FINAL

Site Inspection Report for the Iona Island Naval Ammunition Depot

DERP FUDS Project Number: **C02NY074403**

Prepared Under: **Contract No. W912DY-04-D-0017**
Task Order No. 00170001

Prepared for:

U.S. Army Engineering and Support Center, Huntsville
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Huntsville, Alabama 35807

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The views, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentation

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ALION
SCIENCE AND TECHNOLOGY

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Roger Azar, P.E. Date
Alion Program Manager

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September 2008

CONTRACTOR STATEMENT OF AUTHORSHIP AND INDEPENDENT TECHNICAL REVIEW

Alion Science and Technology Corporation has prepared this Site Inspection Report for the Iona Island Naval Ammunition Depot, Formerly Used Defense Site (FUDS), Project No. C02NY074403. An independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in the project, as defined in the Programmatic Work Plan. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of assumptions; methods, procedures, and material used in analyses; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with existing Corps policy. In accordance with Corps requirements, significant authors to this report are presented below.

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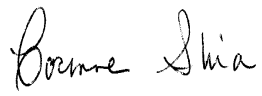
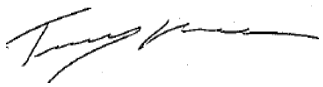
Corinne Shia Deputy Program Manager Alion Science and Technology Corporation	9-11-08	
Timothy Reese, P.E. Project Manager EA Engineering, Science, and Technology, Inc. (Under contract to Alion Science and Technology Corporation)	9-11-08	
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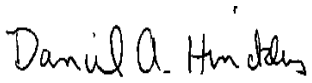
Daniel Hinckley, Ph.D. Risk Assessor EA Engineering, Science, and Technology, Inc. (Under contract to Alion Science and Technology Corporation)	9-11-08	
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Significant concerns and explanation of the resolutions are documented within the project file.

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LIST OF ACRONYMS AND ABBREVIATIONS

Alion	Alion Science and Technology Corporation
APHE	Armor-Piercing High Explosive
ASR	Archive Search Report
bgs	Below ground surface
CDQAR	Chemical Data Quality Assessment Report
CENAB	United States Army Corps of Engineers North Atlantic–Baltimore
CENAN	United States Army Corps of Engineers–New York District
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COPC	Chemical of Potential Concern
COPEC	Chemical of Potential Ecological Concern
CSM	Conceptual Site Model
CX	Center for Expertise
DERP	Defense Environmental Restoration Program
DMM	Discarded Military Munitions
DoA	Department of the Army
DoD	Department of Defense
DQI	Data Quality Indicator
DQO	Data Quality Objective
EA	EA Engineering, Science, and Technology, Inc.
EDS	Environmental Data Services
EOD	Explosive Ordnance Disposal
EPA	United States Environmental Protection Agency
ER	Engineer Regulation
FFAR	Folding Fin Aerial Rocket
FR	Federal Register
ft	Foot or Feet
FUDS	Formerly Used Defense Site(s)

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

GPL	General Physics Laboratory, LLL
GSA	General Services Administration
HQ	Hazard Quotient
HRS	Hazard Ranking System
HTRW	Hazardous, Toxic, and Radioactive Waste
in.	Inch(es)
INPR	Inventory Project Report
m	Meter(s)
MC	Munitions Constituent(s)
MD	Munitions Debris
MDL	Method Detection Limit
MEC	Munitions and Explosives of Concern
mg/kg	Milligram(s) per Kilogram
MMRP	Military Munitions Response Program
MPPEH	Material Potentially Presenting an Explosive Hazard
MRA	Munitions Response Area
MRS	Munitions Response Site
MRSPP	Munitions Response Site Prioritization Protocol
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NDAI	No Department of Defense Action Indicated
NRCS	Natural Resources Conservation Service
NTCRA	Non-Time Critical Removal Action
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OEW	Ordnance and Explosive Waste
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability
PIPC	Palisades Interstate Park Commission
PRG	Preliminary Remediation Goal

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

PWP	Programmatic Work Plan
QA/QC	Quality Assurance/Quality Control
QSM	Quality Services Manual
RAC	Risk Assessment Code
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
RI/FS	Remedial Investigation/Feasibility Study
RPD	Relative Percent Difference
SI	Site Inspection
SLERA	Screening-Level Ecological Risk Assessment
SS-WP	Site-Specific Work Plan Addendum
T&E	Threatened and Endangered
TCRA	Time Critical Removal Action
TNT	Trinitrotoluene
TPP	Technical Project Planning
USACE	United States Army Corps of Engineers
USAESCH	United States Army Engineering and Support Center, Huntsville
USC	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
UXO	Unexploded Ordnance

GLOSSARY OF TERMS

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)—Congress enacted CERCLA, commonly known as Superfund, on 11 December 1980. This law created a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment (United States Army Corps of Engineers [USACE] 2004a).

Cultural Debris—Debris found on operational ranges or munitions response sites, which may be removed to facilitate a range clearance or munitions response that is not related to munitions or range operations. Such debris includes, but is not limited to: rebar, household items (refrigerators, washing machines, etc.), automobile parts and automobiles that were not associated with range targets, fence posts, and fence wire (Department of the Army [DoA] 2005).

Discarded Military Munitions (DMM)—Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of, consistent with applicable environmental laws and regulations (10 United States Code [USC] 2710(e)(2)).

Explosive Ordnance Disposal (EOD)—The detection, identification, on-site evaluation, rendering safe, recovery, and final disposal of unexploded ordnance and of other munitions that have become an imposing danger, for example, by damage or deterioration (DoA 2005).

Explosives Safety—A condition where operational capability and readiness, people, property, and the environment are protected from the unacceptable effects or risks of potential mishaps involving military munitions (DoA 2005).

GLOSSARY OF TERMS

Formerly Used Defense Site (FUDS)— A FUDS is defined as a facility or site (property) that was under the jurisdiction of the Secretary of Defense and owned by, leased to, or otherwise possessed by the United States at the time of actions leading to contamination by hazardous substances. By the Department of Defense Environmental Restoration Program (DERP) policy, the FUDS program is limited to those real properties that were transferred from Department of Defense (DoD) control prior to 17 October 1986. FUDS properties can be located within the 50 States, District of Columbia, Territories, Commonwealths, and possessions of the United States (USACE 2004a).

Material Potentially Presenting an Explosive Hazard (MPPEH)—Material potentially containing explosives or munitions (e.g., munitions containers and packaging material; munitions debris remaining after munitions use, demilitarization, or disposal; and range-related debris); or material potentially containing a high enough concentration of explosives such that the material presents an explosive hazard (e.g., equipment, drainage systems, holding tanks, piping, or ventilation ducts that were associated with munitions production, demilitarization or disposal operations). Excluded from MPPEH are munitions within DoD's established munitions management system and other hazardous items that may present explosion hazards (e.g., gasoline cans, compressed gas cylinders) that are not munitions and are not intended for use as munitions (DoA 2005).

