10% Lilliefors Critical Value		0.241		Data Not Lognormal at 10% Significance Level				
6971				**Data Not Lognormal at 10% Significance Level**								
6972												
6973				**Lognormal Statistics**								
6974				Minimum of Logged Data		4.205		Mean of logged Data				4.268
6975				Maximum of Logged Data		4.533		SD of logged Data				0.0944
6976												
6977				**Assuming Lognormal Distribution**								
6978				95% H-UCL		N/A		90% Chebyshev (MVUE) UCL				78.1
6979				95% Chebyshev (MVUE) UCL		81.01		97.5% Chebyshev (MVUE) UCL				85.05
6980				99% Chebyshev (MVUE) UCL		92.99						
6981												
6982				**Nonparametric Distribution Free UCL Statistics**								
6983				**Data do not follow a Discernible Distribution**								
6984												
6985				**Nonparametric Distribution Free UCLs**								
6986				95% CLT UCL		75.64		95% BCA Bootstrap UCL				78.7
6987				95% Standard Bootstrap UCL		75.42		95% Bootstrap-t UCL				91.7
6988				95% Hall's Bootstrap UCL		98.26		95% Percentile Bootstrap UCL				76.3
6989				90% Chebyshev(Mean, Sd) UCL		78.88		95% Chebyshev(Mean, Sd) UCL				82.14
6990				97.5% Chebyshev(Mean, Sd) UCL		86.65		99% Chebyshev(Mean, Sd) UCL				95.53
6991												
6992				**Suggested UCL to Use**								
6993				95% Student's-t UCL		76.09						
6994												
6995				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
6996				Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.								
6997				However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.								
6998												
6999	**Result (rrds-sw-zinc)**											
7000												
7001				**General Statistics**								
7002				Total Number of Observations		10		Number of Distinct Observations				1
7003				Number of Detects		0		Number of Non-Detects				10
7004				Number of Distinct Detects		0		Number of Distinct Non-Detects				1
7005												
7006				**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**								
7007				**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**								
7008				**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**								
7009												
7010				**The data set for variable Result (rrds-sw-zinc) was not processed!**								
7011												
7012												
7013	**Result (tws-sw-aluminum)**											
7014												
7015				**General Statistics**								
7016				Total Number of Observations		10		Number of Distinct Observations				5
7017				Number of Detects		4		Number of Non-Detects				6
7018				Number of Distinct Detects		4		Number of Distinct Non-Detects				1
7019				Minimum Detect		18		Minimum Non-Detect				70
7020				Maximum Detect		33		Maximum Non-Detect				70

7021					Variance Detects	50.25					Percent Non-Detects	60%
7022					Mean Detects	24.25					SD Detects	7.089
7023					Median Detects	23					CV Detects	0.292
7024					Skewness Detects	0.565					Kurtosis Detects	-2.669
7025					Mean of Logged Detects	3.157					SD of Logged Detects	0.289
7026												
7027					**Normal GOF Test on Detects Only**							
7028					Shapiro Wilk Test Statistic	0.9				**Shapiro Wilk GOF Test**		
7029					1% Shapiro Wilk Critical Value	0.687				Detected Data appear Normal at 1% Significance Level		
7030					Lilliefors Test Statistic	0.271				**Lilliefors GOF Test**		
7031					1% Lilliefors Critical Value	0.413				Detected Data appear Normal at 1% Significance Level		
7032					**Detected Data appear Normal at 1% Significance Level**							
7033					**Note GOF tests may be unreliable for small sample sizes**							
7034												
7035					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**							
7036					KM Mean	24.25					KM Standard Error of Mean	3.544
7037					90KM SD	6.139					95% KM (BCA) UCL	N/A
7038					95% KM (t) UCL	30.75					95% KM (Percentile Bootstrap) UCL	N/A
7039					95% KM (z) UCL	30.08					95% KM Bootstrap t UCL	N/A
7040					90% KM Chebyshev UCL	34.88					95% KM Chebyshev UCL	39.7
7041					97.5% KM Chebyshev UCL	46.38					99% KM Chebyshev UCL	59.52
7042												
7043					**Gamma GOF Tests on Detected Observations Only**							
7044					A-D Test Statistic	0.371				**Anderson-Darling GOF Test**		
7045					5% A-D Critical Value	0.657				Detected data appear Gamma Distributed at 5% Significance Level		
7046					K-S Test Statistic	0.303				**Kolmogorov-Smirnov GOF**		
7047					5% K-S Critical Value	0.395				Detected data appear Gamma Distributed at 5% Significance Level		
7048					**Detected data appear Gamma Distributed at 5% Significance Level**							
7049					**Note GOF tests may be unreliable for small sample sizes**							
7050												
7051					**Gamma Statistics on Detected Data Only**							
7052					k hat (MLE)	15.97					k star (bias corrected MLE)	4.16
7053					Theta hat (MLE)	1.518					Theta star (bias corrected MLE)	5.829
7054					nu hat (MLE)	127.8					nu star (bias corrected)	33.28
7055					Mean (detects)	24.25						
7056												
7057					**Gamma ROS Statistics using Imputed Non-Detects**							
7058					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
7059					GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)							
7060					For such situations, GROS method may yield incorrect values of UCLs and BTVs							
7061					This is especially true when the sample size is small.							
7062					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
7063					Minimum	14.65					Mean	24.3
7064					Maximum	35.06					Median	23.97
7065					SD	6.866					CV	0.282
7066					k hat (MLE)	13.74					k star (bias corrected MLE)	9.688
7067					Theta hat (MLE)	1.768					Theta star (bias corrected MLE)	2.509
7068					nu hat (MLE)	274.9					nu star (bias corrected)	193.8
7069					Adjusted Level of Significance (β)	0.0267						
7070					Approximate Chi Square Value (193.76, α)	162.6					Adjusted Chi Square Value (193.76, β)	157.6
7071					95% Gamma Approximate UCL	28.97					95% Gamma Adjusted UCL	N/A
7072												
7073					**Estimates of Gamma Parameters using KM Estimates**							
7074					Mean (KM)	24.25					SD (KM)	6.139
7075					Variance (KM)	37.69					SE of Mean (KM)	3.544
7076					k hat (KM)	15.6					k star (KM)	10.99
7077					nu hat (KM)	312.1					nu star (KM)	219.8
7078					theta hat (KM)	1.554					theta star (KM)	2.207
7079					80% gamma percentile (KM)	30.1					90% gamma percentile (KM)	33.97
7080					95% gamma percentile (KM)	37.4					99% gamma percentile (KM)	44.42
7081												
7082					**Gamma Kaplan-Meier (KM) Statistics**							
7083					Approximate Chi Square Value (219.78, α)	186.5					Adjusted Chi Square Value (219.78, β)	181.1
7084					95% KM Approximate Gamma UCL	28.58					95% KM Adjusted Gamma UCL	29.42
7085												
7086					**Lognormal GOF Test on Detected Observations Only**							
7087					Shapiro Wilk Test Statistic	0.901				**Shapiro Wilk GOF Test**		
7088					10% Shapiro Wilk Critical Value	0.792				Detected Data appear Lognormal at 10% Significance Level		
7089					Lilliefors Test Statistic	0.269				**Lilliefors GOF Test**		
7090					10% Lilliefors Critical Value	0.346				Detected Data appear Lognormal at 10% Significance Level		
7091					**Detected Data appear Lognormal at 10% Significance Level**							
7092					**Note GOF tests may be unreliable for small sample sizes**							
7093												
7094					**Lognormal ROS Statistics Using Imputed Non-Detects**							
7095					Mean in Original Scale	24.33					Mean in Log Scale	3.157
7096					SD in Original Scale	6.789					SD in Log Scale	0.279
7097					95% t UCL (assumes normality of ROS data)	28.27					95% Percentile Bootstrap UCL	27.88
7098					95% BCA Bootstrap UCL	27.97					95% Bootstrap t UCL	28.64
7099					95% H-UCL (Log ROS)	29.29						
7100												
7101					**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**							
7102					KM Mean (logged)	3.157					KM Geo Mean	23.5
7103					KM SD (logged)	0.25					95% Critical H Value (KM-Log)	1.927

7104			KM Standard Error of Mean (logged)			0.145				95% H-UCL (KM -Log)		28.47
7105			KM SD (logged)			0.25				95% Critical H Value (KM-Log)		1.927
7106			KM Standard Error of Mean (logged)			0.145						
7107			**Note: KM UCLs may be biased low with this dataset. Other substitution method recommended**									
7108												
7109			**DL/2 Statistics**									
7110			**DL/2 Normal**							**DL/2 Log-Transformed**		
7111			Mean in Original Scale			30.7				Mean in Log Scale		3.396
7112			SD in Original Scale			6.897				SD in Log Scale		0.265
7113			95% t UCL (Assumes normality)			34.7				95% H-Stat UCL		36.69
7114			**DL/2 is not a recommended method, provided for comparisons and historical reasons**									
7115												
7116			**Nonparametric Distribution Free UCL Statistics**									
7117			**Detected Data appear Normal Distributed at 1% Significance Level**									
7118												
7119			**Suggested UCL to Use**									
7120			95% KM (t) UCL			30.75						
7121												
7122			Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.									
7123			Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.									
7124			However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.									
7125												
7126	**Result (tws-sw-antimony)**											
7127												
7128			**General Statistics**									
7129			Total Number of Observations			10				Number of Distinct Observations		7
7130			Number of Detects			7				Number of Non-Detects		3
7131			Number of Distinct Detects			6				Number of Distinct Non-Detects		1
7132			Minimum Detect			0.42				Minimum Non-Detect		1
7133			Maximum Detect			1.2				Maximum Non-Detect		1
7134			Variance Detects			0.0769				Percent Non-Detects		30%
7135			Mean Detects			0.589				SD Detects		0.277
7136			Median Detects			0.53				CV Detects		0.471
7137			Skewness Detects			2.347				Kurtosis Detects		5.794
7138			Mean of Logged Detects			-0.599				SD of Logged Detects		0.37
7139												
7140			**Normal GOF Test on Detects Only**									
7141			Shapiro Wilk Test Statistic			0.655				**Shapiro Wilk GOF Test**		
7142			1% Shapiro Wilk Critical Value			0.73				Detected Data Not Normal at 1% Significance Level		
7143			Lilliefors Test Statistic			0.369				**Lilliefors GOF Test**		
7144			1% Lilliefors Critical Value			0.35				Detected Data Not Normal at 1% Significance Level		
7145			**Detected Data Not Normal at 1% Significance Level**									
7146												
7147			**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**									
7148			KM Mean			0.558				KM Standard Error of Mean		0.0775
7149			90KM SD			0.223				95% KM (BCA) UCL		0.705
7150			95% KM (t) UCL			0.7				95% KM (Percentile Bootstrap) UCL		0.697
7151			95% KM (z) UCL			0.686				95% KM Bootstrap t UCL		0.89
7152			90% KM Chebyshev UCL			0.791				95% KM Chebyshev UCL		0.896
7153			97.5% KM Chebyshev UCL			1.042				99% KM Chebyshev UCL		1.33
7154												
7155			**Gamma GOF Tests on Detected Observations Only**									
7156			A-D Test Statistic			0.93				**Anderson-Darling GOF Test**		
7157			5% A-D Critical Value			0.709				Detected Data Not Gamma Distributed at 5% Significance Level		
7158			K-S Test Statistic			0.324				**Kolmogorov-Smirnov GOF**		
7159			5% K-S Critical Value			0.312				Detected Data Not Gamma Distributed at 5% Significance Level		
7160			**Detected Data Not Gamma Distributed at 5% Significance Level**									
7161												
7162			**Gamma Statistics on Detected Data Only**									
7163			k hat (MLE)			7.423				k star (bias corrected MLE)		4.337
7164			Theta hat (MLE)			0.0793				Theta star (bias corrected MLE)		0.136
7165			nu hat (MLE)			103.9				nu star (bias corrected)		60.72
7166			Mean (detects)			0.589						
7167												
7168			**Gamma ROS Statistics using Imputed Non-Detects**									
7169			GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs									
7170			GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)									
7171			For such situations, GROS method may yield incorrect values of UCLs and BTVs									
7172			This is especially true when the sample size is small.									
7173			For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates									
7174			Minimum			0.365				Mean		0.565
7175			Maximum			1.2				Median		0.519
7176			SD			0.24				CV		0.424
7177			k hat (MLE)			8.645				k star (bias corrected MLE)		6.118
7178			Theta hat (MLE)			0.0654				Theta star (bias corrected MLE)		0.0924
7179			nu hat (MLE)			172.9				nu star (bias corrected)		122.4
7180			Adjusted Level of Significance (β)			0.0267						
7181			Approximate Chi Square Value (122.37, α)			97.82				Adjusted Chi Square Value (122.37, β)		94.01
7182			95% Gamma Approximate UCL			0.707				95% Gamma Adjusted UCL		0.736
7183												
7184			**Estimates of Gamma Parameters using KM Estimates**									
7185			Mean (KM)			0.558				SD (KM)		0.223
7186			Variance (KM)			0.0496				SE of Mean (KM)		0.0775

7187					k hat (KM)	6.274					k star (KM)	4.459
7188					nu hat (KM)	125.5					nu star (KM)	89.17
7189					theta hat (KM)	0.0889					theta star (KM)	0.125
7190					80% gamma percentile (KM)	0.76					90% gamma percentile (KM)	0.912
7191					95% gamma percentile (KM)	1.051					99% gamma percentile (KM)	1.348
7192												
7193					**Gamma Kaplan-Meier (KM) Statistics**							
7194					Approximate Chi Square Value (89.17, α)	68.4					Adjusted Chi Square Value (89.17, β)	65.25
7195					95% KM Approximate Gamma UCL	0.727					95% KM Adjusted Gamma UCL	0.763
7196												
7197					**Lognormal GOF Test on Detected Observations Only**							
7198					Shapiro Wilk Test Statistic	0.751					**Shapiro Wilk GOF Test**	
7199					10% Shapiro Wilk Critical Value	0.838					Detected Data Not Lognormal at 10% Significance Level	
7200					Lilliefors Test Statistic	0.299					**Lilliefors GOF Test**	
7201					10% Lilliefors Critical Value	0.28					Detected Data Not Lognormal at 10% Significance Level	
7202					**Detected Data Not Lognormal at 10% Significance Level**							
7203												
7204					**Lognormal ROS Statistics Using Imputed Non-Detects**							
7205					Mean in Original Scale	0.565					Mean in Log Scale	-0.626
7206					SD in Original Scale	0.236					SD in Log Scale	0.322
7207					95% t UCL (assumes normality of ROS data)	0.702					95% Percentile Bootstrap UCL	0.696
7208					95% BCA Bootstrap UCL	0.748					95% Bootstrap t UCL	0.885
7209					95% H-UCL (Log ROS)	0.698						
7210												
7211					**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**							
7212					KM Mean (logged)	-0.638					KM Geo Mean	0.528
7213					KM SD (logged)	0.301					95% Critical H Value (KM-Log)	1.978
7214					KM Standard Error of Mean (logged)	0.107					95% H-UCL (KM -Log)	0.674
7215					KM SD (logged)	0.301					95% Critical H Value (KM-Log)	1.978
7216					KM Standard Error of Mean (logged)	0.107						
7217												
7218					**DL/2 Statistics**							
7219					**DL/2 Normal**						**DL/2 Log-Transformed**	
7220					Mean in Original Scale	0.562					Mean in Log Scale	-0.627
7221					SD in Original Scale	0.23					SD in Log Scale	0.305
7222					95% t UCL (Assumes normality)	0.696					95% H-Stat UCL	0.685
7223					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
7224												
7225					**Nonparametric Distribution Free UCL Statistics**							
7226					**Data do not follow a Discernible Distribution**							
7227												
7228					**Suggested UCL to Use**							
7229					95% KM (t) UCL	0.7						
7230												
7231					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
7232					Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.							
7233					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
7234												
7235												
7236	**Result (tws-sw-arsenic)**											
7237												
7238					**General Statistics**							
7239					Total Number of Observations	10					Number of Distinct Observations	9
7240											Number of Missing Observations	0
7241					Minimum	0.72					Mean	0.97
7242					Maximum	1.4					Median	0.93
7243					SD	0.194					Std. Error of Mean	0.0613
7244					Coefficient of Variation	0.2					Skewness	1.162
7245												
7246					**Normal GOF Test**							
7247					Shapiro Wilk Test Statistic	0.92					**Shapiro Wilk GOF Test**	
7248					1% Shapiro Wilk Critical Value	0.781					Data appear Normal at 1% Significance Level	
7249					Lilliefors Test Statistic	0.151					**Lilliefors GOF Test**	
7250					1% Lilliefors Critical Value	0.304					Data appear Normal at 1% Significance Level	
7251					**Data appear Normal at 1% Significance Level**							
7252												
7253					**Assuming Normal Distribution**							
7254					**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**	
7255					95% Student's-t UCL	1.082					95% Adjusted-CLT UCL (Chen-1995)	1.095
7256											95% Modified-t UCL (Johnson-1978)	1.086
7257												
7258					**Gamma GOF Test**							
7259					A-D Test Statistic	0.263					**Anderson-Darling Gamma GOF Test**	
7260					5% A-D Critical Value	0.724					Detected data appear Gamma Distributed at 5% Significance Level	
7261					K-S Test Statistic	0.122					**Kolmogorov-Smirnov Gamma GOF Test**	
7262					5% K-S Critical Value	0.266					Detected data appear Gamma Distributed at 5% Significance Level	
7263					**Detected data appear Gamma Distributed at 5% Significance Level**							
7264												
7265					**Gamma Statistics**							
7266					k hat (MLE)	30.2					k star (bias corrected MLE)	21.21
7267					Theta hat (MLE)	0.0321					Theta star (bias corrected MLE)	0.0457
7268					nu hat (MLE)	604					nu star (bias corrected)	424.2
7269					MLE Mean (bias corrected)	0.97					MLE Sd (bias corrected)	0.211

7270											Approximate Chi Square Value (0.05)	377.4
7271				Adjusted Level of Significance		0.0267					Adjusted Chi Square Value	369.7
7272												
7273						Assuming Gamma Distribution						
7274				95% Approximate Gamma UCL		1.09					95% Adjusted Gamma UCL	1.113
7275												
7276						Lognormal GOF Test						
7277				Shapiro Wilk Test Statistic		0.964			Shapiro Wilk Lognormal GOF Test			
7278				10% Shapiro Wilk Critical Value		0.869			Data appear Lognormal at 10% Significance Level			
7279				Lilliefors Test Statistic		0.126			Lilliefors Lognormal GOF Test			
7280				10% Lilliefors Critical Value		0.241			Data appear Lognormal at 10% Significance Level			
7281						Data appear Lognormal at 10% Significance Level						
7282												
7283						Lognormal Statistics						
7284				Minimum of Logged Data		-0.329					Mean of logged Data	-0.0471
7285				Maximum of Logged Data		0.336					SD of logged Data	0.189
7286												
7287						Assuming Lognormal Distribution						
7288				95% H-UCL		1.093					90% Chebyshev (MVUE) UCL	1.144
7289				95% Chebyshev (MVUE) UCL		1.223					97.5% Chebyshev (MVUE) UCL	1.333
7290				99% Chebyshev (MVUE) UCL		1.548						
7291												
7292						Nonparametric Distribution Free UCL Statistics						
7293						Data appear to follow a Discernible Distribution						
7294												
7295						Nonparametric Distribution Free UCLs						
7296				95% CLT UCL		1.071					95% BCA Bootstrap UCL	1.091
7297				95% Standard Bootstrap UCL		1.063					95% Bootstrap-t UCL	1.125
7298				95% Hall's Bootstrap UCL		1.178					95% Percentile Bootstrap UCL	1.068
7299				90% Chebyshev(Mean, Sd) UCL		1.154					95% Chebyshev(Mean, Sd) UCL	1.237
7300				97.5% Chebyshev(Mean, Sd) UCL		1.353					99% Chebyshev(Mean, Sd) UCL	1.58
7301												
7302						Suggested UCL to Use						
7303				95% Student's-t UCL		1.082						
7304												
7305						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
7306						Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.						
7307						However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.						
7308												
7309												
7310	Result (tws-sw-barium)											
7311												
7312						General Statistics						
7313				Total Number of Observations		10					Number of Distinct Observations	3
7314											Number of Missing Observations	0
7315				Minimum		13					Mean	13.7
7316				Maximum		15					Median	14
7317				SD		0.675					Std. Error of Mean	0.213
7318				Coefficient of Variation		0.0493					Skewness	0.434
7319												
7320						Normal GOF Test						
7321				Shapiro Wilk Test Statistic		0.802			Shapiro Wilk GOF Test			
7322				1% Shapiro Wilk Critical Value		0.781			Data appear Normal at 1% Significance Level			
7323				Lilliefors Test Statistic		0.272			Lilliefors GOF Test			
7324				1% Lilliefors Critical Value		0.304			Data appear Normal at 1% Significance Level			
7325						Data appear Normal at 1% Significance Level						
7326												
7327						Assuming Normal Distribution						
7328				95% Normal UCL					95% UCLs (Adjusted for Skewness)			
7329				95% Student's-t UCL		14.09					95% Adjusted-CLT UCL (Chen-1995)	14.08
7330											95% Modified-t UCL (Johnson-1978)	14.1
7331												
7332						Gamma GOF Test						
7333				A-D Test Statistic		1.055			Anderson-Darling Gamma GOF Test			
7334				5% A-D Critical Value		0.724			Data Not Gamma Distributed at 5% Significance Level			
7335				K-S Test Statistic		0.285			Kolmogorov-Smirnov Gamma GOF Test			
7336				5% K-S Critical Value		0.266			Data Not Gamma Distributed at 5% Significance Level			
7337						Data Not Gamma Distributed at 5% Significance Level						
7338												
7339						Gamma Statistics						
7340				k hat (MLE)		462.1					k star (bias corrected MLE)	323.5
7341				Theta hat (MLE)		0.0296					Theta star (bias corrected MLE)	0.0423
7342				nu hat (MLE)		9242					nu star (bias corrected)	6471
7343				MLE Mean (bias corrected)		13.7					MLE Sd (bias corrected)	0.762
7344											Approximate Chi Square Value (0.05)	6285
7345				Adjusted Level of Significance		0.0267					Adjusted Chi Square Value	6253
7346												
7347						Assuming Gamma Distribution						
7348				95% Approximate Gamma UCL		14.11					95% Adjusted Gamma UCL	14.18
7349												
7350						Lognormal GOF Test						
7351				Shapiro Wilk Test Statistic		0.802			Shapiro Wilk Lognormal GOF Test			
7352				10% Shapiro Wilk Critical Value		0.869			Data Not Lognormal at 10% Significance Level			

7353				Lilliefors Test Statistic	0.279	**Lilliefors Lognormal GOF Test**						
7354				10% Lilliefors Critical Value	0.241	Data Not Lognormal at 10% Significance Level						
7355	**Data Not Lognormal at 10% Significance Level**											
7356												
7357	**Lognormal Statistics**											
7358				Minimum of Logged Data	2.565	Mean of logged Data	2.616					
7359				Maximum of Logged Data	2.708	SD of logged Data	0.0489					
7360												
7361	**Assuming Lognormal Distribution**											
7362				95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	14.34					
7363				95% Chebyshev (MVUE) UCL	14.62	97.5% Chebyshev (MVUE) UCL	15.02					
7364				99% Chebyshev (MVUE) UCL	15.81							
7365												
7366	**Nonparametric Distribution Free UCL Statistics**											
7367	**Data appear to follow a Discernible Distribution**											
7368												
7369	**Nonparametric Distribution Free UCLs**											
7370				95% CLT UCL	14.05	95% BCA Bootstrap UCL	N/A					
7371				95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A					
7372				95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A					
7373				90% Chebyshev(Mean, Sd) UCL	14.34	95% Chebyshev(Mean, Sd) UCL	14.63					
7374				97.5% Chebyshev(Mean, Sd) UCL	15.03	99% Chebyshev(Mean, Sd) UCL	15.82					
7375												
7376	**Suggested UCL to Use**											
7377				95% Student's-t UCL	14.09							
7378												
7379	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
7380	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
7381	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
7382												
7383	**Result (tws-sw-beryllium)**											
7384												
7385	**General Statistics**											
7386				Total Number of Observations	10	Number of Distinct Observations	4					
7387				Number of Detects	3	Number of Non-Detects	7					
7388				Number of Distinct Detects	3	Number of Distinct Non-Detects	1					
7389				Minimum Detect	0.1	Minimum Non-Detect	0.3					
7390				Maximum Detect	0.22	Maximum Non-Detect	0.3					
7391				Variance Detects	0.0039	Percent Non-Detects	70%					
7392				Mean Detects	0.15	SD Detects	0.0624					
7393				Median Detects	0.13	CV Detects	0.416					
7394				Skewness Detects	1.293	Kurtosis Detects	N/A					
7395				Mean of Logged Detects	-1.952	SD of Logged Detects	0.402					
7396												
7397	**Warning: Data set has only 3 Detected Values.**											
7398	**This is not enough to compute meaningful or reliable statistics and estimates.**											
7399												
7400												
7401	**Normal GOF Test on Detects Only**											
7402				Shapiro Wilk Test Statistic	0.923	**Shapiro Wilk GOF Test**						
7403				1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level						
7404				Lilliefors Test Statistic	0.292	**Lilliefors GOF Test**						
7405				1% Lilliefors Critical Value	0.429	Detected Data appear Normal at 1% Significance Level						
7406	**Detected Data appear Normal at 1% Significance Level**											
7407	**Note GOF tests may be unreliable for small sample sizes**											
7408												
7409	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
7410				KM Mean	0.15	KM Standard Error of Mean	0.0361					
7411				90KM SD	0.051	95% KM (BCA) UCL	N/A					
7412				95% KM (t) UCL	0.216	95% KM (Percentile Bootstrap) UCL	N/A					
7413				95% KM (z) UCL	0.209	95% KM Bootstrap t UCL	N/A					
7414				90% KM Chebyshev UCL	0.258	95% KM Chebyshev UCL	0.307					
7415				97.5% KM Chebyshev UCL	0.375	99% KM Chebyshev UCL	0.509					
7416												
7417	**Gamma GOF Tests on Detected Observations Only**											
7418				A-D Test Statistic	0.314	**Anderson-Darling GOF Test**						
7419				5% A-D Critical Value	0.636	Detected data appear Gamma Distributed at 5% Significance Level						
7420				K-S Test Statistic	0.29	**Kolmogorov-Smirnov GOF**						
7421				5% K-S Critical Value	0.432	Detected data appear Gamma Distributed at 5% Significance Level						
7422	**Detected Data Not Gamma Distributed at 5% Significance Level**											
7423												
7424	**Gamma Statistics on Detected Data Only**											
7425				k hat (MLE)	9.223	k star (bias corrected MLE)	N/A					
7426				Theta hat (MLE)	0.0163	Theta star (bias corrected MLE)	N/A					
7427				nu hat (MLE)	55.34	nu star (bias corrected)	N/A					
7428				Mean (detects)	0.15							
7429												
7430	**Gamma ROS Statistics using Imputed Non-Detects**											
7431	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
7432	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
7433	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
7434	This is especially true when the sample size is small.											
7435	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											

7436					Minimum	0.0565				Mean		0.152
7437					Maximum	0.264				Median		0.138
7438					SD	0.0654				CV		0.431
7439					k hat (MLE)	5.564				k star (bias corrected MLE)		3.961
7440					Theta hat (MLE)	0.0273				Theta star (bias corrected MLE)		0.0383
7441					nu hat (MLE)	111.3				nu star (bias corrected)		79.23
7442				Adjusted Level of Significance (β)		0.0267						
7443				Approximate Chi Square Value (79.23, α)		59.72				Adjusted Chi Square Value (79.23, β)		56.79
7444				95% Gamma Approximate UCL		0.201				95% Gamma Adjusted UCL		N/A
7445												
7446					**Estimates of Gamma Parameters using KM Estimates**							
7447					Mean (KM)	0.15				SD (KM)		0.051
7448					Variance (KM)	0.0026				SE of Mean (KM)		0.0361
7449					k hat (KM)	8.654				k star (KM)		6.124
7450					nu hat (KM)	173.1				nu star (KM)		122.5
7451					theta hat (KM)	0.0173				theta star (KM)		0.0245
7452				80% gamma percentile (KM)		0.197				90% gamma percentile (KM)		0.231
7453				95% gamma percentile (KM)		0.262				99% gamma percentile (KM)		0.326
7454												
7455					**Gamma Kaplan-Meier (KM) Statistics**							
7456				Approximate Chi Square Value (122.49, α)		97.93				Adjusted Chi Square Value (122.49, β)		94.12
7457				95% KM Approximate Gamma UCL		0.188				95% KM Adjusted Gamma UCL		0.195
7458												
7459					**Lognormal GOF Test on Detected Observations Only**							
7460				Shapiro Wilk Test Statistic		0.964				**Shapiro Wilk GOF Test**		
7461				10% Shapiro Wilk Critical Value		0.789				Detected Data appear Lognormal at 10% Significance Level		
7462				Lilliefors Test Statistic		0.253				**Lilliefors GOF Test**		
7463				10% Lilliefors Critical Value		0.389				Detected Data appear Lognormal at 10% Significance Level		
7464					**Detected Data appear Lognormal at 10% Significance Level**							
7465					**Note GOF tests may be unreliable for small sample sizes**							
7466												
7467					**Lognormal ROS Statistics Using Imputed Non-Detects**							
7468				Mean in Original Scale		0.154				Mean in Log Scale		-1.952
7469				SD in Original Scale		0.0652				SD in Log Scale		0.423
7470				95% t UCL (assumes normality of ROS data)		0.192				95% Percentile Bootstrap UCL		0.187
7471				95% BCA Bootstrap UCL		0.188				95% Bootstrap t UCL		0.199
7472				95% H-UCL (Log ROS)		0.209						
7473												
7474					**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**							
7475				KM Mean (logged)		-1.952				KM Geo Mean		0.142
7476				KM SD (logged)		0.328				95% Critical H Value (KM-Log)		2.007
7477				KM Standard Error of Mean (logged)		0.232				95% H-UCL (KM -Log)		0.187
7478				KM SD (logged)		0.328				95% Critical H Value (KM-Log)		2.007
7479				KM Standard Error of Mean (logged)		0.232						
7480												
7481					**DL/2 Statistics**							
7482				**DL/2 Normal**						**DL/2 Log-Transformed**		
7483				Mean in Original Scale		0.15				Mean in Log Scale		-1.914
7484				SD in Original Scale		0.0294				SD in Log Scale		0.191
7485				95% t UCL (Assumes normality)		0.167				95% H-Stat UCL		0.169
7486					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
7487												
7488					**Nonparametric Distribution Free UCL Statistics**							
7489					**Detected Data appear Normal Distributed at 1% Significance Level**							
7490												
7491					**Suggested UCL to Use**							
7492				95% KM (t) UCL		0.216						
7493												
7494					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
7495					Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.							
7496					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
7497												
7498	**Result (tws-sw-cadmium)**											
7499												
7500					**General Statistics**							
7501				Total Number of Observations		10				Number of Distinct Observations		1
7502				Number of Detects		0				Number of Non-Detects		10
7503				Number of Distinct Detects		0				Number of Distinct Non-Detects		1
7504												
7505					**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**							
7506					**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**							
7507					**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**							
7508												
7509					**The data set for variable Result (tws-sw-cadmium) was not processed!**							
7510												
7511												
7512												
7513	**Result (tws-sw-calcium)**											
7514												
7515					**General Statistics**							
7516				Total Number of Observations		10				Number of Distinct Observations		2
7517										Number of Missing Observations		0
7518					Minimum	22000				Mean		22500