Military Munitions— All ammunition products and components produced for or used by the armed forces for national defense and security, including ammunition products or components under the control of the Department of Defense, the Coast Guard, the Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants; explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives, and chemical warfare agents; chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges; and devices and components thereof. The term does not include wholly inert items; improvised explosive devices; and nuclear weapons, nuclear devices, and nuclear components, other than non-nuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 USC 2011 et seq.) have been completed (10 USC 101(e)(4)(A) through (C)).

GLOSSARY OF TERMS

Munitions and Explosives of Concern (MEC)—This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks means: (A) Unexploded ordnance (UXO), as defined in 10 USC 101(e)(5); (B) DMM, as defined in 10 USC 2710(e)(2); or (C) Munitions constituents (e.g., Trinitrotoluene [TNT], Hexahydro-1,3,5-trinitro-1,3,5-triazine [RDX]), as defined in 10 USC 2710(e)(3), present in high enough concentrations to pose an explosive hazard.

Munitions Constituents (MC)—Any materials originating from UXO, DMM, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions (10 USC 2710(e)(3)).

Munitions Debris (MD)—Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal (USACE 2004b).

Munitions Response Area (MRA) — Any area on a defense site that is known or suspected to contain UXO, DMM, or MC. Examples include former ranges and munitions burial areas. A MRA is comprised of one or more munitions response sites (32 Code of Federal Regulations [CFR] 179.3).

Munitions Response Site (MRS) —A discrete location within an MRA that is known to require a munitions response (32 CFR 179.3).

Munitions Response Site Prioritization Protocol (MRSPP)—The MRSPP was published as a rule on 5 October 2005. This rule implements the requirement established in Section 311(b) of the National Defense Authorization Act for Fiscal Year 2002 for the DoD to assign a relative priority for munitions responses to each location in the DoD's inventory of defense sites known or suspected of containing UXO DMM, or MC. The DoD adopted the MRSPP under the authority of 10 USC 2710(b). Provisions of 10 USC 2710(b) require that the Department assign to each defense site in the inventory required by 10 USC 2710(a) a relative priority for response activities based on the overall conditions at each location and taking into consideration various factors related to safety and environmental hazards.

GLOSSARY OF TERMS

Non-Time Critical Removal Action (NTCRA)—Actions initiated in response to a release or threat of a release that poses a risk to human health or the environment where more than six months planning time is available (USACE 2000).

Risk Assessment Code (RAC)—An expression of the risk associated with a hazard. The RAC combines the hazard severity and accident probability into a single Arabic number on a scale from 1 to 5, with 1 being the greatest risk and 5 the lowest risk. The RAC is used to prioritize response actions (USACE 2004a).

Range—A designated land or water area that is set aside, managed, and used for range activities of the Department of Defense. The term includes firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas, electronic scoring sites, buffer zones with restricted access and exclusionary areas. The term also includes airspace areas designated for military use in accordance with regulations and procedures prescribed by the Administrator of the Federal Aviation Administration (10 USC 101(e)(1)(A) and (B)).

Range Activities—Research, development, testing, and evaluation of military munitions, other ordnance, and weapons systems; and the training of members of the armed forces in the use and handling of military munitions, other ordnance, and weapons systems (10 USC 101(e)(2)(A) and (B)).

Range-Related Debris—Debris, other than munitions debris, collected from operational ranges or from former ranges (e.g., target debris, military munitions packaging and crating material) (DoA 2005).

Time Critical Removal Action (TCRA)—Removal actions conducted to respond to an imminent danger posed by the release or threat of a release, where cleanup or stabilization actions must be initiated within six months to reduce risk to public health or the environment (USACE 2000).

Unexploded Ordnance (UXO)—Military munitions that (A) have been primed, fuzed, armed, or otherwise prepared for action; (B) have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and (C) remain unexploded whether by malfunction, design, or any other cause. (10 USC 101(e)(5)(A) through (C)).

EXECUTIVE SUMMARY

ES.1 Under contract with the United States Army Corps of Engineers (USACE), Alion Science and Technology Corporation (Alion) prepared the following Site Inspection (SI) Report to document SI activities and findings for the Iona Island Naval Ammunition Depot Formerly Used Defense Site (FUDS), Property No. C02NY0744. The Department of Defense (DoD) has established the Military Munitions Response Program (MMRP) under the Defense Environmental Restoration Program (DERP) to address potential munitions and explosives of concern (MEC) and munitions constituents (MC) remaining at FUDS. This SI is completed under Project No. C02NY074403 and addresses potential MMRP hazards remaining at the Iona Island Naval Ammunition Depot FUDS.

ES.2 **Site Inspection Objective and Scope.** The primary objective of the MMRP SI is to determine whether or not the FUDS project warrants further response action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The SI collects the minimum amount of information necessary to make this determination as well as it (i) determines the potential need for a removal action; (ii) collects or develops additional data, as appropriate, for potential Hazard Ranking System (HRS) scoring by the United States Environmental Protection Agency (EPA); and (iii) collects data, as appropriate, to characterize the hazardous substance release for effective and rapid initiation of the Remedial Investigation/Feasibility Study (RI/FS). An additional objective of the MMRP SI is to collect data necessary to evaluate Munitions Response Sites (MRSs) using the Munitions Response Site Prioritization Protocol (MRSPP).

ES.3 The scope of the SI is restricted to the evaluation of the presence of MEC or MC related to historical use of the FUDS prior to transfer. Potential releases of hazardous, toxic, and radioactive waste (HTRW) are not within the scope of the SI.

ES.4 **Iona Island Naval Ammunition Depot.** The former Iona Island Naval Ammunition Depot FUDS property consists of approximately 124.2 total acres of land and inland water. The former Iona Island Naval Ammunition Depot is located on Iona Island and Round Island in the Town of Stony Point, County of Rockland, New York. The United States Naval Department used the property from 1900 to 1947 as an ammunition depot. Currently, the FUDS property is part of the much larger Hudson River National Estuarine Research Reserve, Significant Coastal Fish and Wildlife Habitat Area, and a National Natural Landmark. The former Iona Island Naval Ammunition Depot, which includes Iona Island and Round Island, is under the administration of the Palisades Interstate Park Commission (PIPC). PIPC currently utilizes a portion of Iona

Island as a storage facility. The former Iona Island Naval Ammunition Depot also is used for various biological studies, including a 4-year plant study on the southern end of Round Island.

ES.5 **Technical Project Planning.** The SI approach was developed in concert with stakeholders through the USACE's Technical Project Planning (TPP) framework, which was applied at the initial TPP meeting held on 24 May 2007. Stakeholders agreed to the SI objectives and approach, as presented during the TPP meeting and as finalized in the Site-Specific Work Plan Addendum (SS-WP).