7519					Maximum	23000					Median	22500
7520					SD	527					Std. Error of Mean	166.7
7521					Coefficient of Variation	0.0234					Skewness	0
7522												
7523						**Normal GOF Test**						
7524					Shapiro Wilk Test Statistic	0.655					**Shapiro Wilk GOF Test**	
7525					1% Shapiro Wilk Critical Value	0.781					Data Not Normal at 1% Significance Level	
7526					Lilliefors Test Statistic	0.329					**Lilliefors GOF Test**	
7527					1% Lilliefors Critical Value	0.304					Data Not Normal at 1% Significance Level	
7528						**Data Not Normal at 1% Significance Level**						
7529												
7530						**Assuming Normal Distribution**						
7531					**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**	
7532					95% Student's-t UCL	22806					95% Adjusted-CLT UCL (Chen-1995)	22774
7533											95% Modified-t UCL (Johnson-1978)	22806
7534												
7535						**Gamma GOF Test**						
7536					A-D Test Statistic	1.801					**Anderson-Darling Gamma GOF Test**	
7537					5% A-D Critical Value	0.724					Data Not Gamma Distributed at 5% Significance Level	
7538					K-S Test Statistic	0.342					**Kolmogorov-Smirnov Gamma GOF Test**	
7539					5% K-S Critical Value	0.266					Data Not Gamma Distributed at 5% Significance Level	
7540						**Data Not Gamma Distributed at 5% Significance Level**						
7541												
7542						**Gamma Statistics**						
7543					k hat (MLE)	2025					k star (bias corrected MLE)	1417
7544					Theta hat (MLE)	11.11					Theta star (bias corrected MLE)	15.87
7545					nu hat (MLE)	40493					nu star (bias corrected)	28347
7546					MLE Mean (bias corrected)	22500					MLE Sd (bias corrected)	597.6
7547											Approximate Chi Square Value (0.05)	27956
7548					Adjusted Level of Significance	0.0267					Adjusted Chi Square Value	27889
7549												
7550						**Assuming Gamma Distribution**						
7551					95% Approximate Gamma UCL	22814					95% Adjusted Gamma UCL	22870
7552												
7553						**Lognormal GOF Test**						
7554					Shapiro Wilk Test Statistic	0.655					**Shapiro Wilk Lognormal GOF Test**	
7555					10% Shapiro Wilk Critical Value	0.869					Data Not Lognormal at 10% Significance Level	
7556					Lilliefors Test Statistic	0.329					**Lilliefors Lognormal GOF Test**	
7557					10% Lilliefors Critical Value	0.241					Data Not Lognormal at 10% Significance Level	
7558						**Data Not Lognormal at 10% Significance Level**						
7559												
7560						**Lognormal Statistics**						
7561					Minimum of Logged Data	9.999					Mean of logged Data	10.02
7562					Maximum of Logged Data	10.04					SD of logged Data	0.0234
7563												
7564						**Assuming Lognormal Distribution**						
7565					95% H-UCL	N/A					90% Chebyshev (MVUE) UCL	23000
7566					95% Chebyshev (MVUE) UCL	23227					97.5% Chebyshev (MVUE) UCL	23541
7567					99% Chebyshev (MVUE) UCL	24159						
7568												
7569						**Nonparametric Distribution Free UCL Statistics**						
7570						**Data do not follow a Discernible Distribution**						
7571												
7572						**Nonparametric Distribution Free UCLs**						
7573					95% CLT UCL	22774					95% BCA Bootstrap UCL	N/A
7574					95% Standard Bootstrap UCL	N/A					95% Bootstrap-t UCL	N/A
7575					95% Hall's Bootstrap UCL	N/A					95% Percentile Bootstrap UCL	N/A
7576					90% Chebyshev(Mean, Sd) UCL	23000					95% Chebyshev(Mean, Sd) UCL	23226
7577					97.5% Chebyshev(Mean, Sd) UCL	23541					99% Chebyshev(Mean, Sd) UCL	24158
7578												
7579						**Suggested UCL to Use**						
7580					95% Student's-t UCL	22806						
7581												
7582						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
7583						Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.						
7584						However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.						
7585												
7586	**Result (tws-sw-chromium)**											
7587												
7588						**General Statistics**						
7589					Total Number of Observations	10					Number of Distinct Observations	3
7590					Number of Detects	2					Number of Non-Detects	8
7591					Number of Distinct Detects	2					Number of Distinct Non-Detects	1
7592					Minimum Detect	0.58					Minimum Non-Detect	1.8
7593					Maximum Detect	0.69					Maximum Non-Detect	1.8
7594					Variance Detects	0.00605					Percent Non-Detects	80%
7595					Mean Detects	0.635					SD Detects	0.0778
7596					Median Detects	0.635					CV Detects	0.122
7597					Skewness Detects	N/A					Kurtosis Detects	N/A
7598					Mean of Logged Detects	-0.458					SD of Logged Detects	0.123
7599												
7600						**Warning: Data set has only 2 Detected Values.**						
7601						**This is not enough to compute meaningful or reliable statistics and estimates.**						

7602											
7603											
7604	**Normal GOF Test on Detects Only**										
7605	**Not Enough Data to Perform GOF Test**										
7606											
7607	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**										
7608				KM Mean	0.635			KM Standard Error of Mean	0.055		
7609				90KM SD	0.055			95% KM (BCA) UCL	N/A		
7610				95% KM (t) UCL	0.736			95% KM (Percentile Bootstrap) UCL	N/A		
7611				95% KM (z) UCL	0.725			95% KM Bootstrap t UCL	N/A		
7612				90% KM Chebyshev UCL	0.8			95% KM Chebyshev UCL	0.875		
7613				97.5% KM Chebyshev UCL	0.978			99% KM Chebyshev UCL	1.182		
7614											
7615	**Gamma GOF Tests on Detected Observations Only**										
7616	**Not Enough Data to Perform GOF Test**										
7617											
7618	**Gamma Statistics on Detected Data Only**										
7619				k hat (MLE)	133			k star (bias corrected MLE)	N/A		
7620				Theta hat (MLE)	0.00478			Theta star (bias corrected MLE)	N/A		
7621				nu hat (MLE)	531.9			nu star (bias corrected)	N/A		
7622				Mean (detects)	0.635						
7623											
7624	**Estimates of Gamma Parameters using KM Estimates**										
7625				Mean (KM)	0.635			SD (KM)	0.055		
7626				Variance (KM)	0.00303			SE of Mean (KM)	0.055		
7627				k hat (KM)	133.3			k star (KM)	93.37		
7628				nu hat (KM)	2666			nu star (KM)	1867		
7629				theta hat (KM)	0.00476			theta star (KM)	0.0068		
7630				80% gamma percentile (KM)	0.69			90% gamma percentile (KM)	0.721		
7631				95% gamma percentile (KM)	0.747			99% gamma percentile (KM)	0.798		
7632											
7633	**Gamma Kaplan-Meier (KM) Statistics**										
7634								Adjusted Level of Significance (β)	0.0267		
7635				Approximate Chi Square Value (N/A, α)	1768			Adjusted Chi Square Value (N/A, β)	1751		
7636				95% KM Approximate Gamma UCL	0.671			95% KM Adjusted Gamma UCL	0.677		
7637											
7638	**Lognormal GOF Test on Detected Observations Only**										
7639	**Not Enough Data to Perform GOF Test**										
7640											
7641	**Lognormal ROS Statistics Using Imputed Non-Detects**										
7642				Mean in Original Scale	0.639			Mean in Log Scale	-0.458		
7643				SD in Original Scale	0.0954			SD in Log Scale	0.149		
7644				95% t UCL (assumes normality of ROS data)	0.694			95% Percentile Bootstrap UCL	0.686		
7645				95% BCA Bootstrap UCL	0.69			95% Bootstrap t UCL	0.696		
7646				95% H-UCL (Log ROS)	0.701						
7647											
7648	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**										
7649				KM Mean (logged)	-0.458			KM Geo Mean	0.633		
7650				KM SD (logged)	0.0868			95% Critical H Value (KM-Log)	N/A		
7651				KM Standard Error of Mean (logged)	0.0868			95% H-UCL (KM -Log)	N/A		
7652				KM SD (logged)	0.0868			95% Critical H Value (KM-Log)	N/A		
7653				KM Standard Error of Mean (logged)	0.0868						
7654											
7655	**DL/2 Statistics**										
7656				**DL/2 Normal**				**DL/2 Log-Transformed**			
7657				Mean in Original Scale	0.847			Mean in Log Scale	-0.176		
7658				SD in Original Scale	0.115			SD in Log Scale	0.154		
7659				95% t UCL (Assumes normality)	0.913			95% H-Stat UCL	0.933		
7660	**DL/2 is not a recommended method, provided for comparisons and historical reasons**										
7661											
7662	**Nonparametric Distribution Free UCL Statistics**										
7663	**Data do not follow a Discernible Distribution**										
7664											
7665	**Suggested UCL to Use**										
7666				95% KM (t) UCL	0.736						
7667	**Warning: Recommended UCL exceeds the maximum observation**										
7668											
7669	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
7670	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.										
7671	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
7672											
7673	**Result (tws-sw-cobalt)**										
7674											
7675	**General Statistics**										
7676				Total Number of Observations	10			Number of Distinct Observations	4		
7677				Number of Detects	4			Number of Non-Detects	6		
7678				Number of Distinct Detects	3			Number of Distinct Non-Detects	1		
7679				Minimum Detect	0.094			Minimum Non-Detect	0.35		
7680				Maximum Detect	0.12			Maximum Non-Detect	0.35		
7681				Variance Detects	1.5067E-4			Percent Non-Detects	60%		
7682				Mean Detects	0.111			SD Detects	0.0123		
7683				Median Detects	0.115			CV Detects	0.111		
7684				Skewness Detects	-1.246			Kurtosis Detects	0.691		

7685				Mean of Logged Detects		-2.203					SD of Logged Detects	0.115
7686												
7687						**Normal GOF Test on Detects Only**							
7688				Shapiro Wilk Test Statistic		0.845		**Shapiro Wilk GOF Test**				
7689				1% Shapiro Wilk Critical Value		0.687		Detected Data appear Normal at 1% Significance Level				
7690				Lilliefors Test Statistic		0.268		**Lilliefors GOF Test**				
7691				1% Lilliefors Critical Value		0.413		Detected Data appear Normal at 1% Significance Level				
7692						**Detected Data appear Normal at 1% Significance Level**							
7693						**Note GOF tests may be unreliable for small sample sizes**							
7694												
7695						**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**							
7696				KM Mean		0.111		KM Standard Error of Mean				0.00614
7697				90KM SD		0.0106		95% KM (BCA) UCL				N/A
7698				95% KM (t) UCL		0.122		95% KM (Percentile Bootstrap) UCL				N/A
7699				95% KM (z) UCL		0.121		95% KM Bootstrap t UCL				N/A
7700				90% KM Chebyshev UCL		0.129		95% KM Chebyshev UCL				0.138
7701				97.5% KM Chebyshev UCL		0.149		99% KM Chebyshev UCL				0.172
7702												
7703						**Gamma GOF Tests on Detected Observations Only**							
7704				A-D Test Statistic		0.47		**Anderson-Darling GOF Test**				
7705				5% A-D Critical Value		0.657		Detected data appear Gamma Distributed at 5% Significance Level				
7706				K-S Test Statistic		0.298		**Kolmogorov-Smirnov GOF**				
7707				5% K-S Critical Value		0.394		Detected data appear Gamma Distributed at 5% Significance Level				
7708						**Detected data appear Gamma Distributed at 5% Significance Level**							
7709						**Note GOF tests may be unreliable for small sample sizes**							
7710												
7711						**Gamma Statistics on Detected Data Only**							
7712				k hat (MLE)		103.5		k star (bias corrected MLE)				26.03
7713				Theta hat (MLE)		0.00107		Theta star (bias corrected MLE)				0.00426
7714				nu hat (MLE)		827.7		nu star (bias corrected)				208.3
7715				Mean (detects)		0.111						
7716												
7717						**Gamma ROS Statistics using Imputed Non-Detects**							
7718						GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
7719						GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)							
7720						For such situations, GROS method may yield incorrect values of UCLs and BTVs							
7721						This is especially true when the sample size is small.							
7722						For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
7723				Minimum		0.094		Mean				0.111
7724				Maximum		0.128		Median				0.112
7725				SD		0.0115		CV				0.103
7726				k hat (MLE)		101.5		k star (bias corrected MLE)				71.14
7727				Theta hat (MLE)		0.00109		Theta star (bias corrected MLE)				0.00156
7728				nu hat (MLE)		2031		nu star (bias corrected)				1423
7729				Adjusted Level of Significance (β)		0.0267						
7730				Approximate Chi Square Value (N/A, α)		1336		Adjusted Chi Square Value (N/A, β)				1322
7731				95% Gamma Approximate UCL		0.118		95% Gamma Adjusted UCL				N/A
7732												
7733						**Estimates of Gamma Parameters using KM Estimates**							
7734				Mean (KM)		0.111		SD (KM)				0.0106
7735				Variance (KM)		1.1300E-4		SE of Mean (KM)				0.00614
7736				k hat (KM)		109		k star (KM)				76.39
7737				nu hat (KM)		2181		nu star (KM)				1528
7738				theta hat (KM)		0.00102		theta star (KM)				0.00145
7739				80% gamma percentile (KM)		0.122		90% gamma percentile (KM)				0.128
7740				95% gamma percentile (KM)		0.133		99% gamma percentile (KM)				0.143
7741												
7742						**Gamma Kaplan-Meier (KM) Statistics**							
7743				Approximate Chi Square Value (N/A, α)		1438		Adjusted Chi Square Value (N/A, β)				1423
7744				95% KM Approximate Gamma UCL		0.118		95% KM Adjusted Gamma UCL				0.119
7745												
7746						**Lognormal GOF Test on Detected Observations Only**							
7747				Shapiro Wilk Test Statistic		0.836		**Shapiro Wilk GOF Test**				
7748				10% Shapiro Wilk Critical Value		0.792		Detected Data appear Lognormal at 10% Significance Level				
7749				Lilliefors Test Statistic		0.264		**Lilliefors GOF Test**				
7750				10% Lilliefors Critical Value		0.346		Detected Data appear Lognormal at 10% Significance Level				
7751						**Detected Data appear Lognormal at 10% Significance Level**							
7752						**Note GOF tests may be unreliable for small sample sizes**							
7753												
7754						**Lognormal ROS Statistics Using Imputed Non-Detects**							
7755				Mean in Original Scale		0.111		Mean in Log Scale				-2.203
7756				SD in Original Scale		0.0118		SD in Log Scale				0.108
7757				95% t UCL (assumes normality of ROS data)		0.118		95% Percentile Bootstrap UCL				0.117
7758				95% BCA Bootstrap UCL		0.116		95% Bootstrap t UCL				0.118
7759				95% H-UCL (Log ROS)		0.119						
7760												
7761						**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**							
7762				KM Mean (logged)		-2.203		KM Geo Mean				0.11
7763				KM SD (logged)		0.0997		95% Critical H Value (KM-Log)				N/A
7764				KM Standard Error of Mean (logged)		0.0576		95% H-UCL (KM -Log)				N/A
7765				KM SD (logged)		0.0997		95% Critical H Value (KM-Log)				N/A
7766				KM Standard Error of Mean (logged)		0.0576						
7767												

7768						DL/2 Statistics						
7769					DL/2 Normal				DL/2 Log-Transformed			
7770					Mean in Original Scale	0.149			Mean in Log Scale	-1.927		
7771					SD in Original Scale	0.0338			SD in Log Scale	0.247		
7772					95% t UCL (Assumes normality)	0.169			95% H-Stat UCL	0.176		
7773					DL/2 is not a recommended method, provided for comparisons and historical reasons							
7774												
7775					Nonparametric Distribution Free UCL Statistics							
7776					Detected Data appear Normal Distributed at 1% Significance Level							
7777												
7778					Suggested UCL to Use							
7779					95% KM (t) UCL	0.122						
7780					Warning: Recommended UCL exceeds the maximum observation							
7781												
7782					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
7783					Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.							
7784					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
7785												
7786												
7787	Result (tws-sw-copper)											
7788												
7789					General Statistics							
7790					Total Number of Observations	10			Number of Distinct Observations	6		
7791									Number of Missing Observations	0		
7792					Minimum	1			Mean	1.25		
7793					Maximum	1.5			Median	1.25		
7794					SD	0.178			Std. Error of Mean	0.0563		
7795					Coefficient of Variation	0.142			Skewness	0.222		
7796												
7797					Normal GOF Test							
7798					Shapiro Wilk Test Statistic	0.917			Shapiro Wilk GOF Test			
7799					1% Shapiro Wilk Critical Value	0.781			Data appear Normal at 1% Significance Level			
7800					Lilliefors Test Statistic	0.2			Lilliefors GOF Test			
7801					1% Lilliefors Critical Value	0.304			Data appear Normal at 1% Significance Level			
7802					Data appear Normal at 1% Significance Level							
7803												
7804					Assuming Normal Distribution							
7805					95% Normal UCL				95% UCLs (Adjusted for Skewness)			
7806					95% Student's-t UCL	1.353			95% Adjusted-CLT UCL (Chen-1995)	1.347		
7807									95% Modified-t UCL (Johnson-1978)	1.354		
7808												
7809					Gamma GOF Test							
7810					A-D Test Statistic	0.398			Anderson-Darling Gamma GOF Test			
7811					5% A-D Critical Value	0.724			Detected data appear Gamma Distributed at 5% Significance Level			
7812					K-S Test Statistic	0.212			Kolmogorov-Smirnov Gamma GOF Test			
7813					5% K-S Critical Value	0.266			Detected data appear Gamma Distributed at 5% Significance Level			
7814					Detected data appear Gamma Distributed at 5% Significance Level							
7815												
7816					Gamma Statistics							
7817					k hat (MLE)	55.08			k star (bias corrected MLE)	38.62		
7818					Theta hat (MLE)	0.0227			Theta star (bias corrected MLE)	0.0324		
7819					nu hat (MLE)	1102			nu star (bias corrected)	772.4		
7820					MLE Mean (bias corrected)	1.25			MLE Sd (bias corrected)	0.201		
7821									Approximate Chi Square Value (0.05)	709		
7822					Adjusted Level of Significance	0.0267			Adjusted Chi Square Value	698.4		
7823												
7824					Assuming Gamma Distribution							
7825					95% Approximate Gamma UCL	1.362			95% Adjusted Gamma UCL	1.383		
7826												
7827					Lognormal GOF Test							
7828					Shapiro Wilk Test Statistic	0.924			Shapiro Wilk Lognormal GOF Test			
7829					10% Shapiro Wilk Critical Value	0.869			Data appear Lognormal at 10% Significance Level			
7830					Lilliefors Test Statistic	0.198			Lilliefors Lognormal GOF Test			
7831					10% Lilliefors Critical Value	0.241			Data appear Lognormal at 10% Significance Level			
7832					Data appear Lognormal at 10% Significance Level							
7833												
7834					Lognormal Statistics							
7835					Minimum of Logged Data	0			Mean of logged Data	0.214		
7836					Maximum of Logged Data	0.405			SD of logged Data	0.142		
7837												
7838					Assuming Lognormal Distribution							
7839					95% H-UCL	1.365			90% Chebyshev (MVUE) UCL	1.419		
7840					95% Chebyshev (MVUE) UCL	1.495			97.5% Chebyshev (MVUE) UCL	1.602		
7841					99% Chebyshev (MVUE) UCL	1.81						
7842												
7843					Nonparametric Distribution Free UCL Statistics							
7844					Data appear to follow a Discernible Distribution							
7845												
7846					Nonparametric Distribution Free UCLs							
7847					95% CLT UCL	1.343			95% BCA Bootstrap UCL	1.33		
7848					95% Standard Bootstrap UCL	1.337			95% Bootstrap-t UCL	1.362		
7849					95% Hall's Bootstrap UCL	1.339			95% Percentile Bootstrap UCL	1.34		
7850					90% Chebyshev(Mean, Sd) UCL	1.419			95% Chebyshev(Mean, Sd) UCL	1.495		

7851				97.5% Chebyshev(Mean, Sd) UCL		1.601				99% Chebyshev(Mean, Sd) UCL		1.81
7852												
7853						**Suggested UCL to Use**						
7854				95% Student's-t UCL		1.353						
7855												
7856						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
7857						Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.						
7858						However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.						
7859												
7860	**Result (tws-sw-iron)**											
7861												
7862						**General Statistics**						
7863				Total Number of Observations		10				Number of Distinct Observations		1
7864				Number of Detects		0				Number of Non-Detects		10
7865				Number of Distinct Detects		0				Number of Distinct Non-Detects		1
7866												
7867						**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**						
7868						**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**						
7869						**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**						
7870												
7871						**The data set for variable Result (tws-sw-iron) was not processed!**						
7872												
7873												
7874	**Result (tws-sw-lead)**											
7875												
7876						**General Statistics**						
7877				Total Number of Observations		10				Number of Distinct Observations		1
7878				Number of Detects		0				Number of Non-Detects		10
7879				Number of Distinct Detects		0				Number of Distinct Non-Detects		1
7880												
7881						**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**						
7882						**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**						
7883						**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**						
7884												
7885						**The data set for variable Result (tws-sw-lead) was not processed!**						
7886												
7887												
7888												
7889	**Result (tws-sw-magnesium)**											
7890												
7891						**General Statistics**						
7892				Total Number of Observations		10				Number of Distinct Observations		9
7893										Number of Missing Observations		0
7894				Minimum		5800				Mean		6640
7895				Maximum		8100				Median		6600
7896				SD		668.7				Std. Error of Mean		211.5
7897				Coefficient of Variation		0.101				Skewness		1.02
7898												
7899						**Normal GOF Test**						
7900				Shapiro Wilk Test Statistic		0.929				**Shapiro Wilk GOF Test**		
7901				1% Shapiro Wilk Critical Value		0.781				Data appear Normal at 1% Significance Level		
7902				Lilliefors Test Statistic		0.205				**Lilliefors GOF Test**		
7903				1% Lilliefors Critical Value		0.304				Data appear Normal at 1% Significance Level		
7904						**Data appear Normal at 1% Significance Level**						
7905												
7906						**Assuming Normal Distribution**						
7907				**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**		
7908				95% Student's-t UCL		7028				95% Adjusted-CLT UCL (Chen-1995)		7061
7909										95% Modified-t UCL (Johnson-1978)		7039
7910												
7911						**Gamma GOF Test**						
7912				A-D Test Statistic		0.269				**Anderson-Darling Gamma GOF Test**		
7913				5% A-D Critical Value		0.724				Detected data appear Gamma Distributed at 5% Significance Level		
7914				K-S Test Statistic		0.187				**Kolmogorov-Smirnov Gamma GOF Test**		
7915				5% K-S Critical Value		0.266				Detected data appear Gamma Distributed at 5% Significance Level		
7916						**Detected data appear Gamma Distributed at 5% Significance Level**						
7917												
7918						**Gamma Statistics**						
7919				k hat (MLE)		114.4				k star (bias corrected MLE)		80.16
7920				Theta hat (MLE)		58.03				Theta star (bias corrected MLE)		82.83
7921				nu hat (MLE)		2288				nu star (bias corrected)		1603
7922				MLE Mean (bias corrected)		6640				MLE Sd (bias corrected)		741.6
7923										Approximate Chi Square Value (0.05)		1511
7924				Adjusted Level of Significance		0.0267				Adjusted Chi Square Value		1496
7925												
7926						**Assuming Gamma Distribution**						
7927				95% Approximate Gamma UCL		7044				95% Adjusted Gamma UCL		7117
7928												
7929						**Lognormal GOF Test**						
7930				Shapiro Wilk Test Statistic		0.95				**Shapiro Wilk Lognormal GOF Test**		
7931				10% Shapiro Wilk Critical Value		0.869				Data appear Lognormal at 10% Significance Level		
7932				Lilliefors Test Statistic		0.186				**Lilliefors Lognormal GOF Test**		
7933				10% Lilliefors Critical Value		0.241				Data appear Lognormal at 10% Significance Level		

7934	**Data appear Lognormal at 10% Significance Level**										
7935											
7936	**Lognormal Statistics**										
7937					Minimum of Logged Data	8.666			Mean of logged Data	8.796	
7938					Maximum of Logged Data	9			SD of logged Data	0.0977	
7939											
7940	**Assuming Lognormal Distribution**										
7941					95% H-UCL	N/A			90% Chebyshev (MVUE) UCL	7255	
7942					95% Chebyshev (MVUE) UCL	7534			97.5% Chebyshev (MVUE) UCL	7921	
7943					99% Chebyshev (MVUE) UCL	8681					
7944											
7945	**Nonparametric Distribution Free UCL Statistics**										
7946	**Data appear to follow a Discernible Distribution**										
7947											
7948	**Nonparametric Distribution Free UCLs**										
7949					95% CLT UCL	6988			95% BCA Bootstrap UCL	7050	
7950					95% Standard Bootstrap UCL	6970			95% Bootstrap-t UCL	7147	
7951					95% Hall's Bootstrap UCL	7382			95% Percentile Bootstrap UCL	6990	
7952					90% Chebyshev(Mean, Sd) UCL	7274			95% Chebyshev(Mean, Sd) UCL	7562	
7953					97.5% Chebyshev(Mean, Sd) UCL	7961			99% Chebyshev(Mean, Sd) UCL	8744	
7954											
7955	**Suggested UCL to Use**										
7956					95% Student's-t UCL	7028					
7957											
7958	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
7959	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.										
7960	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
7961											
7962											
7963	**Result (tws-sw-manganese)**										
7964											
7965	**General Statistics**										
7966					Total Number of Observations	10			Number of Distinct Observations	9	
7967									Number of Missing Observations	0	
7968					Minimum	16			Mean	58.1	
7969					Maximum	120			Median	54	
7970					SD	30.48			Std. Error of Mean	9.638	
7971					Coefficient of Variation	0.525			Skewness	0.555	
7972											
7973	**Normal GOF Test**										
7974					Shapiro Wilk Test Statistic	0.93			**Shapiro Wilk GOF Test**		
7975					1% Shapiro Wilk Critical Value	0.781			Data appear Normal at 1% Significance Level		
7976					Lilliefors Test Statistic	0.195			**Lilliefors GOF Test**		
7977					1% Lilliefors Critical Value	0.304			Data appear Normal at 1% Significance Level		
7978	**Data appear Normal at 1% Significance Level**										
7979											
7980	**Assuming Normal Distribution**										
7981					**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**		
7982					95% Student's-t UCL	75.77			95% Adjusted-CLT UCL (Chen-1995)	75.76	
7983									95% Modified-t UCL (Johnson-1978)	76.05	
7984											
7985	**Gamma GOF Test**										
7986					A-D Test Statistic	0.524			**Anderson-Darling Gamma GOF Test**		
7987					5% A-D Critical Value	0.731			Detected data appear Gamma Distributed at 5% Significance Level		
7988					K-S Test Statistic	0.267			**Kolmogorov-Smirnov Gamma GOF Test**		
7989					5% K-S Critical Value	0.268			Detected data appear Gamma Distributed at 5% Significance Level		
7990	**Detected data appear Gamma Distributed at 5% Significance Level**										
7991											
7992	**Gamma Statistics**										
7993					k hat (MLE)	3.363			k star (bias corrected MLE)	2.421	
7994					Theta hat (MLE)	17.27			Theta star (bias corrected MLE)	24	
7995					nu hat (MLE)	67.27			nu star (bias corrected)	48.42	
7996					MLE Mean (bias corrected)	58.1			MLE Sd (bias corrected)	37.34	
7997									Approximate Chi Square Value (0.05)	33.45	
7998					Adjusted Level of Significance	0.0267			Adjusted Chi Square Value	31.3	
7999											
8000	**Assuming Gamma Distribution**										
8001					95% Approximate Gamma UCL	84.11			95% Adjusted Gamma UCL	89.89	
8002											
8003	**Lognormal GOF Test**										
8004					Shapiro Wilk Test Statistic	0.866			**Shapiro Wilk Lognormal GOF Test**		
8005					10% Shapiro Wilk Critical Value	0.869			Data Not Lognormal at 10% Significance Level		
8006					Lilliefors Test Statistic	0.304			**Lilliefors Lognormal GOF Test**		
8007					10% Lilliefors Critical Value	0.241			Data Not Lognormal at 10% Significance Level		
8008	**Data Not Lognormal at 10% Significance Level**										
8009											
8010	**Lognormal Statistics**										
8011					Minimum of Logged Data	2.773			Mean of logged Data	3.906	
8012					Maximum of Logged Data	4.787			SD of logged Data	0.641	
8013											
8014	**Assuming Lognormal Distribution**										
8015					95% H-UCL	102.7			90% Chebyshev (MVUE) UCL	96.91	
8016					95% Chebyshev (MVUE) UCL	113.8			97.5% Chebyshev (MVUE) UCL	137.2	

8017				99% Chebyshev (MVUE) UCL	183.2							
8018												
8019					**Nonparametric Distribution Free UCL Statistics**							
8020					**Data appear to follow a Discernible Distribution**							
8021												
8022					**Nonparametric Distribution Free UCLs**							
8023				95% CLT UCL	73.95				95% BCA Bootstrap UCL	74.4		
8024				95% Standard Bootstrap UCL	72.75				95% Bootstrap-t UCL	77.63		
8025				95% Hall's Bootstrap UCL	84.13				95% Percentile Bootstrap UCL	73		
8026				90% Chebyshev(Mean, Sd) UCL	87.02				95% Chebyshev(Mean, Sd) UCL	100.1		
8027				97.5% Chebyshev(Mean, Sd) UCL	118.3				99% Chebyshev(Mean, Sd) UCL	154		
8028												
8029					**Suggested UCL to Use**							
8030				95% Student's-t UCL	75.77							
8031												
8032					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
8033					Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.							
8034					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
8035												
8036	**Result (tws-sw-mercury)**											
8037												
8038					**General Statistics**							
8039				Total Number of Observations	10				Number of Distinct Observations	1		
8040				Number of Detects	0				Number of Non-Detects	10		
8041				Number of Distinct Detects	0				Number of Distinct Non-Detects	1		
8042												
8043					**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**							
8044					**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**							
8045					**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**							
8046												
8047					**The data set for variable Result (tws-sw-mercury) was not processed!**							
8048												
8049												
8050												
8051	**Result (tws-sw-nickel)**											
8052												
8053					**General Statistics**							
8054				Total Number of Observations	10				Number of Distinct Observations	8		
8055									Number of Missing Observations	0		
8056				Minimum	0.35				Mean	0.444		
8057				Maximum	0.63				Median	0.39		
8058				SD	0.102				Std. Error of Mean	0.0322		
8059				Coefficient of Variation	0.229				Skewness	0.897		
8060												
8061					**Normal GOF Test**							
8062				Shapiro Wilk Test Statistic	0.833				**Shapiro Wilk GOF Test**			
8063				1% Shapiro Wilk Critical Value	0.781				Data appear Normal at 1% Significance Level			
8064				Lilliefors Test Statistic	0.302				**Lilliefors GOF Test**			
8065				1% Lilliefors Critical Value	0.304				Data appear Normal at 1% Significance Level			
8066					**Data appear Normal at 1% Significance Level**							
8067												
8068					**Assuming Normal Distribution**							
8069				**95% Normal UCL**					**95% UCLs (Adjusted for Skewness)**			
8070				95% Student's-t UCL	0.503				95% Adjusted-CLT UCL (Chen-1995)	0.507		
8071									95% Modified-t UCL (Johnson-1978)	0.504		
8072												
8073					**Gamma GOF Test**							
8074				A-D Test Statistic	0.783				**Anderson-Darling Gamma GOF Test**			
8075				5% A-D Critical Value	0.725				Data Not Gamma Distributed at 5% Significance Level			
8076				K-S Test Statistic	0.305				**Kolmogorov-Smirnov Gamma GOF Test**			
8077				5% K-S Critical Value	0.266				Data Not Gamma Distributed at 5% Significance Level			
8078					**Data Not Gamma Distributed at 5% Significance Level**							
8079												
8080					**Gamma Statistics**							
8081				k hat (MLE)	22.97				k star (bias corrected MLE)	16.15		
8082				Theta hat (MLE)	0.0193				Theta star (bias corrected MLE)	0.0275		
8083				nu hat (MLE)	459.4				nu star (bias corrected)	322.9		
8084				MLE Mean (bias corrected)	0.444				MLE Sd (bias corrected)	0.11		
8085									Approximate Chi Square Value (0.05)	282.3		
8086				Adjusted Level of Significance	0.0267				Adjusted Chi Square Value	275.7		
8087												
8088					**Assuming Gamma Distribution**							
8089				95% Approximate Gamma UCL	0.508				95% Adjusted Gamma UCL	0.52		
8090												
8091					**Lognormal GOF Test**							
8092				Shapiro Wilk Test Statistic	0.849				**Shapiro Wilk Lognormal GOF Test**			
8093				10% Shapiro Wilk Critical Value	0.869				Data Not Lognormal at 10% Significance Level			
8094				Lilliefors Test Statistic	0.291				**Lilliefors Lognormal GOF Test**			
8095				10% Lilliefors Critical Value	0.241				Data Not Lognormal at 10% Significance Level			
8096					**Data Not Lognormal at 10% Significance Level**							
8097												
8098					**Lognormal Statistics**							
8099				Minimum of Logged Data	-1.05				Mean of logged Data	-0.834		

8100				Maximum of Logged Data	-0.462					SD of logged Data	0.217	
8101												
8102					**Assuming Lognormal Distribution**							
8103				95% H-UCL	0.51					90% Chebyshev (MVUE) UCL	0.535	
8104				95% Chebyshev (MVUE) UCL	0.577					97.5% Chebyshev (MVUE) UCL	0.634	
8105				99% Chebyshev (MVUE) UCL	0.747							
8106												
8107					**Nonparametric Distribution Free UCL Statistics**							
8108					**Data appear to follow a Discernible Distribution**							
8109												
8110					**Nonparametric Distribution Free UCLs**							
8111				95% CLT UCL	0.497					95% BCA Bootstrap UCL	0.502	
8112				95% Standard Bootstrap UCL	0.495					95% Bootstrap-t UCL	0.531	
8113				95% Hall's Bootstrap UCL	0.496					95% Percentile Bootstrap UCL	0.496	
8114				90% Chebyshev(Mean, Sd) UCL	0.54					95% Chebyshev(Mean, Sd) UCL	0.584	
8115				97.5% Chebyshev(Mean, Sd) UCL	0.645					99% Chebyshev(Mean, Sd) UCL	0.764	
8116												
8117					**Suggested UCL to Use**							
8118				95% Student's-t UCL	0.503							
8119												
8120					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
8121					Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.							
8122					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
8123												
8124												
8125	**Result (tws-sw-potassium)**											
8126												
8127					**General Statistics**							
8128				Total Number of Observations	10					Number of Distinct Observations	7	
8129										Number of Missing Observations	0	
8130				Minimum	2200					Mean	2550	
8131				Maximum	3000					Median	2550	
8132				SD	250.6					Std. Error of Mean	79.23	
8133				Coefficient of Variation	0.0983					Skewness	0.185	
8134												
8135					**Normal GOF Test**							
8136				Shapiro Wilk Test Statistic	0.961					**Shapiro Wilk GOF Test**		
8137				1% Shapiro Wilk Critical Value	0.781					Data appear Normal at 1% Significance Level		
8138				Lilliefors Test Statistic	0.121					**Lilliefors GOF Test**		
8139				1% Lilliefors Critical Value	0.304					Data appear Normal at 1% Significance Level		
8140					**Data appear Normal at 1% Significance Level**							
8141												
8142					**Assuming Normal Distribution**							
8143				**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**		
8144				95% Student's-t UCL	2695					95% Adjusted-CLT UCL (Chen-1995)	2685	
8145										95% Modified-t UCL (Johnson-1978)	2696	
8146												
8147					**Gamma GOF Test**							
8148				A-D Test Statistic	0.227					**Anderson-Darling Gamma GOF Test**		
8149				5% A-D Critical Value	0.724					Detected data appear Gamma Distributed at 5% Significance Level		
8150				K-S Test Statistic	0.135					**Kolmogorov-Smirnov Gamma GOF Test**		
8151				5% K-S Critical Value	0.266					Detected data appear Gamma Distributed at 5% Significance Level		
8152					**Detected data appear Gamma Distributed at 5% Significance Level**							
8153												
8154					**Gamma Statistics**							
8155				k hat (MLE)	115.2					k star (bias corrected MLE)	80.71	
8156				Theta hat (MLE)	22.13					Theta star (bias corrected MLE)	31.59	
8157				nu hat (MLE)	2304					nu star (bias corrected)	1614	
8158				MLE Mean (bias corrected)	2550					MLE Sd (bias corrected)	283.8	
8159										Approximate Chi Square Value (0.05)	1522	
8160				Adjusted Level of Significance	0.0267					Adjusted Chi Square Value	1506	
8161												
8162					**Assuming Gamma Distribution**							
8163				95% Approximate Gamma UCL	2705					95% Adjusted Gamma UCL	2733	
8164												
8165					**Lognormal GOF Test**							
8166				Shapiro Wilk Test Statistic	0.959					**Shapiro Wilk Lognormal GOF Test**		
8167				10% Shapiro Wilk Critical Value	0.869					Data appear Lognormal at 10% Significance Level		
8168				Lilliefors Test Statistic	0.138					**Lilliefors Lognormal GOF Test**		
8169				10% Lilliefors Critical Value	0.241					Data appear Lognormal at 10% Significance Level		
8170					**Data appear Lognormal at 10% Significance Level**							
8171												
8172					**Lognormal Statistics**							
8173				Minimum of Logged Data	7.696					Mean of logged Data	7.84	
8174				Maximum of Logged Data	8.006					SD of logged Data	0.0983	
8175												
8176					**Assuming Lognormal Distribution**							
8177				95% H-UCL	N/A					90% Chebyshev (MVUE) UCL	2788	
8178				95% Chebyshev (MVUE) UCL	2896					97.5% Chebyshev (MVUE) UCL	3046	
8179				99% Chebyshev (MVUE) UCL	3340							
8180												
8181					**Nonparametric Distribution Free UCL Statistics**							
8182					**Data appear to follow a Discernible Distribution**							

8183												
8184					**Nonparametric Distribution Free UCLs**							
8185					95% CLT UCL	2680				95% BCA Bootstrap UCL	2670	
8186					95% Standard Bootstrap UCL	2674				95% Bootstrap-t UCL	2700	
8187					95% Hall's Bootstrap UCL	2701				95% Percentile Bootstrap UCL	2680	
8188					90% Chebyshev(Mean, Sd) UCL	2788				95% Chebyshev(Mean, Sd) UCL	2895	
8189					97.5% Chebyshev(Mean, Sd) UCL	3045				99% Chebyshev(Mean, Sd) UCL	3338	
8190												
8191					**Suggested UCL to Use**							
8192					95% Student's-t UCL	2695						
8193												
8194					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
8195					Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.							
8196					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
8197												
8198	**Result (tws-sw-selenium)**											
8199												
8200					**General Statistics**							
8201					Total Number of Observations	10				Number of Distinct Observations	1	
8202					Number of Detects	0				Number of Non-Detects	10	
8203					Number of Distinct Detects	0				Number of Distinct Non-Detects	1	
8204												
8205					**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**							
8206					**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**							
8207					**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**							
8208												
8209					**The data set for variable Result (tws-sw-selenium) was not processed!**							
8210												
8211												
8212	**Result (tws-sw-silver)**											
8213												
8214					**General Statistics**							
8215					Total Number of Observations	10				Number of Distinct Observations	1	
8216					Number of Detects	0				Number of Non-Detects	10	
8217					Number of Distinct Detects	0				Number of Distinct Non-Detects	1	
8218												
8219					**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**							
8220					**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**							
8221					**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**							
8222												
8223					**The data set for variable Result (tws-sw-silver) was not processed!**							
8224												
8225												
8226												
8227	**Result (tws-sw-sodium)**											
8228												
8229					**General Statistics**							
8230					Total Number of Observations	10				Number of Distinct Observations	9	
8231										Number of Missing Observations	0	
8232					Minimum	33000				Mean	39600	
8233					Maximum	50000				Median	39500	
8234					SD	4971				Std. Error of Mean	1572	
8235					Coefficient of Variation	0.126				Skewness	0.793	
8236												
8237					**Normal GOF Test**							
8238					Shapiro Wilk Test Statistic	0.949				**Shapiro Wilk GOF Test**		
8239					1% Shapiro Wilk Critical Value	0.781				Data appear Normal at 1% Significance Level		
8240					Lilliefors Test Statistic	0.189				**Lilliefors GOF Test**		
8241					1% Lilliefors Critical Value	0.304				Data appear Normal at 1% Significance Level		
8242					**Data appear Normal at 1% Significance Level**							
8243												
8244					**Assuming Normal Distribution**							
8245					**95% Normal UCL**					**95% UCLs (Adjusted for Skewness)**		
8246					95% Student's-t UCL	42482				95% Adjusted-CLT UCL (Chen-1995)	42607	
8247										95% Modified-t UCL (Johnson-1978)	42547	
8248												
8249					**Gamma GOF Test**							
8250					A-D Test Statistic	0.217				**Anderson-Darling Gamma GOF Test**		
8251					5% A-D Critical Value	0.724				Detected data appear Gamma Distributed at 5% Significance Level		
8252					K-S Test Statistic	0.168				**Kolmogorov-Smirnov Gamma GOF Test**		
8253					5% K-S Critical Value	0.266				Detected data appear Gamma Distributed at 5% Significance Level		
8254					**Detected data appear Gamma Distributed at 5% Significance Level**							
8255												
8256					**Gamma Statistics**							
8257					k hat (MLE)	73.14				k star (bias corrected MLE)	51.26	
8258					Theta hat (MLE)	541.4				Theta star (bias corrected MLE)	772.5	
8259					nu hat (MLE)	1463				nu star (bias corrected)	1025	
8260					MLE Mean (bias corrected)	39600				MLE Sd (bias corrected)	5531	
8261										Approximate Chi Square Value (0.05)	951.9	
8262					Adjusted Level of Significance	0.0267				Adjusted Chi Square Value	939.6	
8263												
8264					**Assuming Gamma Distribution**							
8265					95% Approximate Gamma UCL	42650				95% Adjusted Gamma UCL	43209	

8266											
8267						**Lognormal GOF Test**					
8268					Shapiro Wilk Test Statistic	0.968		**Shapiro Wilk Lognormal GOF Test**			
8269					10% Shapiro Wilk Critical Value	0.869		Data appear Lognormal at 10% Significance Level			
8270					Lilliefors Test Statistic	0.167		**Lilliefors Lognormal GOF Test**			
8271					10% Lilliefors Critical Value	0.241		Data appear Lognormal at 10% Significance Level			
8272					**Data appear Lognormal at 10% Significance Level**						
8273											
8274						**Lognormal Statistics**					
8275					Minimum of Logged Data	10.4		Mean of logged Data	10.58		
8276					Maximum of Logged Data	10.82		SD of logged Data	0.122		
8277											
8278						**Assuming Lognormal Distribution**					
8279					95% H-UCL	42680		90% Chebyshev (MVUE) UCL	44203		
8280					95% Chebyshev (MVUE) UCL	46289		97.5% Chebyshev (MVUE) UCL	49186		
8281					99% Chebyshev (MVUE) UCL	54875					
8282											
8283						**Nonparametric Distribution Free UCL Statistics**					
8284						**Data appear to follow a Discernible Distribution**					
8285											
8286						**Nonparametric Distribution Free UCLs**					
8287					95% CLT UCL	42186		95% BCA Bootstrap UCL	42500		
8288					95% Standard Bootstrap UCL	42055		95% Bootstrap-t UCL	43135		
8289					95% Hall's Bootstrap UCL	43907		95% Percentile Bootstrap UCL	42200		
8290					90% Chebyshev(Mean, Sd) UCL	44316		95% Chebyshev(Mean, Sd) UCL	46452		
8291					97.5% Chebyshev(Mean, Sd) UCL	49417		99% Chebyshev(Mean, Sd) UCL	55241		
8292											
8293						**Suggested UCL to Use**					
8294					95% Student's-t UCL	42482					
8295											
8296					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
8297					Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.						
8298					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.						
8299											
8300	**Result (tws-sw-thallium)**										
8301											
8302						**General Statistics**					
8303					Total Number of Observations	10		Number of Distinct Observations	2		
8304					Number of Detects	1		Number of Non-Detects	9		
8305					Number of Distinct Detects	1		Number of Distinct Non-Detects	1		
8306											
8307					**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**						
8308					**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**						
8309											
8310					**The data set for variable Result (tws-sw-thallium) was not processed!**						
8311											
8312											
8313	**Result (tws-sw-vanadium)**										
8314											
8315						**General Statistics**					
8316					Total Number of Observations	10		Number of Distinct Observations	1		
8317					Number of Detects	0		Number of Non-Detects	10		
8318					Number of Distinct Detects	0		Number of Distinct Non-Detects	1		
8319											
8320					**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**						
8321					**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**						
8322					**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**						
8323											
8324					**The data set for variable Result (tws-sw-vanadium) was not processed!**						
8325											
8326											
8327											
8328	**Result (tws-sw-water hardness)**										
8329											
8330						**General Statistics**					
8331					Total Number of Observations	10		Number of Distinct Observations	8		
8332								Number of Missing Observations	0		
8333					Minimum	79		Mean	83.6		
8334					Maximum	91		Median	83.5		
8335					SD	3.373		Std. Error of Mean	1.067		
8336					Coefficient of Variation	0.0403		Skewness	0.975		
8337											
8338						**Normal GOF Test**					
8339					Shapiro Wilk Test Statistic	0.936		**Shapiro Wilk GOF Test**			
8340					1% Shapiro Wilk Critical Value	0.781		Data appear Normal at 1% Significance Level			
8341					Lilliefors Test Statistic	0.153		**Lilliefors GOF Test**			
8342					1% Lilliefors Critical Value	0.304		Data appear Normal at 1% Significance Level			
8343					**Data appear Normal at 1% Significance Level**						
8344											
8345						**Assuming Normal Distribution**					
8346					**95% Normal UCL**			**95% UCLs (Adjusted for Skewness)**			
8347					95% Student's-t UCL	85.56		95% Adjusted-CLT UCL (Chen-1995)	85.71		
8348								95% Modified-t UCL (Johnson-1978)	85.61		

8349												
8350	**Gamma GOF Test**											
8351					A-D Test Statistic	0.287	**Anderson-Darling Gamma GOF Test**					
8352					5% A-D Critical Value	0.724	Detected data appear Gamma Distributed at 5% Significance Level					
8353					K-S Test Statistic	0.145	**Kolmogorov-Smirnov Gamma GOF Test**					
8354					5% K-S Critical Value	0.266	Detected data appear Gamma Distributed at 5% Significance Level					
8355	**Detected data appear Gamma Distributed at 5% Significance Level**											
8356												
8357	**Gamma Statistics**											
8358					k hat (MLE)	695.6	k star (bias corrected MLE)	487				
8359					Theta hat (MLE)	0.12	Theta star (bias corrected MLE)	0.172				
8360					nu hat (MLE)	13912	nu star (bias corrected)	9739				
8361					MLE Mean (bias corrected)	83.6	MLE Sd (bias corrected)	3.788				
8362							Approximate Chi Square Value (0.05)	9511				
8363					Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	9472				
8364												
8365	**Assuming Gamma Distribution**											
8366					95% Approximate Gamma UCL	85.61	95% Adjusted Gamma UCL	85.96				
8367												
8368	**Lognormal GOF Test**											
8369					Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk Lognormal GOF Test**					
8370					10% Shapiro Wilk Critical Value	0.869	Data appear Lognormal at 10% Significance Level					
8371					Lilliefors Test Statistic	0.145	**Lilliefors Lognormal GOF Test**					
8372					10% Lilliefors Critical Value	0.241	Data appear Lognormal at 10% Significance Level					
8373	**Data appear Lognormal at 10% Significance Level**											
8374												
8375	**Lognormal Statistics**											
8376					Minimum of Logged Data	4.369	Mean of logged Data	4.425				
8377					Maximum of Logged Data	4.511	SD of logged Data	0.0398				
8378												
8379	**Assuming Lognormal Distribution**											
8380					95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	86.76				
8381					95% Chebyshev (MVUE) UCL	88.19	97.5% Chebyshev (MVUE) UCL	90.17				
8382					99% Chebyshev (MVUE) UCL	94.07						
8383												
8384	**Nonparametric Distribution Free UCL Statistics**											
8385	**Data appear to follow a Discernible Distribution**											
8386												
8387	**Nonparametric Distribution Free UCLs**											
8388					95% CLT UCL	85.35	95% BCA Bootstrap UCL	85.5				
8389					95% Standard Bootstrap UCL	85.26	95% Bootstrap-t UCL	86.01				
8390					95% Hall's Bootstrap UCL	87.07	95% Percentile Bootstrap UCL	85.4				
8391					90% Chebyshev(Mean, Sd) UCL	86.8	95% Chebyshev(Mean, Sd) UCL	88.25				
8392					97.5% Chebyshev(Mean, Sd) UCL	90.26	99% Chebyshev(Mean, Sd) UCL	94.21				
8393												
8394	**Suggested UCL to Use**											
8395					95% Student's-t UCL	85.56						
8396												
8397	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
8398	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
8399	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
8400												
8401	**Result (tws-sw-zinc)**											
8402												
8403	**General Statistics**											
8404					Total Number of Observations	10	Number of Distinct Observations	2				
8405					Number of Detects	1	Number of Non-Detects	9				
8406					Number of Distinct Detects	1	Number of Distinct Non-Detects	1				
8407												
8408	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
8409	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**											
8410												
8411	**The data set for variable Result (tws-sw-zinc) was not processed!**											
8412												
8413												

Attachment F

Background Comparisons

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Table F-1. Background Comparison Permutation Tests - Phase I Analytical Soil Data

					Site Data				Background Data			Permutation Test (H0: Site <= Background)		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	No. Samples	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-01	3	3	0.004608154	8	8	0.013412476	-0.008804321	0.96	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-02	3	3	0.052322388	8	8	0.013412476	0.038909912	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-03	3	3	0.010696411	8	8	0.013412476	-0.002716064	0.67	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-04	3	2	0.041000366	8	8	0.013412476	0.027587891	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-05	3	3	0.007843018	8	8	0.013412476	-0.005569458	0.88	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-09	3	3	0.00630188	8	8	0.013412476	-0.007110596	0.94	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-11	3	3	0.026000977	8	8	0.013412476	0.012588501	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-12	3	3	0.056671143	8	8	0.013412476	0.043258667	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-13	3	3	0.363327026	8	8	0.013412476	0.349914551	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-16	3	3	0.020568848	8	8	0.013412476	0.007156372	0.13	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-17	3	3	0.031005859	8	8	0.013412476	0.017593384	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-18	3	3	0.040328979	8	8	0.013412476	0.026916504	<0.05	Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-19	3	3	0.017333984	8	8	0.013412476	0.003921509	0.23	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-20	3	3	0.008728027	8	8	0.013412476	-0.004684448	0.84	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-21	3	3	0.005599976	8	8	0.013412476	-0.0078125	0.96	Do Not Reject H0
SS	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-22	3	3	0.040664673	8	8	0.013412476	0.027252197	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-01	3	3	0.007095337	8	8	0.012390137	-0.0052948	0.93	Do Not Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-02	3	3	0.042007446	8	8	0.012390137	0.02961731	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-03	3	3	0.012268066	8	8	0.012390137	-0.00012207	0.55	Do Not Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-04	3	2	0.054000854	8	8	0.012390137	0.041610718	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-05	3	3	0.010131836	8	8	0.012390137	-0.002258301	0.72	Do Not Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-09	3	3	0.008651733	8	8	0.012390137	-0.003738403	0.84	Do Not Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-11	3	3	0.041000366	8	8	0.012390137	0.028610229	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-12	3	3	0.068664551	8	8	0.012390137	0.056274414	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-13	3	3	0.413330078	8	8	0.012390137	0.400939941	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-16	3	3	0.027404785	8	8	0.012390137	0.015014648	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-17	3	3	0.046340942	8	8	0.012390137	0.033950806	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-18	3	3	0.067337036	8	8	0.012390137	0.054946899	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-19	3	3	0.027008057	8	8	0.012390137	0.01461792	<0.05	Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-20	3	3	0.013000488	8	8	0.012390137	0.000610352	0.40	Do Not Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-21	3	3	0.007659912	8	8	0.012390137	-0.004730225	0.90	Do Not Reject H0
SS	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-22	3	3	0.061340332	8	8	0.012390137	0.048950195	<0.05	Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-01	3	3	0.006393433	8	8	0.038757324	-0.032363892	0.97	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-02	3	3	0.17666626	8	8	0.038757324	0.137908936	<0.05	Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-03	3	3	0.02633667	8	8	0.038757324	-0.012420654	0.68	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-04	3	3	0.101654053	8	8	0.038757324	0.062896729	0.09	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-05	3	3	0.016326904	8	8	0.038757324	-0.02243042	0.86	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-09	3	3	0.010604858	8	8	0.038757324	-0.028152466	0.94	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-11	3	3	0.021347046	8	8	0.038757324	-0.017410278	0.78	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-12	3	3	0.430007935	8	8	0.038757324	0.39125061	<0.05	Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-13	3	3	3.933334351	8	8	0.038757324	3.894577026	<0.05	Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-16	3	3	0.108657837	8	8	0.038757324	0.069900513	<0.05	Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-17	3	3	0.035675049	8	8	0.038757324	-0.003082275	0.54	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-18	3	3	0.050994873	8	8	0.038757324	0.012237549	0.28	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-19	3	3	0.037658691	8	8	0.038757324	-0.001098633	0.50	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-20	3	3	0.011444092	8	8	0.038757324	-0.027313232	0.94	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-21	3	3	0.011672974	8	8	0.038757324	-0.027084351	0.89	Do Not Reject H0
SS	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-22	3	3	0.095657349	8	8	0.038757324	0.056900024	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-01	3	3	0.031326294	8	8	0.033493042	-0.002166748	0.52	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-02	3	3	0.11000061	8	8	0.033493042	0.076507568	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-03	3	3	0.039657593	8	8	0.033493042	0.006164551	0.31	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-04	3	3	0.209991455	8	8	0.033493042	0.176498413	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-05	3	3	0.019668579	8	8	0.033493042	-0.013824463	0.83	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-09	3	3	0.030670166	8	8	0.033493042	-0.002822876	0.45	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-11	3	3	0.186676025	8	8	0.033493042	0.153182983	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-12	3	3	0.059661865	8	8	0.033493042	0.026168823	0.06	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-13	3	1	0.566665649	8	8	0.033493042	0.533172607	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-16	3	3	0.031341553	8	8	0.033493042	-0.002151489	0.48	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-17	3	3	0.13999939	8	8	0.033493042	0.106506348	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-18	3	3	0.084335327	8	8	0.033493042	0.050842285	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-19	3	3	0.203338623	8	8	0.033493042	0.169845581	<0.05	Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-20	3	3	0.034011841	8	8	0.033493042	0.000518799	0.47	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-21	3	3	0.022659302	8	8	0.033493042	-0.01083374	0.76	Do Not Reject H0
SS	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-22	3	3	0.196670532	8	8	0.033493042	0.16317749	<0.05	Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-01	3	3	11000	8	8	12162.5	-1162.5	0.76	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-02	3	3	13000	8	8	12162.5	837.5	0.40	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-03	3	3	13000	8	8	12162.5	837.5	0.38	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-04	3	3	10000	8	8	12162.5	-2162.5	0.87	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-05	3	3	13000	8	8	12162.5	837.5	0.41	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-06	3	3	10666.66667	8	8	12162.5	-1495.833328	0.83	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-07	3	3	10666.66667	8	8	12162.5	-1495.833328	0.87	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-09	3	3	10666.66667	8	8	12162.5	-1495.833328	0.87	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-10	3	3	10433.33333	8	8	12162.5	-1729.166672	0.89	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-11	3	3	10233.33333	8	8	12162.5	-1929.166672	0.91	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-12	3	3	11000	8	8	12162.5	-1162.5	0.76	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-13	3	3	11333.33333	8	8	12162.5	-829.1666718	0.68	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-14	3	3	10333.33333	8	8	12162.5	-1829.166672	0.91	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-15	3	3	11000	8	8	12162.5	-1162.5	0.78	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-16	3	3	14000	8	8	12162.5	1837.5	0.21	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-17	3	3	5900	8	8	12162.5	-6262.5	1.00	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-18	3	3	9500	8	8	12162.5	-2662.5	0.91	Do Not Reject H0
SS	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-19	3	3	20333.33334	8	8	12162.5	8170.833344	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-01	3	3	0.028320313	8	8	0.059188843	-0.03086853	0.83	Do Not Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-02	3	3	0.476669312	8	8	0.059188843	0.417480469	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-03	3	3	0.091339111	8	8	0.059188843	0.032150269	0.17	Do Not Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-04	3	3	0.313323975	8	8	0.059188843	0.254135132	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-05	3	3	0.060668945	8	8	0.059188843	0.001480103	0.52	Do Not Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-09	3	3	0.03666687	8	8	0.059188843	-0.022521973	0.70	Do Not Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-11	3	3	0.125671387	8	8	0.059188843	0.066482544	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-12	3	3	0.733337402	8	8	0.059188843	0.67414856	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-13	3	3	6.166656494	8	8	0.059188843	6.107467651	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-16	3	3	0.134338379	8	8	0.059188843	0.075149536	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-17	3	3	0.186660767	8	8	0.059188843	0.127471924	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-18	3	3	0.169998169	8	8	0.059188843	0.110809326	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-19	3	3	0.28666687	8	8	0.059188843	0.227478027	<0.05	Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-20	3	3	0.04133606	8	8	0.059188843	-0.017852783	0.73	Do Not Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-21	3	3	0.040664673	8	8	0.059188843	-0.01852417	0.72	Do Not Reject H0
SS	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-22	3	3	0.333328247	8	8	0.059188843	0.274139404	<0.05	Reject H0

Table F-1. Background Comparison Permutation Tests - Phase I Analytical Soil Data