ES.6 USACE programmatic range documents identified one range at the Iona Island Naval Ammunition Depot, 1903 Explosion (C02NY074403M01). MRS 1 is identified as the 1903 Explosion, consisting of a 124.2-acre area with a radius of 1,250 feet.

ES.7 **Qualitative Site Reconnaissance and Munitions and Explosives of Concern Assessment.** SI field activities were performed on 4 December 2007. A qualitative site reconnaissance for MEC over approximately 14.9 acres of the FUDS was performed using visual observations and analog geophysics. The field sampling approach included a magnetometer-assisted reconnaissance following a meandering path around sampling locations to identify MEC, munitions debris (MD), or other areas of interest (e.g., areas containing possible firing points or other areas containing distressed vegetation related to range activities). Anomalies encountered during the reconnaissance were attributed to surface debris not related to material potentially presenting an explosive hazard (MPPEH), MEC, and/or MD.

ES.8 A qualitative MEC screening-level risk assessment was conducted based on the SI qualitative reconnaissance, as well as historical data documented in the Inventory Project Report (INPR), Archive Search Report (ASR), and the ASR Supplement results which are documented in Table ES-1. Historical documentation reviewed and interviews indicate that MEC and MD have been recovered in the past. A grenade was found and destroyed in the mid 1980's. Since the FUDS has been a park in 1965, other items found include fragments from a Folding Fin Aerial Rocket (FFAR) 3.5-inch (in.) rocket warhead, small arms cartridge cases, 6-pound projectile cartridge case, and a signal flare. Ordnance items have been found on the island over the years within the radius of the 1903 Explosion. The ordnance items can be found during low water tide at the northeastern edge of Round Island. No MEC or MD related to FUDS activities was found during the SI site visit. A "moderate" risk for MEC at MRS 1 was identified based on an assessment of three risk factors (i.e., presence of MEC source, accessibility or pathway presence, and potential receptor contact).

ES.9 **Munitions Constituents Sampling and Risk Screening**. A total of 23 surface soil samples (including five background samples) were collected using a 7-point wheel composite method. In addition, a total of five sediment samples (including three background samples) were collected. Samples were analyzed for specific Target Analyte List of metals and explosives. A list of MC potentially associated with munitions used at the FUDS was developed and used to support analysis of results and the risk screening. The following is a list of specific MC associated with the munitions at MRS 1 that were used for the risk screening:

1903 Explosion (MRS 1)

- Metals – antimony, copper, lead, mercury, nickel, iron, and zinc
  (Note: Iron was not analyzed per the approved Site Specific-Work Plan (SS-WP))

- Explosives – 2,4,6-trinitrotoluene; 2,4-dinitrotoluene; 2,6-dinitrotoluene; 2-amino-4,6-dinitrotoluene; 2-nitrotoluene; 3-nitrotoluene; 4-amino-2,6-dinitrotoluene; 4-nitrotoluene; methyl-2,4,6-trinitrophenyl nitramine; nitroglycerin.

ES.10 In support of this SI, a human health screening was completed. In addition, a Screening-Level Ecological Risk Assessment (SLERA) was required given that the former FUDS is located in an area regulated by the Coastal Zone Management Program, and contains habitat known to be used by designated Rare or Threatened and Endangered (T&E) species. Antimony, copper, and lead exceeded background and associated ecological screening criteria; therefore, these munition-related MC were identified as chemicals of potential ecological concern (COPECs) in surface soil. Lead exceeded background and its associated health screening criterion; therefore, lead was identified as a human health chemical of potential concern (COPC) in surface soil. Antimony, copper, lead, nickel, and zinc exceeded background concentrations and ecological screening criteria; therefore, these munition-related MC were identified as a COPECs in sediment. Antimony and lead exceeded background and the associated human health screening criterion and were identified as COPCs in sediment. Explosives were not detected above the applicable screening criteria in either medium.

ES.11 **Recommendations.** Based on the findings of this SI, a RI/FS is recommended. Additional studies should focus on both MEC (based on visual evidence of past MD finds within the 1903 explosion area which includes former pier areas) and MC (metal exceedances of human health, ecological, and background) for the Iona Island Naval Ammunition Depot (Table ES-1). Neither a time-critical removal action (TCRA) nor a non-time critical removal action (NTCRA) is recommended for MRS 1 at the Iona Island Naval Ammunition Depot FUDS. Historical

documents should be reviewed and possibly revised to account for the acreage of MRS 1 (1903 Explosion) that falls outside of the FUDS boundary. Additionally, background sample locations from this SI Report should be reviewed and new background samples further away from the FUDS but within the same geologic formation should be selected and agreed upon with NYSDEC.

Table ES-1 Summary of Site Recommendations for Iona Island Naval Ammunition Depot

Iona Island Naval Ammunition Depot (FUDS Project No. C02NY074403)

Iona and Round Island	Recommendation	Basis for Recommendation	
		MEC	**MC**
MRS 1 (1903 Explosion)	Remedial Investigation/ Feasibility Study Additional studies should focus on MEC and MC TCRA/NTCRA not recommended	MEC Assessment: Moderate Risk Past finds of MEC (grenade found and destroyed in mid-1980s) and MD on ground surface. Potential exists for both MEC and MD to remain based on 1903 Explosion. No MEC/MD findings during SI. Area presently is predominantly grass and / or wooded.	Risk Screening Assessment: Potential risk to humans and ecological receptors in both surface soil and sediment. ***Surface Soil*** – Lead exceeded background and its associated health screening criterion; therefore, lead was identified as a COPC. Antimony, copper, and lead exceeded background and associated ecological screening criteria; therefore, these munition-related MC were identified as COPECs. ***Sediment*** – Antimony (residential) and lead (industrial and residential) exceeded background and the associated human health screening criterion and were identified as COPCs. Antimony, copper, lead, nickel, and zinc exceeded background concentrations and ecological screening criteria; therefore, these munition-related MC were identified as a COPECs. ***Subsurface Soil*** – No sampling was completed in accordance with the Final SS-WP. ***Groundwater*** – No sampling was completed in accordance with the Final SS-WP. ***Surface Water–*** No sampling was completed in accordance with the Final SS-WP.
Recommendation:	Historical documents should be reviewed and possibly revised to account for the acreage of MRS 1 (1903 Explosion) that falls outside of the FUDS boundary. Additionally, background sample locations from this SI Report should be reviewed and new background samples further away from the FUDS in the same geologic formation should be selected and agreed upon with NYSDEC.		