					Site Data				Background Data			Permutation Test (H0: Site <= Background)		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	No. Samples	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-01	3	3	0.5	8	8	0.986236572	-0.486236572	1.00	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-02	3	3	0.636672974	8	8	0.986236572	-0.349563599	0.98	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-03	3	3	0.659988403	8	8	0.986236572	-0.326248169	0.98	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-04	3	3	1.699996948	8	8	0.986236572	0.713760376	<0.05	Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-05	3	3	0.516662598	8	8	0.986236572	-0.469573975	1.00	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-06	3	3	0.866653442	8	8	0.986236572	-0.11958313	0.76	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-07	3	3	1.616668701	8	8	0.986236572	0.630432129	0.07	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-09	3	3	0.433334351	8	8	0.986236572	-0.552902222	1.00	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-10	3	3	0.38999939	8	8	0.986236572	-0.596237183	1.00	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-11	3	3	0.82333374	8	8	0.986236572	-0.162902832	0.86	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-12	3	3	0.636672974	8	8	0.986236572	-0.349563599	0.98	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-13	3	3	1.699996948	8	8	0.986236572	0.713760376	<0.05	Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-14	3	3	0.583343506	8	8	0.986236572	-0.402893066	0.98	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-15	3	3	0.833328247	8	8	0.986236572	-0.152908325	0.83	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-16	3	3	0.419998169	8	8	0.986236572	-0.566238403	1.00	Do Not Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-17	3	3	7.900009155	8	8	0.986236572	6.913772583	<0.05	Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-18	3	3	6.533325195	8	8	0.986236572	5.547088623	<0.05	Reject H0
SS	Antimony	SB	7440-36-0	mg/kg	IINY-DU-19	3	3	0.42666626	8	8	0.986236572	-0.559570313	1.00	Do Not Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-01	3	3	10.6333313	8	8	5.325012207	5.308319092	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-02	3	3	13.66667175	8	8	5.325012207	8.341659546	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-03	3	3	13.33334351	8	8	5.325012207	8.008331299	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-04	3	3	31.33334351	8	8	5.325012207	26.0083313	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-05	3	3	11.33332825	8	8	5.325012207	6.00831604	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-06	3	3	9.666656494	8	8	5.325012207	4.341644287	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-07	3	3	17.33332825	8	8	5.325012207	12.00831604	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-09	3	3	7.066665649	8	8	5.325012207	1.741653442	0.14	Do Not Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-10	3	3	7.066665649	8	8	5.325012207	1.741653442	0.15	Do Not Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-11	3	3	39.66665649	8	8	5.325012207	34.34164429	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-12	3	3	13.66667175	8	8	5.325012207	8.341659546	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-13	3	3	10.56666565	8	8	5.325012207	5.241653442	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-14	3	3	17	8	8	5.325012207	11.67498779	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-15	3	3	6.866668701	8	8	5.325012207	1.541656494	0.16	Do Not Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-16	3	3	7.033325195	8	8	5.325012207	1.708312988	0.13	Do Not Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-17	3	3	6.566665649	8	8	5.325012207	1.241653442	0.20	Do Not Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-18	3	3	12.6000061	8	8	5.325012207	7.274993896	<0.05	Reject H0
SS	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-19	3	3	9.466674805	8	8	5.325012207	4.141662598	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-01	3	3	67.33334351	8	8	33.375	33.95834351	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-02	3	3	73.66667175	8	8	33.375	40.29167175	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-03	3	3	79.66667175	8	8	33.375	46.29167175	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-04	3	3	85	8	8	33.375	51.625	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-05	3	3	72.66667175	8	8	33.375	39.29167175	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-06	3	3	65.66667175	8	8	33.375	32.29167175	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-07	3	3	104.3333282	8	8	33.375	70.95832825	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-09	3	3	61.66665649	8	8	33.375	28.29165649	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-10	3	3	57	8	8	33.375	23.625	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-11	3	3	77.66665649	8	8	33.375	44.29165649	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-12	3	3	80.66667175	8	8	33.375	47.29167175	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-13	3	3	90	8	8	33.375	56.625	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-14	3	3	78.33332825	8	8	33.375	44.95832825	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-15	3	3	60.33332825	8	8	33.375	26.95832825	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-16	3	3	58.66667175	8	8	33.375	25.29167175	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-17	3	3	133.3333435	8	8	33.375	99.95834351	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-18	3	3	276.6666718	8	8	33.375	243.2916718	<0.05	Reject H0
SS	Barium	BA	7440-39-3	mg/kg	IINY-DU-19	3	3	75.66667175	8	8	33.375	42.29167175	<0.05	Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-01	3	3	0.130004883	8	8	0.307479858	-0.177474976	0.76	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-02	3	3	2.066665649	8	8	0.307479858	1.759185791	<0.05	Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-03	3	3	0.38999939	8	8	0.307479858	0.082519531	0.34	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-04	3	3	1.130004883	8	8	0.307479858	0.822525024	<0.05	Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-05	3	3	0.316665649	8	8	0.307479858	0.009185791	0.51	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-09	3	3	0.156661987	8	8	0.307479858	-0.150817871	0.72	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-11	3	3	0.720001221	8	8	0.307479858	0.412521362	<0.05	Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-12	3	3	1.933334351	8	8	0.307479858	1.625854492	<0.05	Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-13	3	3	14.1333313	8	8	0.307479858	13.82585144	<0.05	Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-16	3	3	0.383346558	8	8	0.307479858	0.075866699	0.38	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-17	3	3	0.649993896	8	8	0.307479858	0.342514038	0.05	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-18	3	3	0.706680298	8	8	0.307479858	0.399200439	0.07	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-19	3	3	1.566665649	8	8	0.307479858	1.259185791	<0.05	Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-20	3	3	0.14666748	8	8	0.307479858	-0.160812378	0.73	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-21	3	3	0.148666382	8	8	0.307479858	-0.158813477	0.80	Do Not Reject H0
SS	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-22	3	3	1.5	8	8	0.307479858	1.192520142	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-01	3	3	0.149993896	8	8	0.329742432	-0.179748535	0.79	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-02	3	3	1.733322144	8	8	0.329742432	1.403579712	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-03	3	3	0.403335571	8	8	0.329742432	0.07359314	0.37	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-04	3	3	1.100006104	8	8	0.329742432	0.770263672	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-05	3	3	0.279998779	8	8	0.329742432	-0.049743652	0.59	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-09	3	3	0.17666626	8	8	0.329742432	-0.153076172	0.77	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-11	3	3	0.940002441	8	8	0.329742432	0.61026001	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-12	3	3	1.600006104	8	8	0.329742432	1.270263672	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-13	3	3	10.69999695	8	8	0.329742432	10.37025452	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-16	3	3	0.380004883	8	8	0.329742432	0.050262451	0.38	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-17	3	3	0.553329468	8	8	0.329742432	0.223587036	0.17	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-18	3	3	0.64666748	8	8	0.329742432	0.316925049	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-19	3	3	1.259994507	8	8	0.329742432	0.930252075	<0.05	Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-20	3	3	0.159988403	8	8	0.329742432	-0.169754028	0.76	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-21	3	3	0.13633728	8	8	0.329742432	-0.193405151	0.81	Do Not Reject H0
SS	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-22	3	3	1.433334351	8	8	0.329742432	1.103591919	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-01	3	3	0.233337402	8	8	0.523986816	-0.290649414	0.76	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-02	3	3	2.466659546	8	8	0.523986816	1.942672729	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-03	3	3	0.593322754	8	8	0.523986816	0.069335938	0.42	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-04	3	3	2.566665649	8	8	0.523986816	2.042678833	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-05	3	3	0.410003662	8	8	0.523986816	-0.113983154	0.61	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-09	3	3	0.279998779	8	8	0.523986816	-0.243988037	0.74	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-11	3	3	1.300003052	8	8	0.523986816	0.776016235	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-12	3	3	2.333343506	8	8	0.523986816	1.809356689	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-13	3	3	14.56666565	8	8	0.523986816	14.04267883	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-16	3	3	0.563339233	8	8	0.523986816	0.039352417	0.46	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-17	3	3	0.96333313	8	8	0.523986816	0.439346313	0.09	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-18	3	3	1.186676025	8	8	0.523986816	0.662689209	<0.05	Reject H0

Table F-1. Background Comparison Permutation Tests - Phase I Analytical Soil Data

					Site Data				Background Data			Permutation Test (H0: Site <= Background)		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	No. Samples	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-19	3	3	2.266662598	8	8	0.523986816	1.742675781	<0.05	Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-20	3	3	0.253326416	8	8	0.523986816	-0.2706604	0.76	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-21	3	3	0.226669312	8	8	0.523986816	-0.297317505	0.76	Do Not Reject H0
SS	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-22	3	3	2.266677856	8	8	0.523986816	1.74269104	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-01	3	3	0.116668701	8	8	0.261871338	-0.145202637	0.80	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-02	3	3	0.976669312	8	8	0.261871338	0.714797974	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-03	3	3	0.289993286	8	8	0.261871338	0.028121948	0.36	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-04	3	3	0.880004883	8	8	0.261871338	0.618133545	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-05	3	3	0.179992676	8	8	0.261871338	-0.081878662	0.67	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-09	3	3	0.120010376	8	8	0.261871338	-0.141860962	0.77	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-11	3	3	0.933334351	8	8	0.261871338	0.671463013	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-12	3	3	1.129989624	8	8	0.261871338	0.868118286	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-13	3	3	6.433334351	8	8	0.261871338	6.171463013	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-16	3	3	0.25	8	8	0.261871338	-0.011871338	0.53	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-17	3	3	0.35333252	8	8	0.261871338	0.091461182	0.23	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-18	3	3	0.449996948	8	8	0.261871338	0.18812561	0.14	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-19	3	3	0.763336182	8	8	0.261871338	0.501464844	<0.05	Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-20	3	3	0.123336792	8	8	0.261871338	-0.138534546	0.76	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-21	3	3	0.080337524	8	8	0.261871338	-0.181533813	0.88	Do Not Reject H0
SS	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-22	3	3	0.806671143	8	8	0.261871338	0.544799805	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-01	3	3	0.077667236	8	8	0.191375732	-0.113708496	0.86	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-02	3	3	0.763336182	8	8	0.191375732	0.571960449	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-03	3	3	0.186676025	8	8	0.191375732	-0.004699707	0.49	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-04	3	3	0.803329468	8	8	0.191375732	0.611953735	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-05	3	3	0.133331299	8	8	0.191375732	-0.058044434	0.66	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-09	3	3	0.094665527	8	8	0.191375732	-0.096710205	0.76	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-11	3	3	0.453338623	8	8	0.191375732	0.261962891	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-12	3	3	0.89666748	8	8	0.191375732	0.705291748	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-13	3	3	5.866653442	8	8	0.191375732	5.67527771	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-12	3	3	0.89666748	8	8	0.191375732	0.705291748	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-13	3	3	5.866653442	8	8	0.191375732	5.67527771	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-16	3	3	0.203323364	8	8	0.191375732	0.011947632	0.41	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-17	3	3	0.300003052	8	8	0.191375732	0.108627319	0.17	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-18	3	3	0.32333374	8	8	0.191375732	0.131958008	0.12	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-19	3	3	0.793334961	8	8	0.191375732	0.601959229	<0.05	Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-20	3	3	0.082000732	8	8	0.191375732	-0.109375	0.78	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-21	3	3	0.075668335	8	8	0.191375732	-0.115707397	0.83	Do Not Reject H0
SS	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-22	3	3	0.759994507	8	8	0.191375732	0.568618774	<0.05	Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-01	3	3	0.523330688	8	8	0.43963623	0.083694458	0.36	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-02	3	3	0.579986572	8	8	0.43963623	0.140350342	0.27	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-03	3	3	0.556671143	8	8	0.43963623	0.117034912	0.27	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-04	3	3	0.483337402	8	8	0.43963623	0.043701172	0.46	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-05	3	3	0.580001831	8	8	0.43963623	0.140365601	0.23	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-06	3	3	0.529998779	8	8	0.43963623	0.090362549	0.36	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-07	3	3	0.53666687	8	8	0.43963623	0.09703064	0.34	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-09	3	3	0.496658325	8	8	0.43963623	0.057022095	0.44	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-10	3	3	0.553329468	8	8	0.43963623	0.113693237	0.29	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-11	3	3	0.550003052	8	8	0.43963623	0.110366821	0.29	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-12	3	3	0.64666748	8	8	0.43963623	0.20703125	0.18	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-13	3	3	0.599990845	8	8	0.43963623	0.160354614	0.24	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-14	3	3	0.550003052	8	8	0.43963623	0.110366821	0.30	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-15	3	3	0.479995728	8	8	0.43963623	0.040359497	0.44	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-16	3	3	0.576675415	8	8	0.43963623	0.137039185	0.29	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-17	3	3	0.35333252	8	8	0.43963623	-0.086303711	0.68	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-18	3	3	0.590011597	8	8	0.43963623	0.150375366	0.25	Do Not Reject H0
SS	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-19	3	3	0.406661987	8	8	0.43963623	-0.032974243	0.58	Do Not Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-01	3	3	0.283325195	8	8	0.174987793	0.108337402	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-02	3	3	0.226669312	8	8	0.174987793	0.051681519	0.13	Do Not Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-03	3	3	0.253326416	8	8	0.174987793	0.078338623	0.06	Do Not Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-04	3	3	0.986679077	8	8	0.174987793	0.811691284	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-05	3	3	0.209991455	8	8	0.174987793	0.035003662	0.22	Do Not Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-06	3	0	1.7	8	8	0.174987793	1.525012207	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-07	3	3	0.563323975	8	8	0.174987793	0.388336182	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-09	3	3	0.236663818	8	8	0.174987793	0.061676025	0.12	Do Not Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-10	3	2	0.179992676	8	8	0.174987793	0.005004883	0.44	Do Not Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-11	3	3	0.366668701	8	8	0.174987793	0.191680908	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-12	3	3	0.35333252	8	8	0.174987793	0.178344727	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-13	3	3	0.753341675	8	8	0.174987793	0.578353882	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-14	3	3	0.276672363	8	8	0.174987793	0.10168457	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-15	3	3	0.513336182	8	8	0.174987793	0.338348389	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-16	3	3	0.283340454	8	8	0.174987793	0.108352661	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-17	3	3	13.66665649	8	8	0.174987793	13.4916687	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-18	3	3	4.633331299	8	8	0.174987793	4.458343506	<0.05	Reject H0
SS	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-19	3	3	0.293334961	8	8	0.174987793	0.118347168	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-01	3	3	4533.333328	8	8	1222.5	3310.833328	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-02	3	3	10600	8	8	1222.5	9377.5	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-03	3	3	6233.333344	8	8	1222.5	5010.833344	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-04	3	3	9666.666656	8	8	1222.5	8444.166656	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-05	3	3	3233.333344	8	8	1222.5	2010.833344	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-06	3	3	14333.33333	8	8	1222.5	13110.83333	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-07	3	3	16000	8	8	1222.5	14777.5	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-09	3	3	7366.666672	8	8	1222.5	6144.166672	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-10	3	3	15000	8	8	1222.5	13777.5	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-11	3	3	26666.66666	8	8	1222.5	25444.16666	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-12	3	3	11333.33334	8	8	1222.5	10110.83334	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-13	3	3	8866.666672	8	8	1222.5	7644.166672	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-14	3	3	8400	8	8	1222.5	7177.5	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-15	3	3	8166.666672	8	8	1222.5	6944.166672	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-16	3	3	7600	8	8	1222.5	6377.5	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-17	3	3	58333.33333	8	8	1222.5	57110.83333	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-18	3	3	12333.33333	8	8	1222.5	11110.83333	<0.05	Reject H0
SS	Calcium	CA	7440-70-2	mg/kg	IINY-DU-19	3	3	12333.33333	8	8	1222.5	11110.83333	<0.05	Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-01	3	3	13.33332825	8	8	14.6625061	-1.329177856	0.57	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-02	3	3	15	8	8	14.6625061	0.337493896	0.44	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-03	3	3	15.33332825	8	8	14.6625061	0.670822144	0.43	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-04	3	3	17	8	8	14.6625061	2.337493896	0.36	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-05	3	3	15	8	8	14.6625061	0.337493896	0.45	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-06	3	3	13	8	8	14.6625061	-1.662506104	0.62	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-07	3	3	16	8	8	14.6625061	1.337493896	0.40	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-09	3	3	13	8	8	14.6625061	-1.662506104	0.66	Do Not Reject H0

Table F-1. Background Comparison Permutation Tests - Phase I Analytical Soil Data

					Site Data				Background Data			Permutation Test (H0: Site <= Background)		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	No. Samples	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-10	3	3	13.66667175	8	8	14.6625061	-0.995834351	0.55	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-11	3	3	15	8	8	14.6625061	0.337493896	0.45	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-12	3	3	15	8	8	14.6625061	0.337493896	0.45	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-13	3	3	14.66667175	8	8	14.6625061	0.004165649	0.46	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-14	3	3	13.66667175	8	8	14.6625061	-0.995834351	0.58	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-15	3	3	15	8	8	14.6625061	0.337493896	0.42	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-16	3	3	14.66667175	8	8	14.6625061	0.004165649	0.49	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-17	3	3	16.96665955	8	8	14.6625061	2.304153442	0.39	Do Not Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-18	3	3	95.66667175	8	8	14.6625061	81.00416565	<0.05	Reject H0
SS	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-19	3	3	10.33332825	8	8	14.6625061	-4.329177856	0.80	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-01	3	3	0.143325806	8	8	0.424224854	-0.280899048	0.89	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-02	3	3	1.966674805	8	8	0.424224854	1.542449951	<0.05	Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-03	3	3	0.403335571	8	8	0.424224854	-0.020889282	0.51	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-04	3	3	1.833328247	8	8	0.424224854	1.409103394	<0.05	Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-05	3	3	0.313339233	8	8	0.424224854	-0.11088562	0.64	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-09	3	3	0.17666626	8	8	0.424224854	-0.247558594	0.81	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-11	3	3	1.003326416	8	8	0.424224854	0.579101563	<0.05	Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-12	3	3	2.033325195	8	8	0.424224854	1.609100342	<0.05	Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-13	3	3	13.7666626	8	8	0.424224854	13.34243774	<0.05	Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-16	3	3	0.380004883	8	8	0.424224854	-0.044219971	0.58	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-17	3	3	0.743331909	8	8	0.424224854	0.319107056	0.08	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-18	3	3	1.153335571	8	8	0.424224854	0.729110718	<0.05	Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-19	3	3	1.459991455	8	8	0.424224854	1.035766602	<0.05	Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-20	3	3	0.173339844	8	8	0.424224854	-0.25088501	0.83	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-21	3	3	0.152328491	8	8	0.424224854	-0.271896362	0.88	Do Not Reject H0
SS	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-22	3	3	1.599990845	8	8	0.424224854	1.175765991	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-01	3	3	7.100006104	8	8	3.748733521	3.351272583	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-02	3	3	7.566665649	8	8	3.748733521	3.817932129	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-03	3	3	7.633331299	8	8	3.748733521	3.884597778	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-04	3	3	7.300003052	8	8	3.748733521	3.551269531	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-05	3	3	7.799987793	8	8	3.748733521	4.051254272	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-06	3	3	7.233337402	8	8	3.748733521	3.484603882	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-07	3	3	6.100006104	8	8	3.748733521	2.351272583	0.13	Do Not Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-09	3	3	7.433334351	8	8	3.748733521	3.68460083	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-10	3	3	7.800003052	8	8	3.748733521	4.051269531	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-11	3	3	6.800003052	8	8	3.748733521	3.051269531	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-12	3	3	7.666656494	8	8	3.748733521	3.917922974	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-13	3	3	8.433334351	8	8	3.748733521	4.68460083	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-14	3	3	7	8	8	3.748733521	3.251266479	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-15	3	3	6.766662598	8	8	3.748733521	3.017929077	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-16	3	3	8.300003052	8	8	3.748733521	4.551269531	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-17	3	3	5.933334351	8	8	3.748733521	2.18460083	0.12	Do Not Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-18	3	3	7.266662598	8	8	3.748733521	3.517929077	<0.05	Reject H0
SS	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-19	3	3	16	8	8	3.748733521	12.25126648	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-01	3	3	21.33332825	8	8	14.92500305	6.408325195	0.14	Do Not Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-02	3	3	27	8	8	14.92500305	12.07499695	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-03	3	3	26.66665649	8	8	14.92500305	11.74165344	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-04	3	3	56	8	8	14.92500305	41.07499695	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-05	3	3	24.66667175	8	8	14.92500305	9.741668701	0.07	Do Not Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-06	3	3	36.66665649	8	8	14.92500305	21.74165344	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-07	3	3	49	8	8	14.92500305	34.07499695	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-09	3	3	28.33334351	8	8	14.92500305	13.40834045	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-10	3	3	23	8	8	14.92500305	8.074996948	0.09	Do Not Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-11	3	3	33.33332825	8	8	14.92500305	18.4083252	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-12	3	3	48.66667175	8	8	14.92500305	33.7416687	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-13	3	3	360	8	8	14.92500305	345.0749969	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-14	3	3	24.66665649	8	8	14.92500305	9.741653442	0.06	Do Not Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-15	3	3	31.33334351	8	8	14.92500305	16.40834045	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-16	3	3	36.66665649	8	8	14.92500305	21.74165344	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-17	3	3	191	8	8	14.92500305	176.0749969	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-18	3	3	913.3333282	8	8	14.92500305	898.4083252	<0.05	Reject H0
SS	Copper	CU	7440-50-8	mg/kg	IINY-DU-19	3	3	150	8	8	14.92500305	135.0749969	<0.05	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-01	3	3	0.030334473	7	6	0.06703186	-0.0367	0.82	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-02	3	3	0.316665649	7	6	0.06703186	0.249633789	0.01	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-03	3	3	0.076324463	7	6	0.06703186	0.00929	0.37	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-04	3	3	0.279998779	7	6	0.06703186	0.212966919	0.01	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-05	3	3	0.054000854	7	6	0.06703186	-0.013031006	0.65	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-09	3	3	0.030990601	7	6	0.06703186	-0.03604126	0.81	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-11	3	3	0.189987183	7	6	0.06703186	0.122955322	0.02	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-12	3	3	0.316665649	7	6	0.06703186	0.249633789	<0.01	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-13	3	3	1.966659546	7	6	0.06703186	1.899627686	<0.01	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-16	3	3	0.075683594	7	6	0.06703186	0.00865	0.44	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-17	3	3	0.120986938	7	6	0.06703186	0.053955078	0.10	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-18	3	3	0.153335571	7	6	0.06703186	0.086303711	0.04	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-19	3	3	0.313323975	7	6	0.06703186	0.246292114	<0.01	Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-20	3	3	0.028671265	7	6	0.06703186	-0.038360596	0.81	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-21	3	3	0.024337769	7	6	0.06703186	-0.042694092	0.84	Do Not Reject H0
SS	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-22	3	3	0.270004272	7	6	0.06703186	0.202972412	0.02	Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-01	3	3	0.233337402	8	8	0.907501221	-0.674163818	0.91	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-02	3	3	3.633346558	8	8	0.907501221	2.725845337	<0.05	Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-03	3	3	0.726669312	8	8	0.907501221	-0.180831909	0.61	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-04	3	3	4.466674805	8	8	0.907501221	3.559173584	<0.05	Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-05	3	3	0.539993286	8	8	0.907501221	-0.367507935	0.73	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-09	3	3	0.350006104	8	8	0.907501221	-0.557495117	0.85	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-11	3	3	1.03666687	8	8	0.907501221	0.129165649	0.41	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-12	3	3	3.866668701	8	8	0.907501221	2.95916748	<0.05	Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-13	3	3	31	8	8	0.907501221	30.09249878	<0.05	Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-16	3	3	0.790008545	8	8	0.907501221	-0.117492676	0.59	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-17	3	3	1.213348389	8	8	0.907501221	0.305847168	0.28	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-18	3	3	1.290008545	8	8	0.907501221	0.382507324	0.24	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-19	3	3	2.433334351	8	8	0.907501221	1.52583313	<0.05	Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-20	3	3	0.290008545	8	8	0.907501221	-0.617492676	0.89	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-21	3	3	0.269989014	8	8	0.907501221	-0.637512207	0.92	Do Not Reject H0
SS	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-22	3	3	2.599990845	8	8	0.907501221	1.692489624	<0.05	Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-01	3	3	0.008239746	8	8	0.055587769	-0.047348022	0.97	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-02	3	3	0.150009155	8	8	0.055587769	0.094421387	<0.05	Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-03	3	3	0.027999878	8	8	0.055587769	-0.027587891	0.92	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-04	3	3	0.140991211	8	8	0.055587769	0.085403442	0.08	Do Not Reject H0

Table F-1. Background Comparison Permutation Tests - Phase I Analytical Soil Data

					Site Data				Background Data			Permutation Test (H0: Site <= Background)		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	No. Samples	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-05	3	3	0.018325806	8	8	0.055587769	-0.037261963	0.96	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-09	3	3	0.013290405	8	8	0.055587769	-0.042297363	0.95	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-11	3	3	0.043991089	8	8	0.055587769	-0.01159668	0.67	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-12	3	3	0.346664429	8	8	0.055587769	0.29107666	<0.05	Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-13	3	3	3.033340454	8	8	0.055587769	2.977752686	<0.05	Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-16	3	3	0.075668335	8	8	0.055587769	0.020080566	0.18	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-17	3	3	0.04598999	8	8	0.055587769	-0.009597778	0.67	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-18	3	3	0.066665649	8	8	0.055587769	0.011077881	0.29	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-19	3	3	0.04800415	8	8	0.055587769	-0.007583618	0.66	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-20	3	3	0.015258789	8	8	0.055587769	-0.040328979	0.95	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-21	3	3	0.014831543	8	8	0.055587769	-0.040756226	0.98	Do Not Reject H0
SS	Fluorene	FL	86-73-7	mg/kg	IINY-DU-22	3	3	0.106338501	8	8	0.055587769	0.050750732	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-01	3	3	1.558258057	8	8	4.054122925	-2.495864868	0.86	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-02	3	3	20.1000061	8	8	4.054122925	16.04588318	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-03	3	3	4.350631714	8	8	4.054122925	0.296508789	0.44	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-04	3	3	18.022995	8	8	4.054122925	13.96887207	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-05	3	3	3.140960693	8	8	4.054122925	-0.913162231	0.62	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-09	3	3	1.931427002	8	8	4.054122925	-2.122695923	0.78	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-11	3	3	9.054000854	8	8	4.054122925	4.99987793	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-12	3	3	21.84367371	8	8	4.054122925	17.78955078	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-13	3	3	157.843338	8	8	4.054122925	153.7892151	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-16	3	3	4.701965332	8	8	4.054122925	0.647842407	0.43	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-17	3	3	6.504333496	8	8	4.054122925	2.450210571	0.16	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-18	3	3	7.623336792	8	8	4.054122925	3.569213867	0.06	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-19	3	3	13.85333252	8	8	4.054122925	9.799209595	<0.05	Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-20	3	3	1.66734314	8	8	4.054122925	-2.386779785	0.80	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-21	3	3	1.495666504	8	8	4.054122925	-2.558456421	0.85	Do Not Reject H0
SS	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-22	3	3	14.82000732	8	8	4.054122925	10.7658844	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-01	3	3	0.136657715	8	8	0.287521362	-0.150863647	0.77	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-02	3	3	1.14666748	8	8	0.287521362	0.859146118	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-03	3	3	0.306671143	8	8	0.287521362	0.01914978	0.45	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-04	3	3	1.033340454	8	8	0.287521362	0.745819092	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-05	3	3	0.210006714	8	8	0.287521362	-0.077514648	0.64	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-09	3	3	0.14666748	8	8	0.287521362	-0.140853882	0.72	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-11	3	3	0.873336792	8	8	0.287521362	0.58581543	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-12	3	3	1.220001221	8	8	0.287521362	0.932479858	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-13	3	3	7.333328247	8	8	0.287521362	7.045806885	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-16	3	3	0.306671143	8	8	0.287521362	0.01914978	0.43	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-17	3	3	0.399993896	8	8	0.287521362	0.112472534	0.27	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-18	3	3	0.490005493	8	8	0.287521362	0.202484131	0.15	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-19	3	3	1.030014038	8	8	0.287521362	0.742492676	<0.05	Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-20	3	3	0.133331299	8	8	0.287521362	-0.154190063	0.77	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-21	3	3	0.098007202	8	8	0.287521362	-0.18951416	0.88	Do Not Reject H0
SS	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-22	3	3	0.949996948	8	8	0.287521362	0.662475586	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-01	3	3	15666.66667	8	8	14200	1466.666672	0.29	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-02	3	3	18666.66667	8	8	14200	4466.666672	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-03	3	3	18666.66667	8	8	14200	4466.666672	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-04	3	3	19333.33333	8	8	14200	5133.333328	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-05	3	3	19666.66667	8	8	14200	5466.666672	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-06	3	3	17333.33334	8	8	14200	3133.333344	0.12	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-07	3	3	18666.66667	8	8	14200	4466.666672	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-09	3	3	16333.33333	8	8	14200	2133.333328	0.19	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-10	3	3	17333.33333	8	8	14200	3133.333328	0.11	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-11	3	3	18333.33333	8	8	14200	4133.333328	0.05	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-12	3	3	17000	8	8	14200	2800	0.15	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-13	3	3	18333.33333	8	8	14200	4133.333328	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-14	3	3	16333.33333	8	8	14200	2133.333328	0.21	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-15	3	3	18333.33333	8	8	14200	4133.333328	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-16	3	3	21000	8	8	14200	6800	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-17	3	3	16333.33333	8	8	14200	2133.333328	0.23	Do Not Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-18	3	3	32333.33333	8	8	14200	18133.33333	<0.05	Reject H0
SS	Iron	FE	7439-89-6	mg/kg	IINY-DU-19	3	3	29333.33333	8	8	14200	15133.33333	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-01	3	3	64.33332825	8	8	55	9.333328247	0.27	Do Not Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-02	3	3	93.66667175	8	8	55	38.66667175	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-03	3	3	130	8	8	55	75	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-04	3	3	296.6666718	8	8	55	241.6666718	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-05	3	3	86	8	8	55	31	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-06	3	3	98.33332825	8	8	55	43.33332825	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-07	3	3	1086.666672	8	8	55	1031.666672	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-09	3	3	58.33334351	8	8	55	3.333343506	0.31	Do Not Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-10	3	3	34.33334351	8	8	55	-20.66665649	1.00	Do Not Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-11	3	3	123.3333282	8	8	55	68.33332825	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-12	3	3	84.66667175	8	8	55	29.66667175	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-13	3	3	166.6666718	8	8	55	111.6666718	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-14	3	3	108.6666565	8	8	55	53.66665649	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-15	3	3	126.6666718	8	8	55	71.66667175	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-16	3	3	42	8	8	55	-13	0.94	Do Not Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-17	3	3	1866.666672	8	8	55	1811.666672	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-18	3	3	1433.333328	8	8	55	1378.333328	<0.05	Reject H0
SS	Lead	PB	7439-92-1	mg/kg	IINY-DU-19	3	3	55.33332825	8	8	55	0.333328247	0.41	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-01	3	3	0.306930542	8	8	0.668014526	-0.361083984	0.86	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-02	3	3	5.030014038	8	8	0.668014526	4.361999512	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-03	3	3	0.974304199	8	8	0.668014526	0.306289673	0.21	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-04	3	3	3.929672241	8	8	0.668014526	3.261657715	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-05	3	3	0.70362854	8	8	0.668014526	0.035614014	0.42	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-09	3	3	0.399108887	8	8	0.668014526	-0.26890564	0.77	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-11	3	3	1.604003906	8	8	0.668014526	0.93598938	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-12	3	3	6.513671875	8	8	0.668014526	5.845657349	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-13	3	3	52.07666016	8	8	0.668014526	51.40864563	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-16	3	3	1.369628906	8	8	0.668014526	0.70161438	0.06	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-17	3	3	1.107666016	8	8	0.668014526	0.439651489	0.10	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-18	3	3	1.473007202	8	8	0.668014526	0.804992676	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-19	3	3	1.552337646	8	8	0.668014526	0.88432312	<0.05	Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-20	3	3	0.260437012	8	8	0.668014526	-0.407577515	0.91	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-21	3	3	0.260101318	8	8	0.668014526	-0.407913208	0.86	Do Not Reject H0
SS	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-22	3	3	1.964660645	8	8	0.668014526	1.296646118	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-01	3	3	4266.666656	8	8	1712.5	2554.166656	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-02	3	3	8766.666656	8	8	1712.5	7054.166656	<0.05	Reject H0