FUDS – Formerly Used Defense Site
COPEC – Chemical of Potential Ecological Concern
MRS – Munitions Response Site
TCRA – Time-Critical Removal Action
NTCRA – Non-Time-Critical Removal Action
COPC – Chemical of Potential Concern
MEC – munitions and explosives of concern
MC – munitions constituents
MD – munitions debris
SS-WP – Site-Specific Work Plan Addendum

1. INTRODUCTION

1.0.1 This report documents the findings of the Military Munitions Response Program (MMRP) Site Inspection (SI) performed at the Iona Island Naval Ammunition Depot Formerly Used Defense Site (FUDS) located in the Town of Stony Point, County of Rockland, New York, and MMRP Project No. C02NY074403. Alion Science and Technology Corporation (Alion), along with its subcontractors EA Engineering, Science, and Technology, Inc. (EA), Environmental Data Services, Inc. (EDS), and General Physics Laboratory, LLLP (GPL), prepared this report under contract to the United States Army Engineering and Support Center Huntsville (USAESCH). This work is being performed in accordance with Contract No. W912DY-04-D-0017, Task Order 00170001 for FUDS in the Northeast Region of the Continental United States. USAESCH transferred management of the contract to the United States Army Corps of Engineers North Atlantic—Baltimore District (CENAB). CENAB is working with USAESCH and its contractor, Alion, on the completion of this project in accordance with the SI Performance Work Statement (Appendix A).

1.0.2 The technical approach to this SI is based on the *Programmatic Work Plan for Formerly Used Defense Sites (FUDS) Military Munitions Response Program (MMRP) Site Inspections at Multiple Sites in the Northeast Region* (PWP) (Alion 2005) and the *Final Site-Specific Work Plan Addendum to the MMRP Programmatic Work Plan for the Site Inspection of Iona Island Naval Ammunition Depot* (SS-WP) (Alion 2007a).

1.1 PROJECT AUTHORIZATION

1.1.1 The Department of Defense (DoD) has established the MMRP to address DoD sites suspected of containing munitions and explosives of concern (MEC) or munitions constituents (MC). Under the MMRP, the United States Army Corps of Engineers (USACE) is conducting environmental response activities at FUDS for the Army, DoD's Executive Agent for the FUDS program.

1.1.2 Pursuant to USACE's Engineer Regulation (ER) 200-3-1 (USACE 2004a) and the Management Guidance for the Defense Environmental Response Program (DERP) (Office of the Deputy Under Secretary of Defense [Installations and Environment], September 2001 [USACE 2001]), USACE is conducting FUDS response activities in accordance with the DERP statute (10 United States Code [USC] 2701 et seq.), the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (42 USC § 9601 et seq.), Executive Orders 12580 and 13016, and the National Oil and Hazardous Substances Pollution Contingency Plan

(NCP) (40 Code of Federal Regulations Part 300). As such, USACE is conducting the SI, as set forth in the NCP, to evaluate hazardous substance releases or threatened releases from eligible FUDS.

1.1.3 While not all MEC/MC constitute CERCLA hazardous substances, pollutants, or contaminants, the DERP statute provides DoD the authority to respond to releases of MEC/MC, and DoD policy states that such responses shall be conducted in accordance with CERCLA and the NCP.

1.2 PROJECT SCOPE AND OBJECTIVES

1.2.1 The primary objective of the MMRP SI is to determine whether or not the FUDS project warrants further response action under CERCLA. The SI collects the minimum amount of information necessary to make this determination as well as (i) determines the potential need for a removal action; (ii) collects or develops additional data, as appropriate, for potential Hazard Ranking System (HRS) scoring by the United States Environmental Protection Agency (EPA); and (iii) collects data, as appropriate, to characterize the hazardous substance release for effective and rapid initiation of the Remedial Investigation/Feasibility Study (RI/FS). An additional objective of the MMRP SI is to collect data necessary to evaluate Munitions Response Sites (MRSs) using the Munitions Response Site Prioritization Protocol (MRSPP).

1.2.2 The scope of the SI is restricted to the evaluation of the presence of MEC or MC related to historical use of this FUDS prior to transfer through records review, qualitative site reconnaissance to assess MEC presence/absence, and sampling where MC might be expected based on the conceptual site models (CSMs). Evaluation of potential releases of hazardous, toxic, and radioactive waste (HTRW) is not within the scope of this SI.

1.3 PROJECT LOCATION

1.3.1 The Iona Island Naval Ammunition Depot FUDS is comprised of 124.2 acres of land and inland water. The Iona Island Naval Ammunition Depot is located on Iona Island and Round Island within the area of Bear Mountain State Park in the Town of Stony Point, New York. Iona Island Naval Ammunition Depot is approximately 45 miles north of New York City and 7 miles south of West Point Military Academy on the western side of the Hudson River. The North American Datum 1983 Universal Transverse Mercator X and Y coordinates for the approximate center of the Iona Island Naval Ammunition Depot are 587760.03 and 4572863.25 meters (m), respectively. Iona Island Naval Ammunition Depot is under the geographical jurisdiction of

United States Army Corps of Engineers–New York District (CENAN) (USACE 1997). The SI for the former Iona Island Naval Ammunition Depot is being completed under DERP FUDS Project No. C02NY074403, to address potential MMRP hazards remaining at the FUDS.

1.4 MUNITIONS RESPONSE SITE PRIORITIZATION PROTOCOL

1.4.1 This SI Report includes draft MRSPP rankings that apply to the MRS identified in this report (Appendix K). The MRSPP scoring will be updated by USACE on an annual basis, as appropriate, to incorporate new information.

2. SITE DESCRIPTION

2.1 SITE DESCRIPTION AND OPERATIONAL HISTORY

2.1.1 The former Iona Island Naval Ammunition Depot is located on Iona Island and Round Island in the Town of Stony Point, County of Rockland, New York. United States Naval Department used the property from 1900 to 1947 as an ammunition depot. The former Iona Island Naval Ammunition Depot is under the administration of the Palisades Interstate Park Commission (PIPC). The staff of Bear Mountain State Park maintains the former Iona Island Naval Ammunition Depot. Currently, the FUDS property (approximately 99.2 land acres) is part of the much larger, Hudson River National Estuarine Research Reserve, Significant Coastal Fish and Wildlife Habitat Area, and a National Natural Landmark. The Hudson River National Estuarine Research Reserve is managed under the New York's Coastal Management Program (National Oceanic and Atmospheric Administration 2007).

2.1.2 Prior to use by the military, the 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 in 1900.

2.1.3 The United States purchased Iona Island from a brokerage company in 1899 (USACE 1997). In 1942, the Department of the Navy acquired the adjacent Round Island for ammunition storage (USACE 2004c). Records revealed discrepancies in the acreage; therefore, 120 acres is the average of these sources (USACE 2004c). 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 General Service Administration (GSA) utilized the former depot 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. The Maritime Administration also conducted occasional transshipments 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 Island (USACE 1997).

2.1.4 The Navy used the former Iona Island Naval Ammunition Depot as an ammunition depot for approximately 50 years from 1900 to 1947. According to historical records, activities included preparing, assembling, maintaining, inspecting, testing, and issuing ammunition. Range munitions included small arms, large caliber, aerial rocket (3.5-inch [in.] rocket aircraft Mk4,

Folding Fin Aerial Rocket (FFAR)), flares, signals, and simulators. In 1903, an explosion occurred between Shell Houses 3 and 4 (former Building Nos. 210 and 209, respectively) on Iona Island. Some of the contents of the explosion are thought to have included 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 include 1-pounders, 6-pounders, and 6-in. ammunition. According to the Archive Search Report (ASR) Supplement (USACE 2004c), other ordnance items found on the island over the years included a hand grenade, small arms cartridge cases, a 6-pound projectile cartridge case, a signal flare, and a fragment from a 3.5-in. rocket warhead (FFAR). In addition, an area referred to as a "dump site" located near the shoreline south of the former piers was reported to have visible munitions in the shallow near-shore sediments during low tide conditions. The "dump site" is located east of former Building Nos. 209 and 210 at the waters' edge near Round Island. Round Island, the southernmost portion of the depot, was also utilized by the Navy for ammunition storage. Structures were built on the FUDS during the period of DoD use. The historic FUDS layout is shown on Figure 2-1 (USACE 1997).

2.2 MUNITIONS RESPONSE SITE IDENTIFICATION AND MUNITIONS INFORMATION

2.2.1 USACE programmatic range document (including the ASR Supplement) identified one Area of Concern at the former Iona Island Naval Ammunition Depot FUDS, named 1903 Explosion (USACE 2004c). This Area of Concern is documented in Table 2-1 and shown in Figure 2-2. The MRS designation is applied to the identified Area of Concern as MRS 1-1903 Explosion-, a 124.2-acre area with a radius of 1,250 ft. The munitions associated with DoD use of MRS 1 are identified in the ASR and the ASR Supplement and are summarized in Table 2-2.

2.2.2 As Figure 2-2 indicates, MRS 1 includes the 1903 Explosion. Some of the acreage associated with MRS 1 extends beyond the FUDS boundary. According to DERP-FUDS policy, range lands within the FUDS boundary, along with tidal waters extending up to 100 yards from shore, during mean high tide, are eligible for evaluation under DERP-FUDS.

2.3 PHYSICAL SETTING

2.3.0.1 The following sections provide a physical description of the FUDS property with respect to relief, vegetation, and climate as well as the local demographic and land uses.

2.3.1 Topography and Vegetation

2.3.1.1 Iona Island Naval Ammunition Depot is located in the New England Upland section of the New England physiographic province. Iona Island has rock like terrain, with varying degrees of slopes. The bedrock of the New England Upland is folded, faulted, and includes metamorphosed sediments that have been intruded by numerous plutonic masses (USACE 1997).

2.3.1.2 The former Iona Island Naval Ammunition Depot lies on the west side of the Hudson River across from Peekskill, New York, approximately 45 miles upstream of the mouth of Hudson River. An open bay known as Doodletown Bight is located on the northern portion of Iona Island. The Hudson River flows west directly into the Hudson Bay. The area drains into the Hudson River through various creeks and by surface water drainage (USACE 1997). The groundwater is encountered at greater than 6 ft within the bedrock (USACE 1997). The majority of the aquifers are bounded by less permeable rock which limits aquifer width to a few thousand feet (USACE 1997).

2.3.1.3 The Hudson River at Iona Island is affected by semidiurnal tides which are two nearly equal high waters and two nearly equal low waters each 12.5 hours. During the Technical Project Planning (TPP) meeting, PIPC stated that shorelines may not be accessible during high tide, therefore, the Alion Team was informed that the proposed geophysical surveys should be scheduled during low tide conditions. (Alion 2007a).

2.3.1.4 Comprised predominately of rock, Iona Island has vegetation which is dominated by narrow leaf cattail with common reed and swamp rose mallow. Crack willow is present at the mouth of Doodletown Brook within the tidal swamp. The mainland slopes consist of deciduous forest with red oak, chestnut oak, and pignut hickory (The Encyclopedia of Earth 2007).

2.3.2 Climate

2.3.2.1 The climate in the study area is characterized by warm summers and severe winters. The climate primarily is continental and is subjected to some modification by the Atlantic Ocean. The data collected at Albany, New York shows an average annual precipitation from 2.27 to 3.62 in. per month throughout the year. Average annual temperature ranges from 11.0 to 84.0 degrees Fahrenheit per month throughout the year. The average wind direction is southerly. The highest mean monthly velocities of over 10 miles per hour occur in February, March, and April (USACE 1997). The ASR did not document the time frame when these data were collected.

2.3.3 Local Demographics

2.3.3.1 The Iona Island Naval Ammunition Depot FUDS boundary includes 99.2 acres of land located in the Town of Stony Point in the County of Rockland. The property is closed to the public. However, Iona Island currently is partially fenced and open on the Hudson River side of island. The main gate of the fenced portion of the FUDS is unmanned which provides limited access to Iona Island from Bear Mountain State Park. The population for Stony Point, New York is approximately 11,744 people with 3,991 households and 3,160 families residing in the town as stated in the 2000 census (United States Census Bureau 2000). The population density for Stony Point, New York is 2,134.8 people per square mile, while the population density for Rockland County is 1,648.4 people per square mile (United States Census Bureau 2000).

2.3.4 Current and Future Land Use

2.3.4.1 Currently, the former Iona Island Naval Ammunition Depot which includes Iona Island and Round Island, is under the administration of the PIPC. The staff of Bear Mountain State Park maintains the former Iona Island Naval Ammunition Depot. The State of New York planning document (Clarke and Rapuano, Inc. 1966) illustrates demolition and development plans for a recreational area. PIPC developed the demolition plans, however, the plans to develop the island into a recreational area 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 on-site. The plans also illustrate the fill area (believed to be building demolition debris) that currently provides access between Iona Island and Round Island. PIPC currently utilizes Iona Island as a storage facility. The FUDS is closed to the public. However, Iona Island is partially fenced and the main gate is unmanned which provides limited access to Iona Island from Bear Mountain State Park. The former Iona Island Naval Ammunition Depot is part of the Hudson River National Estuarine Research Reserve and Significant Coastal Fish and Wildlife Habitat Area. The former Iona Island Naval Ammunition Depot also is used for various biological studies, including a 4-year plant study on the southern end of Round Island. There are no current plans, as of 2007, to change the limited use of the former Iona Island Naval Ammunition Depot.

2.3.5 Geologic Setting

2.3.5.1 Iona Island Naval Ammunition Depot is located in the New England Upland section of the New England physiographic province. The bedrock of the New England Upland is folded, faulted, and includes metamorphosed sediments that have been intruded by numerous plutonic

masses. The surface of the New England Upland slopes southeastward from maximum inland altitudes around 2,200 ft to approximately 400-500 ft at its seaward edge. Numerous hills and mountains rise above the general level of the Upland. The shallow bedrock of Iona Island consists of a mixture of biotite and hornblende granitic gneiss. Iona Island primarily consists of Precambrian gneiss with outcrops that can be above 100 ft over the river. The elevation of the terrain of Iona Island ranges from 75 to 0 ft National Geodetic Vertical Datum (USACE 1997).