Table F-1. Background Comparison Permutation Tests - Phase I Analytical Soil Data

					Site Data				Background Data			Permutation Test (H0: Site <= Background)		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	No. Samples	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-03	3	3	6066.666672	8	8	1712.5	4354.166672	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-04	3	3	6466.666656	8	8	1712.5	4754.166656	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-05	3	3	4966.666656	8	8	1712.5	3254.166656	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-06	3	3	10333.33333	8	8	1712.5	8620.833328	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-07	3	3	11000	8	8	1712.5	9287.5	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-09	3	3	6000	8	8	1712.5	4287.5	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-10	3	3	10300	8	8	1712.5	8587.5	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-11	3	3	18000	8	8	1712.5	16287.5	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-12	3	3	7633.333344	8	8	1712.5	5920.833344	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-13	3	3	5533.333344	8	8	1712.5	3820.833344	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-14	3	3	6466.666672	8	8	1712.5	4754.166672	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-15	3	3	6533.333344	8	8	1712.5	4820.833344	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-16	3	3	6266.666672	8	8	1712.5	4554.166672	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-17	3	3	35000	8	8	1712.5	33287.5	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-18	3	3	7866.666672	8	8	1712.5	6154.166672	<0.05	Reject H0
SS	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-19	3	3	6900	8	8	1712.5	5187.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-01	3	3	473.3333282	8	8	211.5	261.8333282	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-02	3	3	640	8	8	211.5	428.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-03	3	3	626.6666565	8	8	211.5	415.1666565	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-04	3	3	473.3333282	8	8	211.5	261.8333282	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-05	3	3	730	8	8	211.5	518.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-06	3	3	690	8	8	211.5	478.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-07	3	3	523.3333282	8	8	211.5	311.8333282	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-09	3	3	493.3333282	8	8	211.5	281.8333282	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-10	3	3	546.6666718	8	8	211.5	335.1666718	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-11	3	3	600	8	8	211.5	388.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-12	3	3	850	8	8	211.5	638.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-13	3	3	976.6666565	8	8	211.5	765.1666565	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-14	3	3	696.6666718	8	8	211.5	485.1666718	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-15	3	3	440	8	8	211.5	228.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-16	3	3	440	8	8	211.5	228.5	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-17	3	3	406.6666565	8	8	211.5	195.1666565	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-18	3	3	513.3333282	8	8	211.5	301.8333282	<0.05	Reject H0
SS	Manganese	MN	7439-96-5	mg/kg	IINY-DU-19	3	3	430	8	8	211.5	218.5	<0.05	Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-01	3	3	0.080657959	8	8	0.227493286	-0.146835327	1.00	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-02	3	3	0.09765625	8	8	0.227493286	-0.129837036	1.00	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-03	3	3	0.126663208	8	8	0.227493286	-0.100830078	0.98	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-04	3	3	0.286651611	8	8	0.227493286	0.059158325	0.13	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-05	3	3	0.153335571	8	8	0.227493286	-0.074157715	0.92	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-09	3	3	0.076004028	8	8	0.227493286	-0.151489258	1.00	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-11	3	3	0.183334351	8	8	0.227493286	-0.044158936	0.81	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-12	3	3	0.243331909	8	8	0.227493286	0.015838623	0.40	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-13	3	3	0.316665649	8	8	0.227493286	0.089172363	0.07	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-14	3	3	0.17666626	8	8	0.227493286	-0.050827026	0.82	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-15	3	3	0.21333313	8	8	0.227493286	-0.014160156	0.63	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-16	3	3	0.096328735	8	8	0.227493286	-0.131164551	1.00	Do Not Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-17	3	3	0.78666687	8	8	0.227493286	0.559173584	<0.05	Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-18	3	3	2.700012207	8	8	0.227493286	2.472518921	<0.05	Reject H0
SS	Mercury	HG	7439-97-6	mg/kg	IINY-DU-19	3	3	0.333343506	8	8	0.227493286	0.10585022	0.13	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-01	3	3	0.008270264	8	8	0.017593384	-0.00932312	0.95	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-02	3	3	0.055664063	8	8	0.017593384	0.038070679	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-03	3	3	0.015991211	8	8	0.017593384	-0.001602173	0.57	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-04	3	1	0.050994873	8	8	0.017593384	0.033401489	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-05	3	3	0.01399231	8	8	0.017593384	-0.003601074	0.76	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-09	3	3	0.011245728	8	8	0.017593384	-0.006347656	0.94	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-11	3	3	0.085998535	8	8	0.017593384	0.068405151	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-12	3	3	0.151992798	8	8	0.017593384	0.134399414	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-13	3	3	0.933334351	8	8	0.017593384	0.915740967	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-16	3	3	0.054992676	8	8	0.017593384	0.037399292	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-17	3	3	0.078674316	8	8	0.017593384	0.061080933	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-18	3	3	0.226669312	8	8	0.017593384	0.209075928	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-19	3	3	0.065673828	8	8	0.017593384	0.048080444	<0.05	Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-20	3	3	0.013320923	8	8	0.017593384	-0.004272461	0.82	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-21	3	3	0.008987427	8	8	0.017593384	-0.008605957	0.97	Do Not Reject H0
SS	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-22	3	3	0.060653687	8	8	0.017593384	0.043060303	<0.05	Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-01	3	3	14	8	8	13.02500916	0.974990845	0.41	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-02	3	3	17	8	8	13.02500916	3.974990845	0.24	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-03	3	3	16.66667175	8	8	13.02500916	3.641662598	0.23	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-04	3	3	15.66665649	8	8	13.02500916	2.641647339	0.28	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-05	3	3	18	8	8	13.02500916	4.974990845	0.20	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-06	3	3	15	8	8	13.02500916	1.974990845	0.32	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-07	3	3	14	8	8	13.02500916	0.974990845	0.40	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-09	3	3	14.66667175	8	8	13.02500916	1.641662598	0.39	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-10	3	3	15.66667175	8	8	13.02500916	2.641662598	0.30	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-11	3	3	16	8	8	13.02500916	2.974990845	0.25	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-12	3	3	15	8	8	13.02500916	1.974990845	0.33	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-13	3	3	16.33332825	8	8	13.02500916	3.308319092	0.29	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-14	3	3	15.66667175	8	8	13.02500916	2.641662598	0.29	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-15	3	3	14.33332825	8	8	13.02500916	1.308319092	0.37	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-16	3	3	16	8	8	13.02500916	2.974990845	0.26	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-17	3	3	13.96665955	8	8	13.02500916	0.941650391	0.49	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-18	3	3	25	8	8	13.02500916	11.97499084	0.07	Do Not Reject H0
SS	Nickel	NI	7440-02-0	mg/kg	IINY-DU-19	3	3	16.66667175	8	8	13.02500916	3.641662598	0.27	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-01	3	3	0.082672119	8	8	0.43762207	-0.354949951	0.97	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-02	3	3	1.899993896	8	8	0.43762207	1.462371826	<0.05	Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-03	3	3	0.36000061	8	8	0.43762207	-0.07762146	0.61	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-04	3	3	1.953338623	8	8	0.43762207	1.515716553	<0.05	Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-05	3	3	0.240005493	8	8	0.43762207	-0.197616577	0.75	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-09	3	3	0.125	8	8	0.43762207	-0.31262207	0.91	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-11	3	3	0.35333252	8	8	0.43762207	-0.084289551	0.60	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-12	3	3	2.733337402	8	8	0.43762207	2.295715332	<0.05	Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-13	3	3	22.66665649	8	8	0.43762207	22.22903442	<0.05	Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-16	3	3	0.533340454	8	8	0.43762207	0.095718384	0.34	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-17	3	3	0.543334961	8	8	0.43762207	0.105712891	0.32	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-18	3	3	0.766662598	8	8	0.43762207	0.329040527	0.09	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-19	3	3	0.866668701	8	8	0.43762207	0.429046631	0.12	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-20	3	3	0.123336792	8	8	0.43762207	-0.314285278	0.93	Do Not Reject H0
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-21	3	3	0.147994995	8	8	0.43762207	-0.289627075	0.90	Do Not Reject H0

Table F-1. Background Comparison Permutation Tests - Phase I Analytical Soil Data

					Site Data				Background Data			Permutation Test (H0: Site <= Background)		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	No. Samples	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-22	3	3	1.069992065	8	8	0.43762207	0.632369995	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-01	3	3	1200	8	8	727.5	472.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-02	3	3	1300	8	8	727.5	572.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-03	3	3	1300	8	8	727.5	572.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-04	3	3	1266.666672	8	8	727.5	539.1666718	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-05	3	3	1233.333328	8	8	727.5	505.8333282	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-06	3	3	1200	8	8	727.5	472.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-07	3	3	1033.333328	8	8	727.5	305.8333282	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-09	3	3	1266.666672	8	8	727.5	539.1666718	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-10	3	3	1333.333328	8	8	727.5	605.8333282	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-11	3	3	956.6666565	8	8	727.5	229.1666565	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-12	3	3	1100	8	8	727.5	372.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-13	3	3	1400	8	8	727.5	672.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-14	3	3	993.3333282	8	8	727.5	265.8333282	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-15	3	3	1200	8	8	727.5	472.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-16	3	3	1566.666656	8	8	727.5	839.1666565	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-17	3	3	1200	8	8	727.5	472.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-18	3	3	1840	8	8	727.5	1112.5	<0.05	Reject H0
SS	Potassium	K	2023695	mg/kg	IINY-DU-19	3	3	1433.333328	8	8	727.5	705.8333282	<0.05	Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-01	3	3	0.233337402	8	8	0.762481689	-0.529144287	0.88	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-02	3	3	3.566665649	8	8	0.762481689	2.80418396	<0.05	Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-03	3	3	0.730010986	8	8	0.762481689	-0.032470703	0.51	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-04	3	3	3.433334351	8	8	0.762481689	2.670852661	<0.05	Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-05	3	3	0.576675415	8	8	0.762481689	-0.185806274	0.61	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-09	3	3	0.326675415	8	8	0.762481689	-0.435806274	0.84	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-11	3	3	1.223327637	8	8	0.762481689	0.460845947	0.15	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-12	3	3	3.200012207	8	8	0.762481689	2.437530518	<0.05	Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-13	3	3	24.66667175	8	8	0.762481689	23.90419006	<0.05	Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-16	3	3	0.670013428	8	8	0.762481689	-0.092468262	0.55	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-17	3	3	1.206680298	8	8	0.762481689	0.444198608	0.15	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-18	3	3	1.223327637	8	8	0.762481689	0.460845947	0.17	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-19	3	3	1.966674805	8	8	0.762481689	1.204193115	0.05	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-20	3	3	0.276672363	8	8	0.762481689	-0.485809326	0.86	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-21	3	3	0.283340454	8	8	0.762481689	-0.479141235	0.85	Do Not Reject H0
SS	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-22	3	3	2.633331299	8	8	0.762481689	1.870849609	<0.05	Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-01	3	3	0.356658936	8	8	0.959991455	-0.60333252	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-02	3	3	0.319992065	8	8	0.959991455	-0.63999939	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-03	3	3	0.416671753	8	8	0.959991455	-0.543319702	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-04	3	3	0.486679077	8	8	0.959991455	-0.473312378	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-05	3	3	0.28666687	8	8	0.959991455	-0.673324585	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-06	3	3	0.350006104	8	8	0.959991455	-0.609985352	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-07	3	3	0.386672974	8	8	0.959991455	-0.573318481	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-09	3	3	0.289993286	8	8	0.959991455	-0.669998169	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-10	3	3	0.276657104	8	8	0.959991455	-0.683334351	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-11	3	3	0.550003052	8	8	0.959991455	-0.409988403	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-12	3	3	0.429992676	8	8	0.959991455	-0.529998779	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-13	3	3	0.61000061	8	8	0.959991455	-0.349990845	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-14	3	3	0.386672974	8	8	0.959991455	-0.573318481	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-15	3	3	0.53666687	8	8	0.959991455	-0.423324585	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-16	3	3	0.383331299	8	8	0.959991455	-0.576660156	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-17	3	3	0.466659546	8	8	0.959991455	-0.493331909	1.00	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-18	3	3	0.559997559	8	8	0.959991455	-0.399993896	0.98	Do Not Reject H0
SS	Selenium	SE	7782-49-2	mg/kg	IINY-DU-19	3	3	0.403335571	8	8	0.959991455	-0.556655884	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-01	3	0	0.099	8	8	0.272491455	-0.173491455	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-02	3	0	0.1	8	8	0.272491455	-0.172491455	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-03	3	1	0.096008301	8	8	0.272491455	-0.176483154	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-04	3	3	0.102661133	8	8	0.272491455	-0.169830322	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-05	3	0	0.099	8	8	0.272491455	-0.173491455	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-06	3	3	0.07699585	8	8	0.272491455	-0.195495605	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-07	3	3	0.099990845	8	8	0.272491455	-0.17250061	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-09	3	0	0.095	8	8	0.272491455	-0.177491455	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-10	3	1	0.059005737	8	8	0.272491455	-0.213485718	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-11	3	3	0.079666138	8	8	0.272491455	-0.192825317	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-12	3	3	0.070999146	8	8	0.272491455	-0.20149231	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-13	3	3	0.089660645	8	8	0.272491455	-0.182830811	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-14	3	3	0.076675415	8	8	0.272491455	-0.19581604	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-15	3	3	0.080337524	8	8	0.272491455	-0.192153931	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-16	3	3	0.058334351	8	8	0.272491455	-0.214157104	1.00	Do Not Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-17	3	3	0.623336792	8	8	0.272491455	0.350845337	<0.05	Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-18	3	3	0.800003052	8	8	0.272491455	0.527511597	<0.05	Reject H0
SS	Silver	AG	7440-22-4	mg/kg	IINY-DU-19	3	3	0.123336792	8	8	0.272491455	-0.149154663	1.00	Do Not Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-01	3	3	101.6666565	8	8	43.75	57.91665649	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-02	3	3	73.66667175	8	8	43.75	29.91667175	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-03	3	3	88.66665649	8	8	43.75	44.91665649	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-04	3	3	210	8	8	43.75	166.25	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-05	3	3	61.66667175	8	8	43.75	17.91667175	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-06	3	3	84.66667175	8	8	43.75	40.91667175	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-07	3	3	90.66667175	8	8	43.75	46.91667175	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-09	3	3	163.3333282	8	8	43.75	119.5833282	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-10	3	2	85.5	8	8	43.75	41.75	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-11	3	3	60.33332825	8	8	43.75	16.58332825	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-12	3	3	69.33334351	8	8	43.75	25.58334351	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-13	3	3	123.3333282	8	8	43.75	79.58332825	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-14	3	3	71.66665649	8	8	43.75	27.91665649	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-15	3	3	77.66665649	8	8	43.75	33.91665649	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-16	3	3	376.6666718	8	8	43.75	332.9166718	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-17	3	3	420	8	8	43.75	376.25	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-18	3	3	736.6666718	8	8	43.75	692.9166718	<0.05	Reject H0
SS	Sodium	NA	7440-23-5	mg/kg	IINY-DU-19	3	3	2300	8	8	43.75	2256.25	<0.05	Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-01	3	3	0.126663208	8	8	0.129241943	-0.002578735	0.52	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-02	3	3	0.130004883	8	8	0.129241943	0.000762939	0.50	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-03	3	3	0.133331299	8	8	0.129241943	0.004089355	0.45	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-04	3	3	0.183334351	8	8	0.129241943	0.054092407	0.06	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-05	3	3	0.10333252	8	8	0.129241943	-0.025909424	0.74	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-06	3	3	0.136657715	8	8	0.129241943	0.007415771	0.45	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-07	3	3	0.203338623	8	8	0.129241943	0.07409668	<0.05	Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-09	3	3	0.123336792	8	8	0.129241943	-0.005905151	0.62	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-10	3	3	0.149993896	8	8	0.129241943	0.020751953	0.29	Do Not Reject H0

Table F-1. Background Comparison Permutation Tests - Phase I Analytical Soil Data

					Site Data				Background Data			Permutation Test (H0: Site <= Background)		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	No. Samples	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-11	3	3	0.210006714	8	8	0.129241943	0.080764771	<0.05	Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-12	3	3	0.14666748	8	8	0.129241943	0.017425537	0.30	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-13	3	3	0.166671753	8	8	0.129241943	0.03742981	0.17	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-14	3	3	0.120010376	8	8	0.129241943	-0.009231567	0.63	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-15	3	3	0.156661987	8	8	0.129241943	0.027420044	0.24	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-16	3	3	0.123336792	8	8	0.129241943	-0.005905151	0.57	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-17	3	3	0.123321533	8	8	0.129241943	-0.00592041	0.59	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-18	3	3	0.180007935	8	8	0.129241943	0.050765991	0.11	Do Not Reject H0
SS	Thallium	TL	7440-28-0	mg/kg	IINY-DU-19	3	3	0.126663208	8	8	0.129241943	-0.002578735	0.61	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-01	3	3	22	8	8	32.375	-10.375	0.88	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-02	3	3	21.66667175	8	8	32.375	-10.70832825	0.89	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-03	3	3	24	8	8	32.375	-8.375	0.77	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-04	3	3	22	8	8	32.375	-10.375	0.86	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-05	3	3	19.66667175	8	8	32.375	-12.70832825	0.92	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-06	3	3	20.33334351	8	8	32.375	-12.04165649	0.86	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-07	3	3	20.33332825	8	8	32.375	-12.04167175	0.91	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-09	3	3	25	8	8	32.375	-7.375	0.80	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-10	3	3	22.66665649	8	8	32.375	-9.708343506	0.85	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-11	3	3	23	8	8	32.375	-9.375	0.84	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-12	3	3	27	8	8	32.375	-5.375	0.69	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-13	3	3	30.33332825	8	8	32.375	-2.041671753	0.61	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-14	3	3	20	8	8	32.375	-12.375	0.90	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-15	3	3	25.33332825	8	8	32.375	-7.041671753	0.73	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-16	3	3	29.33332825	8	8	32.375	-3.041671753	0.68	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-17	3	3	19	8	8	32.375	-13.375	0.93	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-18	3	3	27.33332825	8	8	32.375	-5.041671753	0.71	Do Not Reject H0
SS	Vanadium	V	7440-62-2	mg/kg	IINY-DU-19	3	3	47.33332825	8	8	32.375	14.95832825	0.08	Do Not Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-01	3	3	78.33332825	8	8	42.375	35.95832825	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-02	3	3	75.33332825	8	8	42.375	32.95832825	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-03	3	3	109	8	8	42.375	66.625	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-04	3	3	206.6666718	8	8	42.375	164.2916718	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-05	3	3	75.66667175	8	8	42.375	33.29167175	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-06	3	3	67.66667175	8	8	42.375	25.29167175	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-07	3	3	206.6666718	8	8	42.375	164.2916718	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-09	3	3	68.66665649	8	8	42.375	26.29165649	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-10	3	3	58	8	8	42.375	15.625	0.12	Do Not Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-11	3	3	99	8	8	42.375	56.625	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-12	3	3	96	8	8	42.375	53.625	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-13	3	3	153.3333435	8	8	42.375	110.9583435	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-14	3	3	75.33332825	8	8	42.375	32.95832825	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-15	3	3	163.3333282	8	8	42.375	120.9583282	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-16	3	3	69	8	8	42.375	26.625	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-17	3	3	7033.333328	8	8	42.375	6990.958328	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-18	3	3	1161	8	8	42.375	1118.625	<0.05	Reject H0
SS	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-19	3	3	106.6666565	8	8	42.375	64.29165649	<0.05	Reject H0
SB	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-17	3	3	0.098342896	8	8	0.013412476	0.08493042	<0.05	Reject H0
SB	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-18	3	3	0.088668823	8	8	0.013412476	0.075256348	<0.05	Reject H0
SB	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-19	3	3	0.000976563	8	8	0.013412476	-0.012435913	1.00	Do Not Reject H0
SB	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-20	3	3	0.004928589	8	8	0.013412476	-0.008483887	0.96	Do Not Reject H0
SB	1-Methylnaphthalene	MTNPH1	90-12-0	mg/kg	IINY-DU-21	3	3	0.005599976	8	8	0.013412476	-0.0078125	0.97	Do Not Reject H0
SB	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-17	3	3	0.13999939	8	8	0.012390137	0.127609253	<0.05	Reject H0
SB	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-18	3	3	0.105010986	8	8	0.012390137	0.09262085	<0.05	Reject H0
SB	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-19	3	3	0.00151062	8	8	0.012390137	-0.010879517	1.00	Do Not Reject H0
SB	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-20	3	3	0.007553101	8	8	0.012390137	-0.004837036	0.94	Do Not Reject H0
SB	2-Methylnaphthalene	MTNPH2	91-57-6	mg/kg	IINY-DU-21	3	3	0.00793457	8	8	0.012390137	-0.004455566	0.90	Do Not Reject H0
SB	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-17	3	3	0.070999146	8	8	0.038757324	0.032241821	0.06	Do Not Reject H0
SB	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-18	3	3	0.196655273	8	8	0.038757324	0.157897949	<0.05	Reject H0
SB	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-19	3	3	0.001586914	8	8	0.038757324	-0.03717041	1.00	Do Not Reject H0
SB	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-20	3	3	0.006027222	8	8	0.038757324	-0.032730103	0.99	Do Not Reject H0
SB	Acenaphthene	ACNP	83-32-9	mg/kg	IINY-DU-21	3	3	0.004837036	8	8	0.038757324	-0.033920288	0.99	Do Not Reject H0
SB	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-17	3	3	0.036010742	8	8	0.033493042	0.0025177	0.38	Do Not Reject H0
SB	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-18	3	3	0.056655884	8	8	0.033493042	0.023162842	0.10	Do Not Reject H0
SB	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-19	3	3	0.005630493	8	8	0.033493042	-0.027862549	1.00	Do Not Reject H0
SB	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-20	3	3	0.021331787	8	8	0.033493042	-0.012161255	0.84	Do Not Reject H0
SB	Acenaphthylene	ACNPY	208-96-8	mg/kg	IINY-DU-21	3	3	0.011260986	8	8	0.033493042	-0.022232056	0.97	Do Not Reject H0
SB	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-17	3	3	6033.333328	8	8	12162.5	-6129.166672	1.00	Do Not Reject H0
SB	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-18	3	3	5000	8	8	12162.5	-7162.5	1.00	Do Not Reject H0
SB	Aluminum	AL	7429-90-5	mg/kg	IINY-DU-19	3	3	22000	8	8	12162.5	9837.5	<0.05	Reject H0
SB	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-17	3	3	0.15032959	8	8	0.059188843	0.091140747	<0.05	Reject H0
SB	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-18	3	3	0.169998169	8	8	0.059188843	0.110809326	<0.05	Reject H0
SB	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-19	3	3	0.005432129	8	8	0.059188843	-0.053756714	1.00	Do Not Reject H0
SB	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-20	3	3	0.026000977	8	8	0.059188843	-0.033187866	0.89	Do Not Reject H0
SB	Anthracene	ANTH	120-12-7	mg/kg	IINY-DU-21	3	3	0.015670776	8	8	0.059188843	-0.043518066	0.96	Do Not Reject H0
SB	Antimony	SB	7440-36-0	mg/kg	IINY-DU-17	3	3	4.566665649	8	8	0.986236572	3.580429077	<0.05	Reject H0
SB	Antimony	SB	7440-36-0	mg/kg	IINY-DU-18	3	3	9.833343506	8	8	0.986236572	8.847106934	<0.05	Reject H0
SB	Antimony	SB	7440-36-0	mg/kg	IINY-DU-19	3	3	0.113327026	8	8	0.986236572	-0.872909546	1.00	Do Not Reject H0
SB	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-17	3	3	23.33334351	8	8	5.325012207	18.0083313	<0.05	Reject H0
SB	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-18	3	3	17.33334351	8	8	5.325012207	12.0083313	<0.05	Reject H0
SB	Arsenic	AS	7440-38-2	mg/kg	IINY-DU-19	3	3	2.766662598	8	8	5.325012207	-2.558349609	0.97	Do Not Reject H0
SB	Barium	BA	7440-39-3	mg/kg	IINY-DU-17	3	3	356.6666565	8	8	33.375	323.2916565	<0.05	Reject H0
SB	Barium	BA	7440-39-3	mg/kg	IINY-DU-18	3	3	303.3333435	8	8	33.375	269.9583435	<0.05	Reject H0
SB	Barium	BA	7440-39-3	mg/kg	IINY-DU-19	3	3	35.33334351	8	8	33.375	1.958343506	0.44	Do Not Reject H0
SB	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-17	3	3	0.456665039	8	8	0.307479858	0.149185181	0.20	Do Not Reject H0
SB	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-18	3	3	0.503341675	8	8	0.307479858	0.195861816	0.15	Do Not Reject H0
SB	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-19	3	3	0.022003174	8	8	0.307479858	-0.285476685	1.00	Do Not Reject H0
SB	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-20	3	3	0.072998047	8	8	0.307479858	-0.234481812	0.91	Do Not Reject H0
SB	Benzo(a)anthracene	BZAA	56-55-3	mg/kg	IINY-DU-21	3	3	0.066665649	8	8	0.307479858	-0.240814209	0.95	Do Not Reject H0
SB	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-17	3	3	0.289993286	8	8	0.329742432	-0.039749146	0.58	Do Not Reject H0
SB	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-18	3	3	0.356658936	8	8	0.329742432	0.026916504	0.43	Do Not Reject H0
SB	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-19	3	3	0.025009155	8	8	0.329742432	-0.304733276	1.00	Do Not Reject H0
SB	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-20	3	3	0.074661255	8	8	0.329742432	-0.255081177	0.97	Do Not Reject H0
SB	Benzo(a)pyrene	BZAP	50-32-8	mg/kg	IINY-DU-21	3	3	0.067657471	8	8	0.329742432	-0.262084961	0.95	Do Not Reject H0
SB	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-17	3	3	0.653335571	8	8	0.523986816	0.129348755	0.35	Do Not Reject H0
SB	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-18	3	3	0.836669922	8	8	0.523986816	0.312683105	0.17	Do Not Reject H0
SB	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-19	3	3	0.038330078	8	8	0.523986816	-0.485656738	1.00	Do Not Reject H0
SB	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-20	3	3	0.113327026	8	8	0.523986816	-0.41065979	0.97	Do Not Reject H0
SB	Benzo(b)fluoranthene	BZBF	205-99-2	mg/kg	IINY-DU-21	3	3	0.123336792	8	8	0.523986816	-0.400650024	0.97	Do Not Reject H0
SB	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-17	3	3	0.246673584	8	8	0.261871338	-0.015197754	0.54	Do Not Reject H0

Table F-1. Background Comparison Permutation Tests - Phase I Analytical Soil Data