2.3.5.2 In descending order, the native soil of Iona Island consists of dark olive gray peat, dark grayish-brown gravelly, sandy silty clay; yellowish-brown, silty, sandy clay; or gravelly, sandy silty clay in areas. Some areas are wet consisting of meadows and marsh. The majority of the native soil on Iona Island has been filled, built on at one point in time, and/or paved. In areas at a depth of approximately 25 in. below ground surface (bgs), granite bedrock is encountered. Permeability of the soil is moderate and there is low water capacity availability (USACE 1997).

2.3.6 Hydrogeologic Setting

2.3.6.1 The former Iona Island Naval Ammunition Depot lies on the west side of the Hudson River (Figure 2-3) across from Peekskill, New York, approximately 45 miles upstream of the mouth of Hudson River. An open bay known as Doodletown Bight is located on the northern portion of Iona Island. The Hudson River flows primarily to the south and into the New York Bay. The former Iona Island Naval Ammunition Depot drains into the Hudson River through various creeks and by surface water drainage (USACE 1997). The groundwater is encountered at greater than 6 ft within the bedrock (USACE 1997). The majority of the aquifers are bounded by less permeable rock which limits aquifer width to a few thousand feet (USACE 1997).

2.3.6.2 The Hudson River at Iona Island is affected by semidiurnal tides which are two nearly equal high waters and two nearly equal low waters each 12.5 hours. (Alion 2007a).

2.3.7 Area Water Supply/Groundwater Use

2.3.7.1 There are no known current groundwater supply wells located on the Iona Island Naval Ammunition Depot. Groundwater in the glacial areas of the northeastern United States is found in hundreds of small aquifers that act as independent entities rather than one large aquifer. The local sand and gravel aquifers were deposited by glacial melt water and occur chiefly in valleys. The majority of the aquifers are bounded on the sides by less permeable bedrock which limits aquifer width to a few thousand feet (USACE 1997).

2.3.7.2 The New York State Department of Health (NYSDOH) was contacted by CENAN to determine wells and water supply systems within a 4-mile radius of the FUDS. NYSDOH was able to provide general information on the surrounding wells and source water assessment areas but specific information cannot be included in the SI Report due to NYSDOH confidentiality protocols. NYSDOH can be contacted for specific well information.

2.3.8 Sensitive Environments

2.3.8.0.1 The following subsections discuss the sensitive environments associated with the FUDS and the process used to determine the necessity for completing an ecological risk assessment at the FUDS.

2.3.8.1 Army Checklist for Important Ecological Places

2.3.8.1.1 In accordance with guidance from the USACE HTRW Center for Expertise (CX), the Army Checklist for Important Ecological Places is completed to determine if a FUDS may require a Screening-Level Ecological Risk Assessment (SLERA) (USACE 2006). The Iona Island Naval Ammunition Depot FUDS is located within the state of New York's Coastal Management Zone and contains habitat known to be used by designated Threatened and Endangered (T&E) species; therefore, the performance of a SLERA is required (USACE 2006). The SLERA checklist for the Iona Island Naval Ammunition Depot FUDS is included as Table 2-3.

2.3.8.2 Wetlands

2.3.8.2.1 Iona Island includes one of the largest tidal wetlands (270-acre tidal wetland) in the Hudson River. The tidal wetland includes freshwater and brackish water. Tidal creek channels and high gradient freshwater creeks are located on the island. Round Island surface drainage is toward the Hudson River. According to the National Wetlands Inventory (United States Fish and Wildlife Service [USFWS] 2006), there is a freshwater emergent wetland, as well as freshwater forested/scrub wetlands within areas of the islands. Wetlands areas are shown on Figure 2-4.

2.3.8.3 Coastal Zones

2.3.8.3.1 The Hudson River Estuarine Reserve is a network of coastal wetlands which includes the brackish wetlands of Iona Island and is managed under the New York's Coastal Management Program (National Oceanic and Atmospheric Administration 2007). SI field activities were completed in accordance with the SS-WP (Alion 2007a) and did not impact coastal zone resources adversely.

2.4 PREVIOUS INVESTIGATIONS FOR MUNITIONS CONSTITUENTS AND MUNITIONS AND EXPLOSIVES OF CONCERN

2.4.0.1 A summary of previous historical investigations and related discoveries of MC and MEC (if applicable) is provided in the following subsections.

2.4.1 Inventory Project Report

2.4.1.1 In 1995, CENAN prepared an Inventory Project Report (INPR) of the former Iona Island Naval Ammunition Depot. At that time, the Findings and Determination of Eligibility, dated 29 March 1993, concluded that the former Iona Island Naval Ammunition Depot located, on Iona Island, Stony Point, Rockland County, New York, had been utilized by the Navy as an ammunition depot. The Findings and Determination of Eligibility further concluded that there were eligible categories under the DERP-FUDS program, since the property was identified as an Ammunition Depot and the Department of Navy used the property in this capacity. An ordnance and explosives project was recommended, and DERP-FUDS Project No. C02NY074403 was assigned (USACE 1997).

2.4.1.2 In support of the INPR, USACE evaluated the property risk associated with the potential presence of MEC at the FUDS. A Risk Assessment Code (RAC) score of 3 was assigned to the FUDS. RAC scores are assigned indicating the level of MEC risk associated with the area. RAC scores range from 1, being the highest category of risk, to 5, being the lowest (USACE 2003). The RAC score was justified based on the possibility that ordnance explosive waste (OEW) could have been buried on site and accidentally dropped into the Hudson River during a loading operation at three loading docks at the FUDS (USACE 1997). An OEW[1] project investigation also was approved on 30 March 1995 for this property which determined the site to

[1] The project category addressing military munitions hazards termed OEW and defined under DERP-FUDS as ordnance and explosive waste has been replaced with the program terminology "military munitions response program" (MMRP). This document uses current terminology where applicable.

have been formerly used by the DoD and is, therefore, eligible for the DERP – FUDS established under 10 USC 2701 et seq. (USACE 1997). An electronic copy of the INPR is available in Appendix L.

2.4.2 Archive Search Report

2.4.2.1 In 1997, USACE Saint Louis District completed an ASR for the former Iona Naval Ammunition Depot FUDS. The ASR compiles information obtained through historical research at various archives and record-holding facilities, interviews with individuals associated with the FUDS, and site visits. The ASR contains descriptions of the FUDS, of the historical ordnance use and presence, and results of the visual SI. Historical records, real estate records, and aerial photographs were reviewed, although limited historical information was available for the FUDS. The ASR determined that ordnance associated with the former Iona Island Naval Ammunition Depot included small arms; projectiles, projectile fuzes, and propellant; grenades; rockets; bombs and bomb fuzes; pyrotechnics; bulk black powder; and high explosives. Fillers included high-explosive, incendiary, and smoke (USACE 1997).