					Site Data				Background Data			Permutation Test (H0: Site <= Background)		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	No. Samples	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SB	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-18	3	3	0.296661377	8	8	0.261871338	0.034790039	0.39	Do Not Reject H0
SB	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-19	3	3	0.022674561	8	8	0.261871338	-0.239196777	1.00	Do Not Reject H0
SB	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-20	3	3	0.045669556	8	8	0.261871338	-0.216201782	0.96	Do Not Reject H0
SB	Benzo(g,h,i)perylene	BZGHIP	191-24-2	mg/kg	IINY-DU-21	3	3	0.040664673	8	8	0.261871338	-0.221206665	0.98	Do Not Reject H0
SB	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-17	3	3	0.15032959	8	8	0.191375732	-0.041046143	0.63	Do Not Reject H0
SB	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-18	3	3	0.164993286	8	8	0.191375732	-0.026382446	0.55	Do Not Reject H0
SB	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-19	3	3	0.011734009	8	8	0.191375732	-0.179641724	1.00	Do Not Reject H0
SB	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-20	3	3	0.033660889	8	8	0.191375732	-0.157714844	0.96	Do Not Reject H0
SB	Benzo(k)fluoranthene	BZKF	207-08-9	mg/kg	IINY-DU-21	3	3	0.038330078	8	8	0.191375732	-0.153045654	0.95	Do Not Reject H0
SB	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-17	3	3	1.333328247	8	8	0.43963623	0.893692017	<0.05	Reject H0
SB	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-18	3	3	0.653335571	8	8	0.43963623	0.213699341	0.13	Do Not Reject H0
SB	Beryllium	BE	7440-41-7	mg/kg	IINY-DU-19	3	3	0.183334351	8	8	0.43963623	-0.25630188	0.91	Do Not Reject H0
SB	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-17	3	3	3.5	8	8	0.174987793	3.325012207	<0.05	Reject H0
SB	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-18	3	3	12.09999084	8	8	0.174987793	11.92500305	<0.05	Reject H0
SB	Cadmium	CD	7440-43-9	mg/kg	IINY-DU-19	3	3	0.092330933	8	8	0.174987793	-0.08265686	1.00	Do Not Reject H0
SB	Calcium	CA	7440-70-2	mg/kg	IINY-DU-17	3	3	18333.33333	8	8	1222.5	17110.83333	<0.05	Reject H0
SB	Calcium	CA	7440-70-2	mg/kg	IINY-DU-18	3	3	32000	8	8	1222.5	30777.5	<0.05	Reject H0
SB	Calcium	CA	7440-70-2	mg/kg	IINY-DU-19	3	3	18000	8	8	1222.5	16777.5	<0.05	Reject H0
SB	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-17	3	3	12.66667175	8	8	14.6625061	-1.995834351	0.66	Do Not Reject H0
SB	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-18	3	3	31.33332825	8	8	14.6625061	16.67082214	<0.05	Reject H0
SB	Total Chromium	CR	7440-47-3	mg/kg	IINY-DU-19	3	3	7.766662598	8	8	14.6625061	-6.895843506	0.77	Do Not Reject H0
SB	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-17	3	3	0.759994507	8	8	0.424224854	0.335769653	0.09	Do Not Reject H0
SB	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-18	3	3	1.149993896	8	8	0.424224854	0.725769043	<0.05	Reject H0
SB	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-19	3	3	0.024658203	8	8	0.424224854	-0.39956665	1.00	Do Not Reject H0
SB	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-20	3	3	0.079330444	8	8	0.424224854	-0.344894409	0.97	Do Not Reject H0
SB	Chrysene	CHRYSENE	218-01-9	mg/kg	IINY-DU-21	3	3	0.078674316	8	8	0.424224854	-0.345550537	0.97	Do Not Reject H0
SB	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-17	3	3	6.566665649	8	8	3.748733521	2.817932129	0.06	Do Not Reject H0
SB	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-18	3	3	6.333328247	8	8	3.748733521	2.584594727	0.08	Do Not Reject H0
SB	Cobalt	CO	7440-48-4	mg/kg	IINY-DU-19	3	3	17	8	8	3.748733521	13.25126648	<0.05	Reject H0
SB	Copper	CU	7440-50-8	mg/kg	IINY-DU-17	3	3	146.6666718	8	8	14.92500305	131.7416687	<0.05	Reject H0
SB	Copper	CU	7440-50-8	mg/kg	IINY-DU-18	3	3	5400	8	8	14.92500305	5385.074997	<0.05	Reject H0
SB	Copper	CU	7440-50-8	mg/kg	IINY-DU-19	3	3	210	8	8	14.92500305	195.0749969	<0.05	Reject H0
SB	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-17	3	3	0.115997314	7	6	0.06703186	0.048965454	0.15	Do Not Reject H0
SB	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-18	3	3	0.121322632	7	6	0.06703186	0.054290771	0.13	Do Not Reject H0
SB	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-19	3	3	0.005569458	7	6	0.06703186	-0.061462402	0.98	Do Not Reject H0
SB	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-20	3	3	0.013671875	7	6	0.06703186	-0.053359985	0.93	Do Not Reject H0
SB	Dibenz(a,h)anthracene	DBAHA	53-70-3	mg/kg	IINY-DU-21	3	3	0.011993408	7	6	0.06703186	-0.055038452	0.97	Do Not Reject H0
SB	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-17	3	3	0.980010986	8	8	0.907501221	0.072509766	0.45	Do Not Reject H0
SB	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-18	3	3	1.016662598	8	8	0.907501221	0.109161377	0.37	Do Not Reject H0
SB	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-19	3	3	0.040664673	8	8	0.907501221	-0.866836548	1.00	Do Not Reject H0
SB	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-20	3	3	0.136672974	8	8	0.907501221	-0.770828247	0.98	Do Not Reject H0
SB	Fluoranthene	FLA	206-44-0	mg/kg	IINY-DU-21	3	3	0.126663208	8	8	0.907501221	-0.780838013	1.00	Do Not Reject H0
SB	Fluorene	FL	86-73-7	mg/kg	IINY-DU-17	3	3	0.083343506	8	8	0.055587769	0.027755737	0.11	Do Not Reject H0
SB	Fluorene	FL	86-73-7	mg/kg	IINY-DU-18	3	3	0.150009155	8	8	0.055587769	0.094421387	<0.05	Reject H0
SB	Fluorene	FL	86-73-7	mg/kg	IINY-DU-19	3	3	0.002532959	8	8	0.055587769	-0.05305481	1.00	Do Not Reject H0
SB	Fluorene	FL	86-73-7	mg/kg	IINY-DU-20	3	3	0.008956909	8	8	0.055587769	-0.046630859	0.96	Do Not Reject H0
SB	Fluorene	FL	86-73-7	mg/kg	IINY-DU-21	3	3	0.005691528	8	8	0.055587769	-0.04989624	0.99	Do Not Reject H0
SB	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-17	3	3	4.684677124	8	8	4.054122925	0.630554199	0.35	Do Not Reject H0
SB	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-18	3	3	5.639663696	8	8	4.054122925	1.585540771	0.28	Do Not Reject H0
SB	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-19	3	3	0.253631592	8	8	4.054122925	-3.800491333	1.00	Do Not Reject H0
SB	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-20	3	3	0.759002686	8	8	4.054122925	-3.295120239	0.97	Do Not Reject H0
SB	HMW PAH	HMW_PAH	HMW_PAH	mg/kg	IINY-DU-21	3	3	0.728012085	8	8	4.054122925	-3.32611084	0.96	Do Not Reject H0
SB	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-17	3	3	0.208343506	8	8	0.287521362	-0.079177856	0.67	Do Not Reject H0
SB	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-18	3	3	0.256668091	8	8	0.287521362	-0.030853271	0.56	Do Not Reject H0
SB	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-19	3	3	0.023330688	8	8	0.287521362	-0.264190674	1.00	Do Not Reject H0
SB	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-20	3	3	0.048995972	8	8	0.287521362	-0.238525391	0.97	Do Not Reject H0
SB	Indeno(1,2,3-c,d)pyrene	INP123	193-39-5	mg/kg	IINY-DU-21	3	3	0.047332764	8	8	0.287521362	-0.240188599	0.95	Do Not Reject H0
SB	Iron	FE	7439-89-6	mg/kg	IINY-DU-17	3	3	25666.66667	8	8	14200	11466.66667	<0.05	Reject H0
SB	Iron	FE	7439-89-6	mg/kg	IINY-DU-18	3	3	37333.33333	8	8	14200	23133.33333	<0.05	Reject H0
SB	Iron	FE	7439-89-6	mg/kg	IINY-DU-19	3	3	34666.66666	8	8	14200	20466.66666	<0.05	Reject H0
SB	Lead	PB	7439-92-1	mg/kg	IINY-DU-17	3	3	1573.333328	8	8	55	1518.333328	<0.05	Reject H0
SB	Lead	PB	7439-92-1	mg/kg	IINY-DU-18	3	3	2433.333344	8	8	55	2378.333344	<0.05	Reject H0
SB	Lead	PB	7439-92-1	mg/kg	IINY-DU-19	3	3	12.33334351	8	8	55	-42.66665649	1.00	Do Not Reject H0
SB	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-17	3	3	1.63899231	8	8	0.668014526	0.970977783	<0.05	Reject H0
SB	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-18	3	3	2.300323486	8	8	0.668014526	1.63230896	<0.05	Reject H0
SB	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-19	3	3	0.0377	8	8	0.668014526	-0.630310059	1.00	Do Not Reject H0
SB	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-20	3	3	0.151992798	8	8	0.668014526	-0.516021729	0.94	Do Not Reject H0
SB	LMW PAH	LMW_PAH	LMW_PAH	mg/kg	IINY-DU-21	3	3	0.115493774	8	8	0.668014526	-0.552520752	1.00	Do Not Reject H0
SB	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-17	3	3	8233.333328	8	8	1712.5	6520.833328	<0.05	Reject H0
SB	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-18	3	3	17333.33333	8	8	1712.5	15620.83333	<0.05	Reject H0
SB	Magnesium	MG	7439-95-4	mg/kg	IINY-DU-19	3	3	7266.666656	8	8	1712.5	5554.166656	<0.05	Reject H0
SB	Manganese	MN	7439-96-5	mg/kg	IINY-DU-17	3	3	170	8	8	211.5	-41.5	0.74	Do Not Reject H0
SB	Manganese	MN	7439-96-5	mg/kg	IINY-DU-18	3	3	480	8	8	211.5	268.5	<0.05	Reject H0
SB	Manganese	MN	7439-96-5	mg/kg	IINY-DU-19	3	3	276.6666718	8	8	211.5	65.16667175	0.15	Do Not Reject H0
SB	Mercury	HG	7439-97-6	mg/kg	IINY-DU-17	3	3	0.82333374	8	8	0.227493286	0.595840454	<0.05	Reject H0
SB	Mercury	HG	7439-97-6	mg/kg	IINY-DU-18	3	3	1.173339844	8	8	0.227493286	0.945846558	<0.05	Reject H0
SB	Mercury	HG	7439-97-6	mg/kg	IINY-DU-19	3	3	0.206665039	8	8	0.227493286	-0.020828247	0.63	Do Not Reject H0
SB	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-17	3	3	0.240005493	8	8	0.017593384	0.222412109	<0.05	Reject H0
SB	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-18	3	3	0.559997559	8	8	0.017593384	0.542404175	<0.05	Reject H0
SB	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-19	3	2	0.001998901	8	8	0.017593384	-0.015594482	1.00	Do Not Reject H0
SB	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-20	3	3	0.007507324	8	8	0.017593384	-0.01008606	0.96	Do Not Reject H0
SB	Naphthalene	NAPH	91-20-3	mg/kg	IINY-DU-21	3	3	0.007827759	8	8	0.017593384	-0.009765625	0.94	Do Not Reject H0
SB	Nickel	NI	7440-02-0	mg/kg	IINY-DU-17	3	3	19.66667175	8	8	13.02500916	6.641662598	0.23	Do Not Reject H0
SB	Nickel	NI	7440-02-0	mg/kg	IINY-DU-18	3	3	65	8	8	13.02500916	51.97499084	<0.05	Reject H0
SB	Nickel	NI	7440-02-0	mg/kg	IINY-DU-19	3	3	14	8	8	13.02500916	0.974990845	0.40	Do Not Reject H0
SB	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-17	3	3	0.820007324	8	8	0.43762207	0.382385254	0.09	Do Not Reject H0
SB	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-18	3	3	0.973327637	8	8	0.43762207	0.535705566	<0.05	Reject H0
SB	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-19	3	3	0.018035889	8	8	0.43762207	-0.419586182	1.00	Do Not Reject H0
SB	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-20	3	3	0.069656372	8	8	0.43762207	-0.367965698	0.99	Do Not Reject H0
SB	Phenanthrene	PHAN	85-01-8	mg/kg	IINY-DU-21	3	3	0.056655884	8	8	0.43762207	-0.380966187	1.00	Do Not Reject H0
SB	Potassium	K	2023695	mg/kg	IINY-DU-17	3	3	573.3333435	8	8	727.5	-154.1666565	1.00	Do Not Reject H0
SB	Potassium	K	2023695	mg/kg	IINY-DU-18	3	3	723.3333282	8	8	727.5	-4.166671753	0.47	Do Not Reject H0
SB	Potassium	K	2023695	mg/kg	IINY-DU-19	3	3	1133.333328	8	8	727.5	405.8333282	<0.05	Reject H0
SB	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-17	3	3	0.82333374	8	8	0.762481689	0.060852051	0.44	Do Not Reject H0
SB	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-18	3	3	0.936676025	8	8	0.762481689	0.174194336	0.31	Do Not Reject H0
SB	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-19	3	3	0.039672852	8	8	0.762481689	-0.722808838	1.00	Do Not Reject H0
SB	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-20	3	3	0.13999939	8	8	0.762481689	-0.6224823	0.96	Do Not Reject H0
SB	Pyrene	PYR	129-00-0	mg/kg	IINY-DU-21	3	3	0.126663208	8	8	0.762481689	-0.635818481	0.99	Do Not Reject H0

Table F-1. Background Comparison Permutation Tests - Phase I Analytical Soil Data

					Site Data				Background Data			Permutation Test (H0: Site <= Background)		
Matrix	Analyte Name	Analyte Code	CAS	Units	DU	No. Samples	No. Detects	Mean [1]	N	No. Detects	Mean [1]	Site Mean - Background Mean	Right-Tailed Prob.	Conclusion
SB	Selenium	SE	7782-49-2	mg/kg	IINY-DU-17	3	3	1.333343506	8	8	0.959991455	0.373352051	<0.05	Reject H0
SB	Selenium	SE	7782-49-2	mg/kg	IINY-DU-18	3	3	0.866668701	8	8	0.959991455	-0.093322754	0.80	Do Not Reject H0
SB	Selenium	SE	7782-49-2	mg/kg	IINY-DU-19	3	3	0.229995728	8	8	0.959991455	-0.729995728	1.00	Do Not Reject H0
SB	Silver	AG	7440-22-4	mg/kg	IINY-DU-17	3	3	0.263336182	8	8	0.272491455	-0.009155273	0.56	Do Not Reject H0
SB	Silver	AG	7440-22-4	mg/kg	IINY-DU-18	3	3	1.476669312	8	8	0.272491455	1.204177856	<0.05	Reject H0
SB	Silver	AG	7440-22-4	mg/kg	IINY-DU-19	3	3	0.102325439	8	8	0.272491455	-0.170166016	1.00	Do Not Reject H0
SB	Sodium	NA	7440-23-5	mg/kg	IINY-DU-17	3	3	500	8	8	43.75	456.25	<0.05	Reject H0
SB	Sodium	NA	7440-23-5	mg/kg	IINY-DU-18	3	3	426.6666718	8	8	43.75	382.9166718	<0.05	Reject H0
SB	Sodium	NA	7440-23-5	mg/kg	IINY-DU-19	3	3	2733.333328	8	8	43.75	2689.583328	<0.05	Reject H0
SB	Thallium	TL	7440-28-0	mg/kg	IINY-DU-17	3	3	0.706680298	8	8	0.129241943	0.577438354	<0.05	Reject H0
SB	Thallium	TL	7440-28-0	mg/kg	IINY-DU-18	3	3	0.309997559	8	8	0.129241943	0.180755615	<0.05	Reject H0
SB	Thallium	TL	7440-28-0	mg/kg	IINY-DU-19	3	3	0.07232666	8	8	0.129241943	-0.056915283	0.93	Do Not Reject H0
SB	Vanadium	V	7440-62-2	mg/kg	IINY-DU-17	3	3	22.33334351	8	8	32.375	-10.04165649	0.84	Do Not Reject H0
SB	Vanadium	V	7440-62-2	mg/kg	IINY-DU-18	3	3	17.66667175	8	8	32.375	-14.70832825	0.94	Do Not Reject H0
SB	Vanadium	V	7440-62-2	mg/kg	IINY-DU-19	3	3	55.33332825	8	8	32.375	22.95832825	<0.05	Reject H0
SB	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-17	3	3	2133.333328	8	8	42.375	2090.958328	<0.05	Reject H0
SB	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-18	3	3	4566.666672	8	8	42.375	4524.291672	<0.05	Reject H0
SB	Zinc	ZN	7440-66-6	mg/kg	IINY-DU-19	3	3	61	8	8	42.375	18.625	<0.05	Reject H0

Notes:

SS = surface soil

SB = soil boring

mg/kg = milligrams per kilogram

Notes:

CAS = Chemical Abstracts Service

DU = decision unit

mg/kg = Milligram(s) per kilogram

SB = soil boring

SS = surface soil

Table F-2. Background Comparison Permutation Tests - Phase II Analytical Sediment Data

						Site Data				Background Data				Permutation Test (H0: Site <= Background)			
Matrix	Analyte Name	Analyte Code	CAS	Units		DU	No. Samples	No. Detects	Mean [1]	DU	No. Samples	No. Detects	Mean [1]	Site Mean - Background Mean [2]	Right-Tailed Prob. [3]	Adj. Right-Tailed Prob. [3]	Conclusion
WS	Aluminum	AL	7429-90-5	ug/L	1	DUMP	20	10	23.3	CHHRS	20	20	20.5	2.8	.0499*	.2495	Do Not Reject H0
WS	Aluminum	AL	7429-90-5	ug/L	1	DUMP	20	10	23.3	CHMS	20	18	58.9	-35.6	.9900	.9900	Do Not Reject H0
WS	Aluminum	AL	7429-90-5	ug/L	2	IHRS	20	6	21.8	CHHRS	20	20	20.5	1.33	.1677	.1677	Do Not Reject H0
WS	Aluminum	AL	7429-90-5	ug/L	3	RRDS	10	8	20.9	CHMS	20	18	58.9	-38	1.0000	1.0000	Do Not Reject H0
WS	Aluminum	AL	7429-90-5	ug/L	4	TWS	10	4	24.2	CHMS	20	18	58.9	-34.6	.9381	.9381	Do Not Reject H0
WS	Antimony	SB	7440-36-0	ug/L	1	DUMP	20	2	1.04	CHMS	20	0	<1	[0.035, 1.04]	.2315	.2315	Do Not Reject H0
WS	Antimony	SB	7440-36-0	ug/L	1	DUMP	20	2	1.04	CHHRS	20	0	<1	[0.035, 1.04]	.2196	.2196	Do Not Reject H0
WS	Antimony	SB	7440-36-0	ug/L	2	IHRS	20	5	0.622	CHHRS	20	0	<1	[-0.378, 0.622]	.9681	.9681	Do Not Reject H0
WS	Antimony	SB	7440-36-0	ug/L	3	RRDS	10	1	0.72	CHMS	20	0	<1	[-0.28, 0.72]	1.0000	1.0000	Do Not Reject H0
WS	Antimony	SB	7440-36-0	ug/L	4	TWS	10	7	0.558	CHMS	20	0	<1	[-0.442, 0.558]	1.0000	1.0000	Do Not Reject H0
WS	Arsenic	AS	7440-38-2	ug/L	1	DUMP	20	10	0.401	CHHRS	20	16	0.376	0.0248	.1477	.1477	Do Not Reject H0
WS	Arsenic	AS	7440-38-2	ug/L	1	DUMP	20	10	0.401	CHMS	20	19	0.711	-0.31	1.0000	1.0000	Do Not Reject H0
WS	Arsenic	AS	7440-38-2	ug/L	2	IHRS	20	20	0.491	CHHRS	20	16	0.376	0.115	.0020*	.0100*	Reject H0
WS	Arsenic	AS	7440-38-2	ug/L	3	RRDS	10	10	0.559	CHMS	20	19	0.711	-0.152	.7705	.7705	Do Not Reject H0
WS	Arsenic	AS	7440-38-2	ug/L	4	TWS	10	10	0.97	CHMS	20	19	0.711	0.259	.0878	.0878	Do Not Reject H0
WS	Barium	BA	7440-39-3	ug/L	1	DUMP	20	20	12.7	CHMS	20	20	13.1	-0.385	.6627	.6627	Do Not Reject H0
WS	Barium	BA	7440-39-3	ug/L	1	DUMP	20	20	12.7	CHHRS	20	20	12.4	0.35	.1836	.1836	Do Not Reject H0
WS	Barium	BA	7440-39-3	ug/L	2	IHRS	20	20	16.4	CHHRS	20	20	12.4	4	.0020*	.0100*	Reject H0
WS	Barium	BA	7440-39-3	ug/L	3	RRDS	10	10	14.1	CHMS	20	20	13.1	1.02	.2136	.2136	Do Not Reject H0
WS	Barium	BA	7440-39-3	ug/L	4	TWS	10	10	13.7	CHMS	20	20	13.1	0.615	.2814	.2814	Do Not Reject H0
WS	Beryllium	BE	7440-41-7	ug/L	1	DUMP	20	2	0.0996	CHMS	20	0	<0.3	[-0.2, 0.0996]	.7186	.7186	Do Not Reject H0
WS	Beryllium	BE	7440-41-7	ug/L	1	DUMP	20	2	0.0996	CHHRS	20	0	<0.3	[-0.2, 0.0996]	.7425	.7425	Do Not Reject H0
WS	Beryllium	BE	7440-41-7	ug/L	2	IHRS	20	0	<0.3	CHHRS	20	0	<0.3	[-0.3, 0.3]	1.0000	1.0000	Do Not Reject H0
WS	Beryllium	BE	7440-41-7	ug/L	3	RRDS	10	0	<0.3	CHMS	20	0	<0.3	[-0.3, 0.3]	1.0000	1.0000	Do Not Reject H0
WS	Beryllium	BE	7440-41-7	ug/L	4	TWS	10	3	0.15	CHMS	20	0	<0.3	[-0.15, 0.15]	1.0000	1.0000	Do Not Reject H0
WS	Cadmium	CD	7440-43-9	ug/L	1	DUMP	20	0	<0.75	CHMS	20	0	<0.75	[-0.75, 0.75]	1.0000	1.0000	Do Not Reject H0
WS	Cadmium	CD	7440-43-9	ug/L	1	DUMP	20	0	<0.75	CHHRS	20	0	<0.75	[-0.75, 0.75]	1.0000	1.0000	Do Not Reject H0
WS	Cadmium	CD	7440-43-9	ug/L	2	IHRS	20	0	<0.75	CHHRS	20	0	<0.75	[-0.75, 0.75]	1.0000	1.0000	Do Not Reject H0
WS	Cadmium	CD	7440-43-9	ug/L	3	RRDS	10	0	<0.75	CHMS	20	0	<0.75	[-0.75, 0.75]	1.0000	1.0000	Do Not Reject H0
WS	Cadmium	CD	7440-43-9	ug/L	4	TWS	10	0	<0.75	CHMS	20	0	<0.75	[-0.75, 0.75]	1.0000	1.0000	Do Not Reject H0
WS	Calcium	CA	7440-70-2	ug/L	1	DUMP	20	20	17400	CHHRS	20	20	22200	-4800	1.0000	1.0000	Do Not Reject H0
WS	Calcium	CA	7440-70-2	ug/L	1	DUMP	20	20	17400	CHMS	20	20	20300	-2920	.9820	.9820	Do Not Reject H0
WS	Calcium	CA	7440-70-2	ug/L	2	IHRS	20	20	22200	CHHRS	20	20	22200	50	.4711	.4711	Do Not Reject H0
WS	Calcium	CA	7440-70-2	ug/L	3	RRDS	10	10	21600	CHMS	20	20	20300	1280	.2675	.2675	Do Not Reject H0
WS	Calcium	CA	7440-70-2	ug/L	4	TWS	10	10	22500	CHMS	20	20	20300	2180	.1337	.1337	Do Not Reject H0
WS	Chromium	CR	7440-47-3	ug/L	1	DUMP	20	1	0.5	CHHRS	20	0	<1.8	[-1.3, 0.5]	1.0000	1.0000	Do Not Reject H0
WS	Chromium	CR	7440-47-3	ug/L	1	DUMP	20	1	0.5	CHMS	20	12	0.555	-0.055	.9860	.9860	Do Not Reject H0
WS	Chromium	CR	7440-47-3	ug/L	2	IHRS	20	1	0.56	CHHRS	20	0	<1.8	[-1.24, 0.56]	1.0000	1.0000	Do Not Reject H0
WS	Chromium	CR	7440-47-3	ug/L	3	RRDS	10	0	<1.8	CHMS	20	12	0.555	[-0.555, 1.25]	.0040*	.0100*	Reject H0
WS	Chromium	CR	7440-47-3	ug/L	4	TWS	10	2	0.635	CHMS	20	12	0.555	0.08	.0040*	.0100*	Reject H0
WS	Cobalt	CO	7440-48-4	ug/L	1	DUMP	20	4	0.145	CHHRS	20	1	0.093	0.052	.0978	.0978	Do Not Reject H0
WS	Cobalt	CO	7440-48-4	ug/L	1	DUMP	20	4	0.145	CHMS	20	12	0.132	0.0133	.1776	.1776	Do Not Reject H0
WS	Cobalt	CO	7440-48-4	ug/L	2	IHRS	20	0	<0.35	CHHRS	20	1	0.093	[-0.093, 0.257]	.5309	.5309	Do Not Reject H0
WS	Cobalt	CO	7440-48-4	ug/L	3	RRDS	10	2	0.0955	CHMS	20	12	0.132	-0.0362	1.0000	1.0000	Do Not Reject H0
WS	Cobalt	CO	7440-48-4	ug/L	4	TWS	10	4	0.111	CHMS	20	12	0.132	-0.0207	.9681	.9681	Do Not Reject H0
WS	Copper	CU	7440-50-8	ug/L	1	DUMP	20	20	2.66	CHMS	20	20	0.896	1.76	.0020*	.0025*	Reject H0
WS	Copper	CU	7440-50-8	ug/L	1	DUMP	20	20	2.66	CHHRS	20	20	1.36	1.3	.0020*	.0025*	Reject H0
WS	Copper	CU	7440-50-8	ug/L	2	IHRS	20	20	5.93	CHHRS	20	20	1.36	4.57	.0020*	.0025*	Reject H0
WS	Copper	CU	7440-50-8	ug/L	3	RRDS	10	10	1.28	CHMS	20	20	0.896	0.384	.0020*	.0025*	Reject H0
WS	Copper	CU	7440-50-8	ug/L	4	TWS	10	10	1.25	CHMS	20	20	0.896	0.354	.0040*	.0040*	Reject H0
WS	Iron	FE	7439-89-6	ug/L	1	DUMP	20	0	<96.7	CHMS	20	12	170	[-170, -72.8]	.9122	.9122	Do Not Reject H0
WS	Iron	FE	7439-89-6	ug/L	1	DUMP	20	0	<96.7	CHHRS	20	19	65.6	[-65.6, 31.1]	.0120*	.0599	Do Not Reject H0
WS	Iron	FE	7439-89-6	ug/L	2	IHRS	20	1	37.8	CHHRS	20	19	65.6	-27.8	.9800	.9800	Do Not Reject H0
WS	Iron	FE	7439-89-6	ug/L	3	RRDS	10	0	<100	CHMS	20	12	170	[-170, -69.5]	1.0000	1.0000	Do Not Reject H0
WS	Iron	FE	7439-89-6	ug/L	4	TWS	10	0	<100	CHMS	20	12	170	[-170, -69.5]	1.0000	1.0000	Do Not Reject H0
WS	Lead	PB	7439-92-1	ug/L	1	DUMP	20	10	0.406	CHMS	20	5	0.286	0.12	.0459*	.2295	Do Not Reject H0
WS	Lead	PB	7439-92-1	ug/L	1	DUMP	20	10	0.406	CHHRS	20	1	0.61	-0.204	.9441	.9441	Do Not Reject H0
WS	Lead	PB	7439-92-1	ug/L	2	IHRS	20	8	0.31	CHHRS	20	1	0.61	-0.3	1.0000	1.0000	Do Not Reject H0
WS	Lead	PB	7439-92-1	ug/L	3	RRDS	10	0	<0.7	CHMS	20	5	0.286	[-0.286, 0.414]	.1118	.1118	Do Not Reject H0
WS	Lead	PB	7439-92-1	ug/L	4	TWS	10	0	<0.7	CHMS	20	5	0.286	[-0.286, 0.414]	.1517	.1517	Do Not Reject H0
WS	Magnesium	MG	7439-95-4	ug/L	1	DUMP	20	20	5790	CHHRS	20	20	3820	1970	.0020*	.0050*	Reject H0
WS	Magnesium	MG	7439-95-4	ug/L	1	DUMP	20	20	5790	CHMS	20	20	6980	-1180	.8942	.8942	Do Not Reject H0
WS	Magnesium	MG	7439-95-4	ug/L	2	IHRS	20	20	4450	CHHRS	20	20	3820	630	.0020*	.0050*	Reject H0
WS	Magnesium	MG	7439-95-4	ug/L	3	RRDS	10	10	4290	CHMS	20	20	6980	-2680	.9780	.9780	Do Not Reject H0
WS	Magnesium	MG	7439-95-4	ug/L	4	TWS	10	10	6640	CHMS	20	20	6980	-335	.6168	.6168	Do Not Reject H0
WS	Manganese	MN	7439-96-5	ug/L	1	DUMP	20	20	6.73	CHHRS	20	20	12.7	-5.93	.9242	.9242	Do Not Reject H0
WS	Manganese	MN	7439-96-5	ug/L	1	DUMP	20	20	6.73	CHMS	20	20	144	-137	1.0000	1.0000	Do Not Reject H0
WS	Manganese	MN	7439-96-5	ug/L	2	IHRS	20	20	9.32	CHHRS	20	20	12.7	-3.34	.7625	.7625	Do Not Reject H0
WS	Manganese	MN	7439-96-5	ug/L	3	RRDS	10	10	30.7	CHMS	20	20	144	-113	.9920	.9920	Do Not Reject H0
WS	Manganese	MN	7439-96-5	ug/L	4	TWS	10	10	58.1	CHMS	20	20	144	-85.6	.9381	.9381	Do Not Reject H0
WS	Mercury	HG	7439-97-6	ug/L	1	DUMP	40	0	<0.08	CHMS	40	0	<0.08	[-0.08, 0.08]	1.0000	1.0000	Do Not Reject H0
WS	Mercury	HG	7439-97-6	ug/L	1	DUMP	40	0	<0.08	CHHRS	40	0	<0.08	[-0.08, 0.08]	1.0000	1.0000	Do Not Reject H0
WS	Mercury	HG	7439-97-6	ug/L	2	IHRS	40	0	<0.08	CHHRS	40	0	<0.08	[-0.08, 0.08]	1.0000	1.0000	Do Not Reject H0
WS	Mercury	HG	7439-97-6	ug/L	3	RRDS	20	0	<0.08	CHMS	40	0	<0.08	[-0.08, 0.08]	1.0000	1.0000	Do Not Reject H0
WS	Mercury	HG	7439-97-6	ug/L	4	TWS	20	0	<0.08	CHMS	40	0	<0.08	[-0.08, 0.08]	1.0000	1.0000	Do Not Reject H0
WS	Nickel	NI	7440-02-0	ug/L	1	DUMP	20	16	0.428	CHHRS	20	5	0.373	0.0551	.1178	.1178	Do Not Reject H0
WS	Nickel	NI	7440-02-0	ug/L	1	DUMP	20	16	0.428	CHMS	20	17	0.436	-0.00833	.6427	.6427	Do Not Reject H0
WS	Nickel	NI	7440-02-0	ug/L	2	IHRS	20	18	0.432	CHHRS	20	5	0.373	0.0592	.0998	.0998	Do Not Reject H0
WS	Nickel	NI	7440-02-0	ug/L	3	RRDS	10	10	0.444	CHMS	20	17	0.436	0.00754	.3992	.3992	Do Not Reject H0
WS	Nickel	NI	7440-02-0	ug/L	4	TWS	10	10	0.444	CHMS	20	17	0.436	0.00752	.4311	.4311	Do Not Reject H0
WS	Potassium	K	2023695	ug/L	1	DUMP	20	20	2240	CHMS	20	20	2060	185	.1856	.1856	Do Not Reject H0
WS	Potassium	K	2023695	ug/L	1	DUMP	20	20	2240	CHHRS	20	20	1220	1020	.0020*	.0050*	Reject H0
WS	Potassium	K	2023695	ug/L	2	IHRS	20	20	1730	CHHRS	20	20	1220	510	.0020*	.0050*	Reject H0
WS	Potassium	K	2023695	ug/L	3	RRDS	10	10	1580	CHMS	20	20	2060	-475	.9441	.9441	Do Not Reject H0
WS	Potassium	K	2023695	ug/L	4	TWS	10	10	2550	CHMS	20	20	2060	495	.0539	.0539	Do Not Reject H0
WS	Selenium	SE	7782-49-2	ug/L	1	DUMP	20	1	0.37	CHMS	20	0	<1	[-0.63, 0.37]	1.0000	1.0000	Do Not Reject H0
WS	Selenium	SE	7782-49-2	ug/L	1	DUMP	20	1	0.37	CHHRS	20	0	<1	[-0.63, 0.37]	1.0000	1.0000	Do Not Reject H0
WS	Selenium	SE	7782-49-2	ug/L	2	IHRS	20	0	<1	CHHRS	20	0	<1	[-1, 1]	1.0000	1.0000	Do Not Reject H0
WS	Selenium	SE	7782-49-2	ug/L	3	RRDS	10	0	<1	CHMS	20	0	<1	[-1, 1]	1.0000	1.0000	Do Not Reject H0
WS	Selenium	SE	7782-49-2	ug/L	4	TWS	10	0	<1	CHMS	20	0	<1	[-1, 1]	1.0000	1.0000	Do Not Reject H0
WS	Silver	AG	7440-22-4	ug/L	1	DUMP	20	0	<0.1	CHMS	20	0	<0.1	[-0.1, 0.1]	1.0000	1.0000	Do Not Reject H0
WS	Silver	AG	7440-22-4	ug/L	1	DUMP	20	0	<0.1	CHHRS	20	0	<0.1	[-0.1, 0.1]	1.0000	1.0000	Do Not Reject H0
WS	Silver	AG	7440-22-4	ug/L	2	IHRS	20	2	0.0667	CHHRS	20	0	<0.1	[-0.0333, 0.0667]	.7545	.7545	Do Not Reject H0
WS	Silver	AG	7440-22-4	ug/L	3	RRDS	10	0	<0.1	CHMS	20	0	<0.1	[-0.1, 0.1]	1.0000	1.0000	Do Not Reject H0
WS	Silver	AG	7440-22-4	ug/L	4	TWS	10	0	<0.1	CHMS	20	0	<0.1	[-0.1, 0.1]	1.0000	1.0000	Do Not Reject H0
WS	Sodium	NA	7440-23-5	ug/L	1	DUMP	20	20	25100	CHHRS	20	20	15700	9400	.0020*	.0050*	Reject H0
WS	Sodium	NA	7440-23-5	ug/L	1	DUMP	20	20	25100	CHMS	20	20	52200	-27200	1.0000	1.0000	Do Not Reject H0
WS	Sodium	NA	7440-23-5	ug/L	2	IHRS	20	20	20400	CHHRS	20	20	15700	4700	.0020*	.0050*	Reject H0
WS	Sodium	NA	7440-23-5	ug/L	3	RRDS	10	10	20200	CHMS	20	20	52200	-32000	.9900	.9900	Do Not Reject H0
WS	Sodium	NA	7440-23-5	ug/L	4	TWS	10	10	39600	CHMS	20	20	52200	-12600	.8543	.8543	Do Not Reject H0
WS	Thallium	TL	7440-28-0	ug/L	1	DUMP	20	1	0.17	CHHRS	20	0	<0.2	[-0.03, 0.17]	1.0000	1.0000	Do Not Reject H0
WS	Thallium	TL	7440-28-0	ug/L	1	DUMP	20	1	0.17	CHMS	20	0	<0.2	[-0.03, 0.17]	1.0000	1.0000	Do Not Reject H0
WS	Thallium	TL	7440-28-0	ug/L	2	IHRS	20	0	<0.2	CHHRS	20	0	<0.2	[-0.2, 0.2]	1.0000	1.0000	Do Not Reject H0
WS	Thallium	TL	7440-28-0	ug/L	3	RRDS	10	0	<0.2	CHMS	20	0	<0.2	[-0.2, 0.2]	1.0000	1.0000	Do Not Reject H0
WS	Thallium	TL	7440-28-0	ug/L	4	TWS	10	1	0.11	CHMS	20	0	<0.2	[-0.09, 0.11]	1.0000	1.0000	Do Not Reject H0
WS	Vanadium	V	7440-62-2	ug/L	1	DUMP	20	0	<3	CHHRS	20	0	<3	[-3, 3]	1.0000	1.0000	Do Not Reject H0

Table F-2. Background Comparison Permutation Tests - Phase II Analytical Sediment Data

						Site Data				Background Data				Permutation Test (H0: Site <= Background)			
Matrix	Analyte Name	Analyte Code	CAS	Units		DU	No. Samples	No. Detects	Mean [1]	DU	No. Samples	No. Detects	Mean [1]	Site Mean - Background Mean [2]	Right-Tailed Prob. [3]	Adj. Right-Tailed Prob. [3]	Conclusion
WS	Vanadium	V	7440-62-2	ug/L	1	DUMP	20	0	<3	CHMS	20	0	<3	[-3, 3]	1.0000	1.0000	Do Not Reject H0
WS	Vanadium	V	7440-62-2	ug/L	2	IHRS	20	0	<3	CHHRS	20	0	<3	[-3, 3]	1.0000	1.0000	Do Not Reject H0
WS	Vanadium	V	7440-62-2	ug/L	3	RRDS	10	1	1.2	CHMS	20	0	<3	[-1.8, 1.2]	1.0000	1.0000	Do Not Reject H0
WS	Vanadium	V	7440-62-2	ug/L	4	TWS	10	0	<3	CHMS	20	0	<3	[-3, 3]	1.0000	1.0000	Do Not Reject H0
WS	Zinc	ZN	7440-66-6	ug/L	1	DUMP	20	19	11.5	CHHRS	20	2	7.35	4.17	.2635	.2635	Do Not Reject H0
WS	Zinc	ZN	7440-66-6	ug/L	1	DUMP	20	19	11.5	CHMS	20	10	3.08	8.44	.0020*	.0100*	Reject H0
WS	Zinc	ZN	7440-66-6	ug/L	2	IHRS	20	17	7.29	CHHRS	20	2	7.35	-0.06	.4990	.4990	Do Not Reject H0
WS	Zinc	ZN	7440-66-6	ug/L	3	RRDS	10	0	<8	CHMS	20	10	3.08	[-3.08, 4.92]	.0060*	.0150*	Reject H0
WS	Zinc	ZN	7440-66-6	ug/L	4	TWS	10	1	3.9	CHMS	20	10	3.08	0.82	.0639	.0639	Do Not Reject H0
SE	Aluminum	AL	7429-90-5	mg/kg	3	IHRS	3	3	6300	CHHRS	8	8	13500	-7200	1.0000	1.0000	Do Not Reject H0
SE	Aluminum	AL	7429-90-5	mg/kg	4	RRDS	3	3	18000	CHMS	8	8	15400	2620	.0659	.0659	Do Not Reject H0
SE	Aluminum	AL	7429-90-5	mg/kg	5	TWS	3	3	15700	CHMS	8	8	15400	292	.5090	.5090	Do Not Reject H0
SE	Antimony	SB	7440-36-0	mg/kg	3	IHRS	3	3	103	CHHRS	8	8	0.48	103	.0020*	.0060*	Reject H0
SE	Antimony	SB	7440-36-0	mg/kg	4	RRDS	3	3	0.743	CHMS	8	8	0.94	-0.197	.9820	.9820	Do Not Reject H0
SE	Antimony	SB	7440-36-0	mg/kg	5	TWS	3	3	0.84	CHMS	8	8	0.94	-0.1	.7904	.7904	Do Not Reject H0
SE	Arsenic	AS	7440-38-2	mg/kg	3	IHRS	3	3	33.7	CHHRS	8	8	5.94	27.7	.0040*	.0060*	Reject H0
SE	Arsenic	AS	7440-38-2	mg/kg	4	RRDS	3	3	9.57	CHMS	8	8	5.69	3.88	.0040*	.0060*	Reject H0
SE	Arsenic	AS	7440-38-2	mg/kg	5	TWS	3	3	8.57	CHMS	8	8	5.69	2.88	.0080*	.0080*	Reject H0
SE	Barium	BA	7440-39-3	mg/kg	3	IHRS	3	3	450	CHHRS	8	8	85.6	364	.0120*	.0120*	Reject H0
SE	Barium	BA	7440-39-3	mg/kg	4	RRDS	3	3	107	CHMS	8	8	62.4	44.3	.0060*	.0120*	Reject H0
SE	Barium	BA	7440-39-3	mg/kg	5	TWS	3	3	94	CHMS	8	8	62.4	31.6	.0120*	.0120*	Reject H0
SE	Beryllium	BE	7440-41-7	mg/kg	3	IHRS	3	3	0.863	CHHRS	8	8	0.889	-0.0254	.5210	.5210	Do Not Reject H0
SE	Beryllium	BE	7440-41-7	mg/kg	4	RRDS	3	3	0.927	CHMS	8	8	1.12	-0.191	.7764	.7764	Do Not Reject H0
SE	Beryllium	BE	7440-41-7	mg/kg	5	TWS	3	3	0.927	CHMS	8	8	1.12	-0.191	.7904	.7904	Do Not Reject H0
SE	Cadmium	CD	7440-43-9	mg/kg	3	IHRS	3	3	9.27	CHHRS	8	8	0.711	8.56	.0080*	.0140*	Reject H0
SE	Cadmium	CD	7440-43-9	mg/kg	4	RRDS	3	3	0.937	CHMS	8	8	0.726	0.21	.0120*	.0140*	Reject H0
SE	Cadmium	CD	7440-43-9	mg/kg	5	TWS	3	3	1.41	CHMS	8	8	0.726	0.687	.0140*	.0140*	Reject H0
SE	Chromium	CR	7440-47-3	mg/kg	3	IHRS	3	3	133	CHHRS	8	8	32.9	100	.0080*	.0080*	Reject H0
SE	Chromium	CR	7440-47-3	mg/kg	4	RRDS	3	3	41	CHMS	8	8	24.4	16.6	.0080*	.0080*	Reject H0
SE	Chromium	CR	7440-47-3	mg/kg	5	TWS	3	3	42.3	CHMS	8	8	24.4	18	.0060*	.0080*	Reject H0
SE	Cobalt	CO	7440-48-4	mg/kg	3	IHRS	3	3	13.3	CHHRS	8	8	10.5	2.8	.2495	.2495	Do Not Reject H0
SE	Cobalt	CO	7440-48-4	mg/kg	4	RRDS	3	3	14.7	CHMS	8	8	8.22	6.44	.0060*	.0090*	Reject H0
SE	Cobalt	CO	7440-48-4	mg/kg	5	TWS	3	3	13.3	CHMS	8	8	8.22	5.11	.0040*	.0090*	Reject H0
SE	Copper	CU	7440-50-8	mg/kg	3	IHRS	3	3	6230	CHHRS	8	8	35.8	6200	.0120*	.0120*	Reject H0
SE	Copper	CU	7440-50-8	mg/kg	4	RRDS	3	3	54	CHMS	8	8	26.2	27.8	.0060*	.0120*	Reject H0
SE	Copper	CU	7440-50-8	mg/kg	5	TWS	3	3	62	CHMS	8	8	26.2	35.8	.0100*	.0120*	Reject H0
SE	Iron	FE	7439-89-6	mg/kg	3	IHRS	3	3	157000	CHHRS	8	8	23800	133000	.0080*	.0120*	Reject H0
SE	Iron	FE	7439-89-6	mg/kg	4	RRDS	3	3	35700	CHMS	8	8	17400	18300	.0140*	.0140*	Reject H0
SE	Iron	FE	7439-89-6	mg/kg	5	TWS	3	3	31300	CHMS	8	8	17400	14000	.0060*	.0120*	Reject H0
SE	Lead	PB	7439-92-1	mg/kg	3	IHRS	3	3	9900	CHHRS	8	8	49.1	9850	.0080*	.0120*	Reject H0
SE	Lead	PB	7439-92-1	mg/kg	4	RRDS	3	3	61	CHMS	8	8	53.2	7.75	.0439*	.0439*	Reject H0
SE	Lead	PB	7439-92-1	mg/kg	5	TWS	3	3	80.3	CHMS	8	8	53.2	27.1	.0080*	.0120*	Reject H0
SE	Manganese	MN	7439-96-5	mg/kg	3	IHRS	3	3	1200	CHHRS	8	8	1020	182	.2894	.2894	Do Not Reject H0
SE	Manganese	MN	7439-96-5	mg/kg	4	RRDS	3	3	2700	CHMS	8	8	488	2210	.0080*	.0120*	Reject H0
SE	Manganese	MN	7439-96-5	mg/kg	5	TWS	3	3	1100	CHMS	8	8	488	612	.0060*	.0120*	Reject H0
SE	Mercury	HG	7439-97-6	mg/kg	3	IHRS	6	6	0.072	CHHRS	16	16	0.19	-0.118	.9960	.9960	Do Not Reject H0
SE	Mercury	HG	7439-97-6	mg/kg	4	RRDS	6	6	0.187	CHMS	16	16	0.25	-0.0633	.9940	.9940	Do Not Reject H0
SE	Mercury	HG	7439-97-6	mg/kg	5	TWS	6	6	0.193	CHMS	16	16	0.25	-0.0567	.9940	.9940	Do Not Reject H0
SE	Nickel	NI	7440-02-0	mg/kg	3	IHRS	3	3	85.3	CHHRS	8	8	22.9	62.4	.0060*	.0120*	Reject H0
SE	Nickel	NI	7440-02-0	mg/kg	4	RRDS	3	3	34	CHMS	8	8	21.4	12.6	.0080*	.0120*	Reject H0
SE	Nickel	NI	7440-02-0	mg/kg	5	TWS	3	3	33	CHMS	8	8	21.4	11.6	.0140*	.0140*	Reject H0
SE	Selenium	SE	7782-49-2	mg/kg	3	IHRS	3	0	<0.63	CHHRS	8	8	0.436	[-0.436, 0.194]	.0379*	.1138	Do Not Reject H0
SE	Selenium	SE	7782-49-2	mg/kg	4	RRDS	3	3	0.763	CHMS	8	8	0.781	-0.0179	.6287	.6287	Do Not Reject H0
SE	Selenium	SE	7782-49-2	mg/kg	5	TWS	3	3	0.66	CHMS	8	8	0.781	-0.121	.9481	.9481	Do Not Reject H0
SE	Silver	AG	7440-22-4	mg/kg	3	IHRS	3	3	1.47	CHHRS	8	8	0.253	1.21	.0060*	.0180*	Reject H0
SE	Silver	AG	7440-22-4	mg/kg	4	RRDS	3	3	0.317	CHMS	8	8	0.316	0.000443	.4291	.4291	Do Not Reject H0
SE	Silver	AG	7440-22-4	mg/kg	5	TWS	3	3	0.323	CHMS	8	8	0.316	0.00711	.3892	.3892	Do Not Reject H0
SE	Thallium	TL	7440-28-0	mg/kg	3	IHRS	3	3	0.0667	CHHRS	8	8	0.149	-0.0822	1.0000	1.0000	Do Not Reject H0
SE	Thallium	TL	7440-28-0	mg/kg	4	RRDS	3	3	0.19	CHMS	8	8	0.175	0.015	.2735	.2735	Do Not Reject H0
SE	Thallium	TL	7440-28-0	mg/kg	5	TWS	3	3	0.18	CHMS	8	8	0.175	0.005	.4830	.4830	Do Not Reject H0
SE	Vanadium	V	7440-62-2	mg/kg	3	IHRS	3	3	33	CHHRS	8	8	21.8	11.2	.0100*	.0150*	Reject H0
SE	Vanadium	V	7440-62-2	mg/kg	4	RRDS	3	3	29.7	CHMS	8	8	24.2	5.42	.0699	.0699	Do Not Reject H0
SE	Vanadium	V	7440-62-2	mg/kg	5	TWS	3	3	34.3	CHMS	8	8	24.2	10.1	.0060*	.0150*	Reject H0
SE	Zinc	ZN	7440-66-6	mg/kg	3	IHRS	3	3	3730	CHHRS	8	8	109	3620	.0040*	.0080*	Reject H0
SE	Zinc	ZN	7440-66-6	mg/kg	4	RRDS	3	3	193	CHMS	8	8	116	77.8	.0080*	.0080*	Reject H0
SE	Zinc	ZN	7440-66-6	mg/kg	5	TWS	3	3	527	CHMS	8	8	116	411	.0080*	.0080*	Reject H0

Notes:

1. Kaplan-Meier estimator used for datasets with non-detect results.

2. Difference between site and background means reported as an interval if either site or background mean is a non-detect.

3. Right-tailed probability of permutation test of difference between site and background means. Adjusted p-values computed with Benjamini-Hochberg procedure for controlling false discovery rate (FDR). Asterisks indicate significance level (<0.05, <0.01, <0.001).

µg/L = Microgram(s) per liter

CAS = Chemical Abstracts Service

CHHRS = Con Hook Hudson River Shoreline

CHMS = Con Hook Marsh Shoreline

DU = decision unit

IHRS = Iona Hudson River Shoreline

mg/kg = Milligram(s) per kilogram

No. = Number

RRDS = Rip rap drainage swale

SE = Sediment

TWS = Tidal wetland swale

WS = Surface water

Attachment G

Food Web Models

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Table G-1. Food Web Model for Meadow Vole

Soil Ingestion Rate (kg/kg bw-day)	0.00046
Food Ingestion Rate (kg dry wt/kg-day)	0.023
Incidental Soil Ingestion Rate (%)	2
Diet - vegetation (%)	1

COPEC	Soil EPC (mg/kg)	C_{plant} (mg/kg dry wt)	Dose from Soil (mg/kg bw-day)	Dose from Food (mg/kg bw-day)	Total Dose (mg/kg-bw day)	TRV_{NOAEL} (mg/kg bw-day)	TRV_{LOAEL} (mg/kg bw-day)	HQ_{NOAEL}	HQ_{LOAEL}
Iona Island									
Antimony	1.04	4.09E-02	4.78E-04	9.41E-04	1.42E-03	5.90E-02	5.90E-01	<1	<1
Arsenic	16.1	6.04E-01	7.41E-03	1.39E-02	2.13E-02	1.04E+00	1.66E+00	<1	<1
Cadmium	0.42	3.87E-01	1.93E-04	8.90E-03	9.09E-03	7.70E-01	7.70E+00	<1	<1
Copper	90.3	1.15E+01	4.15E-02	2.64E-01	3.06E-01	5.60E+00	9.34E+00	<1	<1
Lead	307.1	6.59E+00	1.41E-01	1.51E-01	2.93E-01	4.70E+00	8.90E+00	<1	<1
Zinc	124.5	6.99E+01	5.73E-02	1.61E+00	1.67E+00	7.54E+01	2.98E+02	<1	<1
HMW PAH	29.4	4.48E+00	1.35E-02	1.03E-01	1.16E-01	6.15E-01	3.16E+01	<1	<1
Former Dump Area (DU 17, DU 18, DU19)									
Antimony	6.7	2.35E-01	3.08E-03	5.40E-03	8.48E-03	5.90E-02	5.90E-01	<1	<1
Cadmium	11.2	2.32E+00	5.15E-03	5.34E-02	5.86E-02	7.70E-01	7.70E+00	<1	<1
Chromium	81.9	3.36E+00	3.77E-02	7.72E-02	1.15E-01	2.40E+00	5.82E+01	<1	<1
Copper	1538	3.51E+01	7.07E-01	8.08E-01	1.52E+00	5.60E+00	9.34E+00	<1	<1
Lead	1825	1.79E+01	8.40E-01	4.12E-01	1.25E+00	4.70E+00	8.90E+00	<1	<1
Mercury	1.7	4.93E-01	7.82E-04	1.13E-02	1.21E-02	1.32E+01	1.32E+02	<1	<1
Selenium	0.81	4.03E-01	3.73E-04	9.26E-03	9.63E-03	1.43E-01	2.15E-01	<1	<1
Thallium	0.3	1.20E-03	1.38E-04	2.76E-05	1.66E-04	7.40E-03	7.40E-02	<1	<1
Zinc	3413	4.38E+02	1.57E+00	1.01E+01	1.16E+01	7.54E+01	2.98E+02	<1	<1
HMW PAH	9.85	1.59E+00	4.53E-03	3.66E-02	4.11E-02	6.15E-01	3.16E+01	<1	<1
Total PCBs	0.15	8.41E-04	6.90E-05	1.94E-05	8.84E-05	6.80E-02	6.80E-01	<1	<1

Notes:
C_{plant} = Concentration in plant
COPEC = Constituent of potential ecological concern
EPC = Exposure point concentration
HQ = Hazard quotient
LOAEL = Lowest observed adverse effects level
mg/kg bw-day = Milligram(s) per kilogram of body weight per day
NOAEL = No observed adverse effects level
PAH = Polycyclic aromatic hydrocarbon
PCB = Polychlorinated biphenyl
TRV = Toxicity reference value
HQs > 1 are bold

Table G-2. Food Web Model for American Robin

Food Ingestion Rate (kg dry wt/kg bw-d)	0.14
Soil Ingestion Rate (%)	10.5
Soil Ingestion Rate (kg/kg bw-d)	0.0147
Diet - inverts (%)	0.93
Diet - veg (%)	0.07
Site Use Factor	0.67

COPEC	Soil EPC (mg/kg)	C_{invert} (mg/kg dry wt)	C_{plant} (mg/kg dry wt)	Dose from Soil (mg/kg bw-day)	Dose from Food (mg/kg bw-day)	Total Dose (mg/kg-bw day)	TRV_{NOAEL} (mg/kg bw-day)	TRV_{LOAEL} (mg/kg bw-day)	HQ_{NOAEL}	HQ_{LOAEL}
Iona Island										
Antimony	1.04	1.04E+00	4.09E-02	1.53E-02	1.36E-01	1.01E-01	NA	NA	--	--
Arsenic	16.1	1.72E+00	6.04E-01	2.37E-01	2.30E-01	3.11E-01	2.24E+00	4.51E+00	<1	<1
Cadmium	0.42	4.16E+00	3.87E-01	6.17E-03	5.45E-01	3.67E-01	1.47E+00	6.35E+00	<1	<1
Copper	90.3	4.65E+01	1.15E+01	1.33E+00	6.17E+00	5.00E+00	4.05E+00	1.21E+01	1	<1
Lead	307.1	8.18E+01	6.59E+00	4.51E+00	1.07E+01	1.01E+01	1.63E+00	3.26E+00	**6**	**3**
Zinc	124.5	4.16E+02	6.99E+01	1.83E+00	5.49E+01	3.78E+01	6.61E+01	1.71E+02	<1	<1
LMW PAH	8.9	2.71E+01	2.70E+00	1.31E-01	3.55E+00	2.45E+00	5.62E+03	5.62E+04	<1	<1
HMW PAH	29.4	7.64E+01	4.48E+00	4.32E-01	1.00E+01	6.95E+00	2.00E+00	2.00E+01	**3**	<1
Total PCBs	0.0296	3.40E-02	1.66E-04	4.35E-04	4.43E-03	3.24E-03	1.80E-01	1.80E+00	<1	<1
Former Dump Area (DU 17, DU 18, DU19)										
Antimony	6.7	6.70E+00	2.35E-01	9.85E-02	8.75E-01	6.49E-01	NA	NA	--	--
Cadmium	11.2	5.65E+01	2.32E+00	1.65E-01	7.38E+00	5.03E+00	1.47E+00	6.35E+00	**3**	<1
Chromium	81.9	2.51E+01	3.36E+00	1.20E+00	3.30E+00	3.00E+00	2.66E+00	1.56E+01	1	<1
Copper	1538	7.92E+02	3.51E+01	2.26E+01	1.03E+02	8.41E+01	4.05E+00	1.21E+01	**21**	**7**
Lead	1825	3.44E+02	1.79E+01	2.68E+01	4.50E+01	4.79E+01	1.63E+00	3.26E+00	**29**	**15**
Mercury	1.7	5.37E-01	4.93E-01	2.50E-02	7.48E-02	6.65E-02	4.50E-01	9.00E-01	<1	<1
Selenium	0.81	7.95E-01	4.03E-01	1.19E-02	1.07E-01	7.96E-02	2.90E-01	5.79E-01	<1	<1
Zinc	3413	1.23E+03	4.38E+02	5.02E+01	1.65E+02	1.43E+02	6.61E+01	1.71E+02	**2**	<1
LMW PAH	1.79	5.44E+00	1.30E+00	2.63E-02	7.21E-01	4.98E-01	5.62E+03	5.62E+04	<1	<1
HMW PAH	9.85	2.56E+01	1.59E+00	1.45E-01	3.35E+00	2.33E+00	2.00E+00	2.00E+01	1	<1
Total PCBs	0.15	3.10E-01	8.41E-04	2.21E-03	4.03E-02	2.84E-02	1.80E-01	1.80E+00	<1	<1

Notes:
C_{plant} = Concentration in plant
C_{invert} = Concentration in invert
COPEC = Constituent of potential ecological concern
EPC = Exposure point concentration
HQ = Hazard quotient
LOAEL = Lowest observed adverse effects level
mg/kg bw-day = Milligram(s) per kilogram of body weight per day
NA/-- = TRV not available
NOAEL = No observed adverse effects level
PAH = Polycyclic aromatic hydrocarbon
PCB = Polychlorniated biphenyl
TRV = Toxicity reference value
HQs > 1 are bold

Table G-3. Food Web Model for Short-Tailed Shrew

Food Ingestion rate (kg dry wt/kg bw-d)	0.099
Soil ingestion rate (%)	3
Soil ingestion rate (kg/kg bw-d)	0.00297
Diet - invert (%)	0.78
Diet -plant (%)	0.17
Diet - sm mammal (%)	0.05

COPEC	Soil EPC (mg/kg)	C_{plant} (mg/kg dry wt)	C_{mammal} (mg/kg dry wt)	C_{invert} (mg/kg dry wt)	Dose from Soil (mg/kg bw-day)	Dose from Food (mg/kg bw-day)	Total Dose (mg/kg-bw day)	TRV_{NOAEL} (mg/kg bw-day)	TRV_{LOAEL} (mg/kg bw-day)	HQ_{NOAEL}	HQ_{LOAEL}
Iona Island											
Antimony	1.04	4.09E-02	5.20E-02	1.04E+00	3.09E-03	8.13E-02	8.43E-02	5.90E-02	5.90E-01	1	<1
Arsenic	16.1	6.04E-01	7.64E-02	1.72E+00	4.78E-02	1.43E-01	1.91E-01	1.04E+00	1.66E+00	<1	<1
Cadmium	0.42	3.87E-01	1.89E-01	4.16E+00	1.25E-03	3.28E-01	3.30E-01	7.70E-01	7.70E+00	<1	<1
Copper	90.3	1.15E+01	1.48E+01	4.65E+01	2.68E-01	3.86E+00	4.13E+00	5.60E+00	9.34E+00	<1	<1
Lead	307.1	6.59E+00	1.36E+01	8.18E+01	9.12E-01	6.49E+00	7.40E+00	4.70E+00	8.90E+00	**2**	<1
Zinc	124.5	6.99E+01	1.10E+02	4.16E+02	3.70E-01	3.39E+01	3.42E+01	7.54E+01	2.98E+02	<1	<1
HMW PAH	29.4	4.48E+00	0.00E+00	7.64E+01	8.73E-02	5.98E+00	6.07E+00	6.15E-01	3.16E+01	**10**	<1
Former Dump Area (DU 17, DU 18, DU19)											
Antimony	6.7	2.35E-01	3.35E-01	6.70E+00	1.99E-02	5.23E-01	5.43E-01	5.90E-02	5.90E-01	**9**	<1
Cadmium	11.2	2.32E+00	8.90E-01	5.65E+01	3.33E-02	4.41E+00	4.44E+00	7.70E-01	7.70E+00	**6**	<1
Chromium	81.9	3.36E+00	5.89E+00	2.51E+01	2.43E-01	2.02E+00	2.26E+00	2.40E+00	5.82E+01	<1	<1
Copper	1538	3.51E+01	2.22E+01	7.92E+02	4.57E+00	6.19E+01	6.64E+01	5.60E+00	9.34E+00	**12**	**7**
Lead	1825	1.79E+01	2.99E+01	3.44E+02	5.42E+00	2.70E+01	3.25E+01	4.70E+00	8.90E+00	**7**	**4**
Mercury	1.7	4.93E-01	3.26E-01	5.37E-01	5.05E-03	5.14E-02	5.64E-02	1.32E+01	1.32E+02	<1	<1
Selenium	0.81	4.03E-01	6.10E-01	7.95E-01	2.41E-03	7.12E-02	7.36E-02	1.43E-01	2.15E-01	<1	<1
Thallium	0.3	1.20E-03	3.68E-02	3.00E-01	8.91E-04	2.34E-02	2.43E-02	7.40E-03	7.40E-02	**3**	<1
Zinc	3413	4.38E+02	1.39E+02	1.23E+03	1.01E+01	1.03E+02	1.13E+02	7.54E+01	2.98E+02	**2**	<1
HMW PAH	9.85	1.59E+00	0.00E+00	2.56E+01	2.93E-02	2.00E+00	2.03E+00	6.15E-01	3.16E+01	**3**	<1
Total PCBs	0.15	8.41E-04	1.26E-01	3.10E-01	4.46E-04	2.46E-02	2.50E-02	6.80E-02	6.80E-01	<1	<1

Notes:
C_{plant} = Concentration in plant
C_{invert} = Concentration in invert
C_{mammal} = Concentration in mammal
COPEC = Constituent of potential ecological concern
EPC = Exposure point concentration
HQ = Hazard quotient
LOAEL = Lowest observed adverse effects level
mg/kg bw-day = Milligram(s) per kilogram of body weight per day
NOAEL = No observed adverse effects level
PAH = Polycyclic aromatic hydrocarbon
PCB = Polychlorinated biphenyl
TRV = Toxicity reference value
HQs > 1 are bold

Table G-4. Food Web Model for Red Fox

Food Ingestion rate (kg dry wt/kg bw-d)	0.045
Soil ingestion rate (%)	2.8
Soil ingestion rate (kg/kg bw-d)	0.00126
Diet - sm mammal (%)	1

COPEC	EPC (mg/kg)	C_{mammal} (mg/kg dry wt)	Dose from Soil (mg/kg bw-day)	Dose from Food (mg/kg bw-day)	Total Dose (mg/kg-bw day)	TRV_{NOAEL} (mg/kg bw-day)	TRV_{LOAEL} (mg/kg bw-day)	HQ_{NOAEL}	HQ_{LOAEL}
Iona Island									
Antimony	1.04	5.20E-02	1.31E-03	2.34E-03	3.65E-03	5.90E-02	5.90E-01	<1	<1
Arsenic	16.1	7.64E-02	2.03E-02	3.44E-03	2.37E-02	1.04E+00	1.66E+00	<1	<1
Cadmium	0.42	1.89E-01	5.29E-04	8.50E-03	9.03E-03	7.70E-01	7.70E+00	<1	<1
Copper	90.3	1.48E+01	1.14E-01	6.64E-01	7.78E-01	5.60E+00	9.34E+00	<1	<1
Lead	307.1	1.36E+01	3.87E-01	6.11E-01	9.98E-01	4.70E+00	8.90E+00	<1	<1
Zinc	124.5	1.10E+02	1.57E-01	4.97E+00	5.12E+00	7.54E+01	2.98E+02	<1	<1
HMW PAH	29.4	0.00E+00	3.70E-02	0.00E+00	3.70E-02	6.15E-01	3.16E+01	<1	<1
Former Dump Area (DU 17, DU 18, DU19)									
Antimony	6.7	3.35E-01	8.44E-03	1.51E-02	2.35E-02	5.90E-02	5.90E-01	<1	<1
Cadmium	11.2	8.90E-01	1.41E-02	4.01E-02	5.42E-02	7.70E-01	7.70E+00	<1	<1
Chromium	81.9	5.89E+00	1.03E-01	2.65E-01	3.68E-01	2.40E+00	5.82E+01	<1	<1
Copper	1538	2.22E+01	1.94E+00	1.00E+00	2.94E+00	5.60E+00	9.34E+00	<1	<1
Lead	1825	2.99E+01	2.30E+00	1.34E+00	3.64E+00	4.70E+00	8.90E+00	<1	<1
Mercury	1.7	3.26E-01	2.14E-03	1.47E-02	1.68E-02	1.32E+01	1.32E+02	<1	<1
Selenium	0.81	6.10E-01	1.02E-03	2.74E-02	2.84E-02	1.43E-01	2.15E-01	<1	<1
Thallium	0.3	3.68E-02	3.78E-04	1.66E-03	2.03E-03	7.40E-03	7.40E-02	<1	<1
Zinc	3413	1.39E+02	4.30E+00	6.27E+00	1.06E+01	7.54E+01	2.98E+02	<1	<1
HMW PAH	9.85	0.00E+00	1.24E-02	0.00E+00	1.24E-02	6.15E-01	3.16E+01	<1	<1
Total PCBs	0.15	1.26E-01	1.89E-04	5.67E-03	5.85E-03	6.80E-02	6.80E-01	<1	<1

Notes:
C_{mammal} = Concentration in mammals
COPEC = Constituent of potential ecological concern
EPC = Exposure point concentration
HMW = High molecular weight
HQ = Hazard quotient
LOAEL = Lowest observed adverse effects level
mg/kg = Milligram(s) per kilogram
mg/kg bw-day = Milligram(s) per kilogram of body weight per day
NOAEL = No observed adverse effects level
PAH = Polycyclic aromatic hydrocarbon
TRV = Toxicity reference value
HQs >1 are bold

Table G-5. Food Web Model for Red-tailed Hawk

Food Ingestion rate (kg dry wt/kg bw-d)	0.032
Soil ingestion rate (%)	5.7
Soil ingestion rate (kg/kg bw-d)	0.001824
Diet - sm mammal (%)	1

COPEC	Soil EPC (mg/kg)	C_{mammal} (mg/kg dry wt)	Dose from Soil (mg/kg bw-day)	Dose from Food (mg/kg bw-day)	Total Dose (mg/kg-bw day)	TRV_{NOAEL} (mg/kg bw-day)	TRV_{LOAEL} (mg/kg bw-day)	HQ_{NOAEL}	HQ_{LOAEL}
Iona Island									
Antimony	1.04	5.20E-02	1.90E-03	1.66E-03	3.56E-03	NA	NA	--	--
Arsenic	16.1	7.64E-02	2.94E-02	2.44E-03	3.18E-02	2.24E+00	4.51E+00	<1	<1
Cadmium	0.42	1.89E-01	7.66E-04	6.04E-03	6.81E-03	1.47E+00	6.35E+00	<1	<1
Copper	90.3	1.48E+01	1.65E-01	4.72E-01	6.37E-01	4.05E+00	1.21E+01	<1	<1
Lead	307.1	1.36E+01	5.60E-01	4.35E-01	9.95E-01	1.63E+00	3.26E+00	<1	<1
Zinc	124.5	1.10E+02	2.27E-01	3.53E+00	3.76E+00	6.61E+01	1.71E+02	<1	<1
LMW PAH	8.9	0.00E+00	1.62E-02	0.00E+00	1.62E-02	5.62E+03	5.62E+04	<1	<1
HMW PAH	29.4	0.00E+00	5.36E-02	0.00E+00	5.36E-02	2.00E+00	2.00E+01	<1	<1
Total PCBs	0.0296	1.26E-01	5.40E-05	4.03E-03	4.08E-03	1.80E-01	1.80E+00	<1	<1
Former Dump Area (DU 17, DU 18, DU19)									
Antimony	6.7	3.35E-01	1.22E-02	1.07E-02	2.29E-02	NA	NA	--	--
Cadmium	11.2	8.90E-01	2.04E-02	2.85E-02	4.89E-02	1.47E+00	6.35E+00	<1	<1
Chromium	81.9	5.89E+00	1.49E-01	1.88E-01	3.38E-01	2.66E+00	1.56E+01	<1	<1
Copper	1538	2.22E+01	2.81E+00	7.12E-01	3.52E+00	4.05E+00	1.21E+01	<1	<1
Lead	1825	2.99E+01	3.33E+00	9.56E-01	4.28E+00	1.63E+00	3.26E+00	**3**	1
Mercury	1.7	3.26E-01	3.10E-03	1.04E-02	1.35E-02	4.50E-01	9.00E-01	<1	<1
Selenium	0.81	6.10E-01	1.48E-03	1.95E-02	2.10E-02	2.90E-01	5.79E-01	<1	<1
Zinc	3413	1.39E+02	6.23E+00	4.46E+00	1.07E+01	6.61E+01	1.71E+02	<1	<1
LMW PAH	1.79	0.00E+00	3.26E-03	0.00E+00	3.26E-03	5.62E+03	5.62E+04	<1	<1
HMW PAH	9.85	0.00E+00	1.80E-02	0.00E+00	1.80E-02	2.00E+00	2.00E+01	<1	<1
Total PCBs	0.15	1.26E-01	2.74E-04	4.03E-03	4.30E-03	1.80E-01	1.80E+00	<1	<1

Notes:
C_{mammal} = Concentration in mammal
COPEC = Constituent of potential ecological concern
EPC = Exposure point concentration
HQ = Hazard quotient
LOAEL = Lowest observed adverse effects level
mg/kg bw-day = Milligram(s) per kilogram of body weight per day
NA/-- = TRV not available
NOAEL = No observed adverse effects level
PAH = Polycyclic aromatic hydrocarbon
PCB = Polychlorinated biphenyl
TRV = Toxicity reference value
HQs > 1 are bold

Table G-6. Food Web Model for Mallard Duck

MALLARD DUCK (HERBIVOROUS BIRD)		
Body Weight	1.134	kg
Food Ingestion Rate	0.049	kg dry wt./kg-day
Incidental Soil Ingestion Rate	3.30%	% of total mass of diet
Incidental Soil Ingestion Rate	0.002	kg dry wt./kg-day
Habitat Range	1075	acres
Area use factor	0.0005	0.5/1075
Diet - veg	100	%

COPEC	Sediment EPC (mg/kg)	Plant EPC (mg/kg dry wt)	Dose (mg/kg bw-day) Sediment	Dose (mg/kg bw-day) Plant	Total Dose (mg/kg bw-day)	TRV_{NOAEL} (mg/kg bw-day)	TRV_{LOAEL} (mg/kg bw-day)	HQ_{NOAEL}	HQ_{LOAEL}
Iona Island Hudson River Shoreline									
Antimony	1.23E+02	3.60E+00	1.99E-01	1.76E-01	1.74E-04	NA	NA	--	--
Arsenic	3.62E+01	1.36E+00	5.85E-02	6.65E-02	5.81E-05	2.24E+00	4.51E+00	<1	<1
Cadmium	9.86E+00	2.17E+00	1.59E-02	1.06E-01	5.68E-05	1.47E+00	6.35E+00	<1	<1
Chromium	1.59E+02	6.52E+00	2.57E-01	3.19E-01	2.68E-04	2.66E+00	1.56E+01	<1	<1
Copper	1.01E+04	7.38E+01	1.63E+01	3.61E+00	9.27E-03	4.05E+00	1.21E+01	<1	<1
Lead	1.88E+04	6.62E+01	3.04E+01	3.24E+00	1.56E-02	1.63E+00	3.26E+00	<1	<1
Nickel	1.40E+02	4.36E+00	2.26E-01	2.14E-01	2.05E-04	6.71E+00	1.86E+01	<1	<1
Silver	2.73E+00	3.82E-02	4.41E-03	1.87E-03	2.92E-06	2.02E+00	2.02E+01	<1	<1
Zinc	3.93E+03	4.73E+02	6.35E+00	2.32E+01	1.37E-02	6.61E+01	1.71E+02	<1	<1
Tidal Wetland Swale									
Copper	6.01E+01	9.79E+00	9.71E-02	4.80E-01	2.68E-04	4.05E+00	1.21E+01	<1	<1
Lead	7.04E+01	2.88E+00	1.14E-01	1.41E-01	1.19E-04	1.63E+00	3.26E+00	<1	<1
Zinc	2.03E+02	9.17E+01	3.28E-01	4.49E+00	2.24E-03	6.61E+01	1.71E+02	<1	<1
Rip Rap Drainage Swale									
Cadmium	3.19E+00	1.17E+00	5.15E-03	5.74E-02	2.91E-05	1.47E+00	6.35E+00	<1	<1
Copper	7.70E+01	1.08E+01	1.24E-01	5.29E-01	3.04E-04	4.05E+00	1.21E+01	<1	<1
Lead	1.21E+02	3.91E+00	1.96E-01	1.91E-01	1.80E-04	1.63E+00	3.26E+00	<1	<1
Nickel	3.64E+01	1.59E+00	5.88E-02	7.80E-02	6.36E-05	6.71E+00	1.86E+01	<1	<1
Zinc	1.55E+03	2.83E+02	2.50E+00	1.38E+01	7.61E-03	6.61E+01	1.71E+02	<1	<1

Notes:
COPEC = Constistuent of potential ecological concern
EPC = Exposure point concentration
HQ = Hazard quotient
kg = Kilogram(s)
L = Liter(s)
LOAEL = Lowest observed adverse effects level
mg/kg bw-day = Milligram(s) per kilogram of body weight per day
NA/-- = TRV not available
NOAEL = No observed adverse effects level
TRV = Toxicity reference value
wt = Weight
Hazard quotients >1 are bold font

Table G-7. Food Web Model for Muskrat (Sediment Exposures along Shoreline)

MUSKRAT (HERBIVOROUS MAMMAL)		
Body Weight	1.17	kg
Food Ingestion Rate	0.045	kg dry wt./kg-day
Incidental Soil Ingestion Rate	2.00%	% of total mass of diet
Incidental Soil Ingestion Rate	0.0009	kg dry wt./kg-day
Habitat Range	0.33	acres
Diet - veg	100	%

0.0009

COPEC	Sediment EPC (mg/kg)	Plant EPC (mg/kg dry wt)	Dose (mg/kg bw-day) Sediment	Dose (mg/kg bw-day) Plant	Total Dose (mg/kg bw-day)	TRV_{NOAEL} (mg/kg bw-day)	TRV_{LOAEL} (mg/kg bw-day)	HQ_{NOAEL}	HQ_{LOAEL}
Iona Island Hudson River Shoreline									
Antimony	1.23E+02	3.60E+00	1.11E-01	1.62E-01	2.73E-01	5.90E-02	5.90E-01	**5**	**<1**
Arsenic	3.62E+01	1.36E+00	3.26E-02	6.11E-02	9.37E-02	1.04E+00	1.66E+00	<1	<1
Cadmium	9.86E+00	2.17E+00	8.87E-03	9.76E-02	1.07E-01	7.70E-01	7.70E+00	<1	<1
Chromium	1.59E+02	6.52E+00	1.43E-01	2.93E-01	4.36E-01	2.40E+00	5.82E+01	<1	<1
Copper	1.01E+04	7.38E+01	9.09E+00	3.32E+00	1.24E+01	5.60E+00	9.34E+00	**2**	**1**
Lead	1.88E+04	6.62E+01	1.69E+01	2.98E+00	1.99E+01	4.70E+00	8.90E+00	**4**	**2**
Nickel	1.40E+02	4.36E+00	1.26E-01	1.96E-01	3.22E-01	1.70E+00	3.40E+00	**<1**	<1
Silver	2.73E+00	3.82E-02	2.46E-03	1.72E-03	4.18E-03	6.02E+00	6.02E+01	<1	<1
Zinc	3.93E+03	4.73E+02	3.54E+00	2.13E+01	2.48E+01	7.54E+01	2.98E+02	<1	<1
Tidal Wetland Swale									
Copper	6.01E+01	9.79E+00	5.41E-02	4.41E-01	4.95E-01	5.60E+00	9.34E+00	<1	<1
Lead	7.04E+01	2.88E+00	6.34E-02	1.30E-01	1.93E-01	4.70E+00	8.90E+00	<1	<1
Zinc	2.03E+02	9.17E+01	1.83E-01	4.13E+00	4.31E+00	7.54E+01	2.98E+02	<1	<1
Rip Rap Drainage Swale									
Cadmium	3.19E+00	1.17E+00	2.87E-03	5.27E-02	5.56E-02	7.70E-01	7.70E+00	<1	<1
Copper	7.70E+01	1.08E+01	6.93E-02	4.86E-01	5.55E-01	5.60E+00	9.34E+00	<1	<1
Lead	1.21E+02	3.91E+00	1.09E-01	1.76E-01	2.85E-01	4.70E+00	8.90E+00	<1	<1
Nickel	3.64E+01	1.59E+00	3.28E-02	7.17E-02	1.04E-01	1.70E+00	3.40E+00	<1	<1
Zinc	1.55E+03	2.83E+02	1.40E+00	1.27E+01	1.41E+01	7.54E+01	2.98E+02	<1	<1

Notes:
COPEC = Constistuent of potential ecological concern
EPC = Exposure point concentration
HQ = Hazard quotient
kg = Kilogram(s)
L = Liter(s)
LOAEL = Lowest observed adverse effects level
mg/kg bw-day = Milligram(s) per kilogram of body weight per day
NA = Not available
NOAEL = No observed adverse effects level
TRV = Toxicity reference value
wt = Weight
Hazard quotients >1 are bold font

Table G-8. Food Web Model for Muskrat (Soil Exposures in Former Dump Area)

Soil Ingestion Rate (kg/kg bw-day)	0.001
Food Ingestion Rate (g/g-day)	0.045
Incidental Soil Ingestion Rate (%)	2
Diet - vegetation (%)	1

COPEC	EPC (mg/kg)	Dose from Soil (mg/kg bw-day)	C_{plant} (mg/kg dry wt)	Dose from Food (mg/kg bw-day)	Total Dose (mg/kg-bw day)	TRV_{NOAEL} (mg/kg bw-day)	TRV_{LOAEL} (mg/kg bw-day)	HQ_{NOAEL}	HQ_{LOAEL}
Antimony	6.70E+00	6.03E-03	2.35E-01	1.06E-02	1.66E-02	5.90E-02	5.90E-01	<1	<1
Arsenic	1.47E+01	1.32E-02	5.52E-01	2.48E-02	3.80E-02	1.04E+00	1.66E+00	<1	<1
Cadmium	1.12E+01	1.01E-02	2.32E+00	1.05E-01	1.15E-01	7.70E-01	7.70E+00	<1	<1
Chromium	8.19E+01	7.37E-02	3.36E+00	1.51E-01	2.25E-01	2.40E+00	5.82E+01	<1	<1
Copper	1.54E+03	1.38E+00	3.51E+01	1.58E+00	2.97E+00	5.60E+00	9.34E+00	<1	<1
Lead	1.83E+03	1.64E+00	1.79E+01	8.05E-01	2.45E+00	4.70E+00	8.90E+00	<1	<1
Mercury	1.70E+00	1.53E-03	4.93E-01	2.22E-02	2.37E-02	1.32E+01	1.32E+02	<1	<1
Nickel	3.30E+01	2.97E-02	1.48E+00	6.66E-02	9.63E-02	1.70E+00	3.40E+00	<1	<1
Selenium	8.10E-01	7.29E-04	4.03E-01	1.81E-02	1.88E-02	1.43E-01	2.15E-01	<1	<1
Thallium	3.00E-01	2.70E-04	1.20E-03	5.40E-05	3.24E-04	7.40E-03	7.40E-02	<1	<1
Zinc	3.41E+03	3.07E+00	4.38E+02	1.97E+01	2.28E+01	7.54E+01	2.98E+02	<1	<1
LMW PAH	1.79E+00	1.61E-03	3.48E-01	1.57E-02	1.73E-02	6.56E+01	3.67E+02	<1	<1
HMW PAH	9.85E+00	8.87E-03	1.59E+00	7.15E-02	8.04E-02	6.15E-01	3.16E+01	<1	<1
Total PCBs	1.50E-01	1.35E-04	8.41E-04	3.79E-05	1.73E-04	6.80E-02	6.80E-01	<1	<1

Notes:

BAF_{plant} = Bioaccumulation factor for plants

C_{plant} = Concentration in plant

COPEC = Constituent of potential ecological concern

EPC = Exposure point concentration

HQ = Hazard quotient

LOAEL = Lowest observed adverse effects level

mg/kg bw-day = Milligram(s) per kilogram of body weight per day

NOAEL = No observed adverse effects level

TRV = Toxicity reference value

HQs > 1 are bold

Table G-9. Food Web Model for Lesser Scaup

LESSER SCAUP (INSECTIVOROUS BIRD)		
Body Weight	0.815	kg
Food Ingestion Rate	0.0625	kg dry wt/kg-day
Incidental Sediment Ingestion Rate	2.00%	% of total mass of diet
Incidental Sediment Ingestion Rate	0.0013	kg dry wt/kg-day
Habitat Range	219	acres
Area use factor	0.0023	0.5/219
Diet - invertebrates	100	%

COPEC	Sediment EPC (mg/kg)	Invertebrate EPC (mg/kg dry wt)	Dose (mg/kg bw-day) Sediment	Dose (mg/kg bw-day) Invertebrate	Total Dose (mg/kg bw-day)	TRV_{NOAEL} (mg/kg bw-day)	TRV_{LOAEL} (mg/kg bw-day)	HQ_{NOAEL}	HQ_{LOAEL}
Iona Island Hudson River Shoreline									
Antimony	1.23E+02	6.63E+02	1.54E-01	4.14E+01	9.49E-02	NA	NA	--	--
Arsenic	3.62E+01	1.95E+02	4.53E-02	1.22E+01	2.79E-02	2.24E+00	4.51E+00	<1	<1
Cadmium	9.86E+00	2.01E+02	1.23E-02	1.25E+01	2.87E-02	1.47E+00	6.35E+00	<1	<1
Chromium	1.59E+02	3.71E+02	1.99E-01	2.32E+01	5.34E-02	2.66E+00	1.56E+01	<1	<1
Copper	1.01E+04	1.81E+04	1.26E+01	1.13E+03	2.62E+00	4.05E+00	1.21E+01	<1	<1
Lead	1.88E+04	7.09E+04	2.35E+01	4.43E+03	1.02E+01	1.63E+00	3.26E+00	**6**	**3**
Nickel	1.40E+02	7.54E+02	1.75E-01	4.72E+01	1.08E-01	6.71E+00	1.86E+01	<1	<1
Silver	2.73E+00	1.47E+01	3.41E-03	9.20E-01	2.11E-03	2.02E+00	2.02E+01	<1	<1
Zinc	3.93E+03	1.34E+04	4.91E+00	8.38E+02	1.93E+00	6.61E+01	1.71E+02	<1	<1
Tidal Wetland Swale									
Copper	6.01E+01	1.08E+02	7.51E-02	6.75E+00	1.56E-02	4.05E+00	1.21E+01	<1	<1
Lead	7.04E+01	2.66E+02	8.80E-02	1.66E+01	3.81E-02	1.63E+00	3.26E+00	<1	<1
Zinc	2.03E+02	6.93E+02	2.54E-01	4.33E+01	9.95E-02	6.61E+01	1.71E+02	<1	<1
Rip Rap Drainage Swale									
Cadmium	3.19E+00	6.49E+01	3.99E-03	4.06E+00	9.28E-03	1.47E+00	6.35E+00	<1	<1
Copper	7.70E+01	1.38E+02	9.63E-02	8.65E+00	2.00E-02	4.05E+00	1.21E+01	<1	<1
Lead	1.21E+02	4.56E+02	1.51E-01	2.85E+01	6.55E-02	1.63E+00	3.26E+00	<1	<1
Nickel	3.64E+01	1.96E+02	4.55E-02	1.23E+01	2.81E-02	6.71E+00	1.86E+01	<1	<1
Zinc	1.55E+03	5.29E+03	1.94E+00	3.31E+02	7.59E-01	6.61E+01	1.71E+02	<1	<1

Notes:
COPEC = Constistuent of potential ecological concern
EPC = Exposure point concentration
HQ = Hazard quotient
kg = Kilogram(s)
L = Liter(s)
LOAEL = Lowest observed adverse effects level
mg/kg bw-day = Milligram(s) per kilogram of body weight per day
NA = Not available
NOAEL = No observed adverse effects level
TRV = Toxicity reference value
wt = Weight
Hazard quotients >1 are bold font

Table G-10. Food Web Model for River Otter

RIVER OTTER (PISCIVOROUS MAMMAL)	Value	Unit
Body Weight	7.43	kg
Food Ingestion Rate	0.0481	kg dry wt/kg-day
Incidental Sediment Ingestion Rate	2.00%	% of total mass of diet
Incidental Sediment Ingestion Rate	0.00096	kg dry wt/kg-day
Habitat Range	859	acres
Area use factor	0.0006	0.5/859
Diet - fish	100	%

COPEC	Sediment EPC (mg/kg)	Fish EPC (mg/kg dry wt)	Dose (mg/kg bw-day) Sediment	Dose (mg/kg bw-day) Fish	Total Dose (mg/kg bw-day)	TRV_{NOAEL} (mg/kg bw-day)	TRV_{LOAEL} (mg/kg bw-day)	HQ_{NOAEL}	HQ_{LOAEL}
Iona Island Hudson River Shoreline									
Antimony	1.23E+02	1.55E-01	1.18E-01	7.44E-03	7.32E-05	5.90E-02	5.90E-01	<1	<1
Arsenic	3.62E+01	2.94E-01	3.48E-02	1.41E-02	2.85E-05	1.04E+00	1.66E+00	<1	<1
Cadmium	9.86E+00	Not detected in surface water, fish tissue concentration not calculated.	9.48E-03	0.00E+00	5.52E-06	7.70E-01	7.70E+00	<1	<1
Chromium	1.59E+02	5.32E-02	1.53E-01	2.56E-03	9.05E-05	2.40E+00	5.82E+01	<1	<1
Copper	1.01E+04	2.48E+01	9.71E+00	1.19E+00	6.35E-03	5.60E+00	9.34E+00	<1	<1
Lead	1.88E+04	1.62E-04	1.81E+01	7.77E-06	1.05E-02	4.70E+00	8.90E+00	<1	<1
Nickel	1.40E+02	1.81E-01	1.35E-01	8.72E-03	8.34E-05	1.70E+00	3.40E+00	<1	<1
Silver	2.73E+00	2.02E-01	2.62E-03	9.70E-03	7.17E-06	6.02E+00	6.02E+01	<1	<1
Zinc	3.93E+03	1.26E+02	3.78E+00	6.06E+00	5.73E-03	7.54E+01	2.98E+02	<1	<1
Tidal Wetland Swale									
Copper	6.01E+01	4.80E+00	5.78E-02	2.31E-01	1.68E-04	5.60E+00	9.34E+00	<1	<1
Lead	7.04E+01	Not detected in surface water, fish tissue concentration not calculated.	6.77E-02	0.00E+00	3.94E-05	4.70E+00	8.90E+00	<1	<1
Zinc	2.03E+02	4.02E+01	1.95E-01	1.93E+00	1.24E-03	7.54E+01	2.98E+02	<1	<1
Rip Rap Drainage Swale									
Cadmium	3.19E+00	Not detected in surface water, fish tissue concentration not calculated.	3.07E-03	0.00E+00	1.79E-06	7.70E-01	7.70E+00	<1	<1
Copper	7.70E+01	4.71E+00	7.40E-02	2.26E-01	1.75E-04	5.60E+00	9.34E+00	<1	<1
Lead	1.21E+02	Not detected in surface water, fish tissue concentration not calculated.	1.16E-01	0.00E+00	6.77E-05	4.70E+00	8.90E+00	<1	<1
Nickel	3.64E+01	1.88E-01	3.50E-02	9.02E-03	2.56E-05	1.70E+00	3.40E+00	<1	<1
Zinc	1.55E+03	Not detected in surface water, fish tissue concentration not calculated.	1.49E+00	0.00E+00	8.67E-04	7.54E+01	2.98E+02	<1	<1

Notes:
COPEC = Constistuent of potential ecological concern
EPC = Exposure point concentration
HQ = Hazard quotient
kg = Kilogram(s)
L = Liter(s)
LOAEL = Lowest observed adverse effects level
mg/kg bw-day = Milligram(s) per kilogram of body weight per day
NA = Not available
NOAEL = No observed adverse effects level
TRV = Toxicity reference value
wt = Weight
Hazard quotients >1 are bold font

Table G-11. Food Web Model for Great Blue Heron

GREAT BLUE HERON (PISCIVOROUS BIRD)		
Body Weight	2.229	kg
Food Ingestion Rate	0.0450	kg dry wt./kg-day
Food Ingestion Rate	0.18	kg wet wt./kg-day
Incidental Sediment Ingestion Rate	2.00%	% of total mass of diet
Incidental Sediment Ingestion Rate	0.0009	kg dry wt./kg-day
Habitat Range	11	acres
Area use factor	0.05	0.5/11
Diet - fish	100	%

COPEC	Sediment EPC (mg/kg)	Fish EPC (mg/kg dry wt)	Dose (mg/kg bw-day) Sediment	Dose (mg/kg bw-day) Fish	Total Dose (mg/kg bw-day)	TRV_{NOAEL} (mg/kg bw-day)	TRV_{LOAEL} (mg/kg bw-day)	HQ_{NOAEL}	HQ_{LOAEL}
Iona Island Hudson River Shoreline									
Antimony	1.23E+02	1.55E-01	1.11E-01	6.97E-03	5.35E-03	NA	NA	--	--
Arsenic	3.62E+01	2.94E-01	3.26E-02	1.32E-02	2.08E-03	2.24E+00	4.51E+00	<1	<1
Cadmium	9.86E+00	Not detected in surface water, fish tissue concentration not calculated.	8.87E-03	0.00E+00	4.03E-04	1.47E+00	6.35E+00	<1	<1
Chromium	1.59E+02	5.32E-02	1.43E-01	2.39E-03	6.61E-03	2.66E+00	1.56E+01	<1	<1
Copper	1.01E+04	2.48E+01	9.09E+00	1.12E+00	4.64E-01	4.05E+00	1.21E+01	<1	<1
Lead	1.88E+04	1.62E-04	1.69E+01	7.27E-06	7.69E-01	1.63E+00	3.26E+00	<1	<1
Nickel	1.40E+02	1.81E-01	1.26E-01	8.16E-03	6.10E-03	6.71E+00	1.86E+01	<1	<1
Silver	2.73E+00	2.02E-01	2.46E-03	9.08E-03	5.24E-04	2.02E+00	2.02E+01	<1	<1
Zinc	3.93E+03	1.26E+02	3.54E+00	5.67E+00	4.19E-01	6.61E+01	1.71E+02	<1	<1
Tidal Wetland Swale									
Copper	6.01E+01	4.80E+00	5.41E-02	2.16E-01	1.23E-02	4.05E+00	1.21E+01	<1	<1
Lead	7.04E+01	Not detected in surface water, fish tissue concentration not calculated.	6.34E-02	0.00E+00	2.88E-03	1.63E+00	3.26E+00	<1	<1
Zinc	2.03E+02	4.02E+01	1.83E-01	1.81E+00	9.04E-02	6.61E+01	1.71E+02	<1	<1
Rip Rap Drainage Swale									
Cadmium	3.19E+00	Not detected in surface water, fish tissue concentration not calculated.	2.87E-03	0.00E+00	1.31E-04	1.47E+00	6.35E+00	<1	<1
Copper	7.70E+01	4.71E+00	6.93E-02	2.12E-01	1.28E-02	4.05E+00	1.21E+01	<1	<1
Lead	1.21E+02	Not detected in surface water, fish tissue concentration not calculated.	1.09E-01	0.00E+00	4.95E-03	1.63E+00	3.26E+00	<1	<1
Nickel	3.64E+01	1.88E-01	3.28E-02	8.44E-03	1.87E-03	6.71E+00	1.86E+01	<1	<1
Zinc	1.55E+03	Not detected in surface water, fish tissue concentration not calculated.	1.40E+00	0.00E+00	6.34E-02	6.61E+01	1.71E+02	<1	<1

Notes:
COPEC = Constistuent of potential ecological concern
EPC = Exposure point concentration
HQ = Hazard quotient
kg = Kilogram(s)
L = Liter(s)
LOAEL = Lowest observed adverse effects level
mg/kg bw-day = Milligram(s) per kilogram of body weight per day
NA = Not available
NOAEL = No observed adverse effects level
TRV = Toxicity reference value
wt = Weight
Hazard quotients >1 are bold font

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