2.4.2.2 Documentation and interviews indicated that ammunition was accidentally dropped into the river during loading operations. There was no documentation available indicating if these items were ever recovered. The ASR also stated that there was no indication that MEC were buried on-site. However, ammunition has been seen in the river near the old "dump site" on Round Island. The ASR states that "documents did not indicate the use of any chemical warfare material during this period" (USACE 1997).

2.4.2.3 Personnel from the USACE Saint Louis District conducted a site visit at the former Iona Island Naval Ammunition Depot on 21 October 1997, as part of the ASR, and inspected the FUDS (USACE 1997). During the site visit, one 20-millimeter practice casing was found in the location of the ordnance dump. This item was an inert casing identified by holes drilled into the case. Ordnance items were found lying in a pile at the Trail Side Museum once the PIPC had taken possession. The USACE Saint Louis District recommended contacting the United States Army Explosive Ordnance Disposal (EOD) Detachment at Fort Monmouth, New Jersey. The EOD unit determined the items were empty and free of explosives. There was a collection of munitions debris that was found on the island stored in the sign shop (was located on Iona Island during the time of the site visit) which were expended and had no visible explosive residue. These items included a small arms cartridge cases, 6-pound projectile cartridge case, signal flare, and a fragment from a 3.5-in. rocket warhead (FFAR) (USACE 1997). An electronic copy of the ASR is provided in Appendix L.

2.4.3 Archive Search Report Supplement

2.4.3.1 In 2004, the USACE Saint Louis District prepared an ASR Supplement for the former Iona Island Naval Ammunition Depot. The ASR Supplement assessed the acreage for ranges; identified munitions used, and assigned a RAC. The ASR Supplement identified one range at the former Iona Island Naval Ammunition Depot, the 1903 Explosion (Restoration Management Information System Range Identification C02NY074403M01) consisting of 124.2 acres[2] (USACE 2004c).

2.4.3.2 The ASR Supplement assigned RAC scores of 3 to the Iona Island Naval Ammunition Depot. RAC scores are assigned to sites, indicating the level of MEC risk associated with the area. RAC scores range from 1, being the highest category of risk, to 5, being the lowest (USACE 2003). Figure 2-2 shows the 1903 Explosion Area. An electronic copy of the 2004 ASR Supplement is provided in Appendix L.

2.5 CITIZEN REPORTS OF MUNITIONS AND EXPLOSIVES OF CONCERN

2.5.1 Reports of the presence of munitions debris (MD) were noted in the ASR, as USACE team members found evidence of the following items at the FUDS. The items listed below were inspected and found to be either expended or empty (USACE 1997).

- 1-pounder Cartridge Case
- 1-pounder Projectile
- 6-pounder Cartridge Case
- 6-Pounder Projectile
- 6-in. Projectile
- 8-in. Projectile, Armor-Piercing High Explosive (APHE)
- 12-in. Projectile, APHE
- 13-in. Projectile, SHOT
- 16-in. Projectile, APHE
- 10-in. Cannon Ball, Shot
- 3.5-in. Rocket Head (FFAR)
- Ship's Emergency Identification Signal, Mk 3, Smoke (expended)
- Cartridge Case, 20mm (Inert, holes present in case)

[2] The range complex was calculated to extend in a 1,250-ft radius circle extending from the target center and includes 99.2 acres of land and 25 acres of inland water (USACE 2004c).

- Cartridge Case Specifications
- Small Arms, General.

2.5.2 Munitions debris has been found on Iona Island over the years; and during low tide, items can be found at the waters' edge near Round Island on the northeastern edge of (USACE 2004c). *Note: As discussed in Section 4.2.1.1, no MD or MEC was observed during the SI field visit on 4 December 2007 on the FUDS or near the shoreline.* The ASR and ASR Supplement states that there have been reports of live ordnance (MEC) being found at the FUDS (USACE 1997 and 2004c) but none can be substantiated.

2.6 NON-DEPARTMENT OF DEFENSE CONTAMINATION/REGULATORY STATUS

2.6.1 There is no evidence, based on historical review and stakeholder comments, that activities occurring prior to or after DoD use of the land contributed to present day MEC/MD and MC findings. The FUDS has remained undeveloped since its transfer from DoD ownership. PIPC developed demolition plans, 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 on-site. The plans also illustrate the fill area (believed to be building demolition debris) that currently provides access between Iona Island and Round Island.

Table 2-1. Range Inventory (USACE 2004b)

Iona Island Naval Ammunition Depot

Site Name	Range Name[1]	Subrange Name	RMIS Range Number	RAC Score	Acreage
Iona Island Naval Ammunition Depot	1903 Explosion (MRS 1)	NA	C02NY074403M01	3	124.2[2]

MRS = Munitions Response Site

RMIS = Restoration Management Information System

RAC = Risk Assessment Code. Scores range from 1 to 5, with 1 being of the greatest concern.

NA = Not applicable

1 – MRS designation completed by USACE.

2 – Includes approximate land and water acreage established as a 1,250 ft radius around the 1903 explosion (USACE 2004).

3 – Approximately 99.2 acres of land and 25 acres of inland water within the 1,250 ft radius (1903 Explosion) which includes a portion of the area outside of the FUDS Boundary as well as inside a portion of the FUDS boundary.

4 – The ASR Supplement identified the site land and inland water acreage as 99.2 and 25, respectively (USACE 2004).

Table 2-2. Military Munitions Type and Composition (USACE 1997 and 2004c)

Iona Island Naval Ammunition Depot

Range Identification (MRS)	Munitions Identification	Munitions Type	Composition (explosives and metallic components)	Associated MC Analysis[1]
1903 Explosion (MRS1)	Small Arms (CTT01), Small Arms Complete Rounds (CTT02)	General Small Arms	Projectile: lead, antimony, copper, nickel, and zinc Propellant: Black Powder (sodium nitrate, potassium nitrate, potassium chlorate, charcoal, and sulfur), Nitrocellulose[3], Nitroglycerin	*MC from the projectile as well as from the propellant will be analyzed due the scattering effects from the 1903 explosion.* Explosives: • Nitroglycerin Metals: • Antimony • Copper • Lead • Nickel • Zinc
	Large caliber (37-millimeter and larger), High Explosive (CTT18)	6-pounder 12-inch, AP, Mk 15 16-inch, AP, Mk 5 6-inch, Mk 27 6-inch, Mk 35 13-inch AP & Target 1-pounder 8-inch, AP, Mk 21 Civil War, 10-inch, Smoothbore Shot	Projectile: Explosive D: (ammonium picrate)[4] Primer: mercury fulminate Booster: Tetryl Propelling Charge: Trinitrotoluene (TNT), Dinitrotoluene (DNT), Antimony Sulfide, Lead Thiocyanate, Black Powder	*MC from the projectile, primer, booster as well as from the propellant will be analyzed due the scattering effects from the 1903 explosion.* Explosives: • Tetryl • TNT[6] • DNT[2] Metals: • Mercury • Antimony • Lead
	Aerial Rockets (Live) (CTT26)	3.5-inch, Rocket, Aircraft, Mk 4 [Folding Fin Aerial Rocket (FFRA)]	Projectile/Warhead: TNT, Nitroglycerin Motor: black powder 8.5 lb ballistite	*MC from the projectile, as well as from the propellant/motor will be analyzed due the scattering effects from the 1903 explosion.* Explosives: • TNT[6] • Nitroglycerin Metals: • Iron Other:

Table 2-2. Military Munitions Type and Composition (USACE 1997 and 2004c)

Iona Island Naval Ammunition Depot

Range Identification (MRS)	Munitions Identification	Munitions Type	Composition (explosives and metallic components)	Associated MC Analysis[1]
				Diphenylamine (stabilizer - no analysis)
	Flares, Signals, Simulators or Screening Smoke (other than White Phosphorous) (CTT35)	Mk 3, Ship Signal	Propelling Charge: Smokeless Powder (Nitrocellulose; Diphenylamine [stabilizer]) Ejection Charge: Black Powder Signal Color (5 second burn): Red (potassium perchlorate[5]); black; green; yellow	*No MC can be analyzed from these munitions.* Explosives: • None Metals: • None

1. Based on available technical manuals, munitions constituents identified for site munitions include the following: **Primer** (potassium chlorate, lead thiocyanate, antimony sulfide, pentaerythritol tetranitrate, lead styphnate, barium nitrate, calcium silicade, acacia technical, acetylene black; **Fuze** (mercury fulminate, lead azide, tetryl, lead styphnate); **Tracer** (strontium nitrate, strontium peroxide, magnesium powder, calcium resinate, strontium oxalate, potassium perchlorate); **Incendiary mixtures** (barium nitrate, magnesium/aluminum powder, asphaltum, graphite). These materials when combined typically represent less than 5% of the weight of the material projectile for small and medium caliber munitions. Typical volumes are broken out as follows: Primer (less than 1% or 1 gram), Tracer (less than 1% or < 1 gram), Incendiary (less than 2% or < 2 grams) and fuze (less than 1% or < 1 gram). These materials along with the propellant typically burn as the projectile is fired. Therefore, these are not included in the list of Associated Munitions Constituents Analysis but have been included at this FUDS due to the scattering effects of the 1903 explosion. The Munitions Constituents sampling/analysis typically focuses on primary constituents present in propellants and the projectile/casings in firing points and impact areas.
2. DNT and break down products currently on the approved PWP explosives analysis using method 8330A list including 2,4-Dinitrotoluene ; 2,6-Dinitrotoluene ; 2-Amino-4,6-dinitrotoluene; 2-Nitrotoluene; 3-Nitrotoluene; 4-Nitrotoluene 4-Amino-2,6-dinitrotoluene) will be analyzed.
3. Nitrocellulose is composed of nitrated paper. Nitrates are readily biodegraded and are not expected to persist in the environment.
4. No ammonium picrate analysis due to extreme solubility and mobility and the time frame that has passed since it was utilized.
5. No analysis for perchlorate due to unavailability of groundwater (shallow bedrock).
6. TNT and break down products currently on the approved PWP explosives analysis using method 8330A list including 2-Amino-4,6-dinitrotoluene; and 4-Amino-2,6-dinitrotoluene.

NOTE: AP = Armor Piercing.
CTT = Closed, transferred or transferring.
DNT = Dinitrotoluene.
MC = Munitions Constituent(s)
MRS = Munitions Response Site
TNT = Trinitrottolune.

Table 2-3 Army Checklist for Important Ecological Places

Iona Island Naval Ammunition Depot

No.	Checklist Item	Yes / No		Comments
1.	Locally important ecological place identified by the Integrated Natural Resource Management Plan, BRAC Cleanup Plan or Redevelopment Plan, or other official land management plans.		No	
2.	Critical habitat for Federally designated endangered or threatened species. See No. 12 below.	Yes		Iona and Round Island provides habitat for several state or federally listed Threatened or Endangered (T&E) species. However, the list of T&E species provided by the New York Natural Heritage Report is sensitive and should not be released to the public.
3.	Marine Sanctuary		No	
4.	National Park		No	
5.	Designated Federal Wilderness Area		No	
6.	Areas identified under the Coastal Zone Management Act	Yes		The Hudson River Estuarine Reserve is a network of coastal wetlands which includes the brackish wetlands of Iona Island and is managed under the New York's Coastal Management Program.
7.	Sensitive Areas identified under the National Estuary Program or Near Coastal Waters Program	Yes		New York State Department of Environmental Conservation lists Iona Island as the Hudson River National Estuarine Research Reserve, Significant Coastal Fish and Wildlife Habitat Area, and National Natural Landmark.
8.	Critical areas identified under the Clean Lakes Program		No	
9.	National Monument		No	
10.	National Seashore Recreational Area		No	
11.	National Lakeshore Recreational Area		No	
12.	Habitat known to be used by Federally designated or proposed endangered or threatened species	Yes		Iona and Round Island provides habitat for several state or federally listed Threatened or Endangered (T&E) species. However, the list of T&E species provided by the New York Natural Heritage Report is sensitive and should not be released to the public.
13.	National preserve		No	
14.	National or State Wildlife Refuge		No	
15.	Unit of Coastal Barrier Resources System		No	
16.	Coastal Barrier (undeveloped)		No	
17.	Federal land designated for protection of natural ecosystems		No	

Table 2-3 Army Checklist for Important Ecological Places

Iona Island Naval Ammunition Depot

No.	Checklist Item	Yes / No		Comments
18.	Administratively Proposed Federal Wilderness Area		No	
19.	Spawning areas critical for the maintenance of fish/shellfish species within river, lake, or coastal tidal waters		No	
20.	Migratory pathways and feeding areas critical for maintenance of anadromous fish species within river reaches or areas in lakes or coastal tidal waters in which fish spend extended periods of time		No	
21.	Terrestrial areas utilized for breeding by large or dense aggregations of animals		No	
22.	National river reach designated as Recreational		No	
23.	Habitat known to be used by state designated endangered or threatened species	Yes		Iona and Round Island provides habitat for several state or federally listed Threatened or Endangered (T&E) species. However, the list of T&E species provided by the New York Natural Heritage Report is sensitive and should not be released to the public.
24.	Habitat known to be used by species under review as to its Federal endangered or threatened status		No	
25.	Coastal Barrier (partially developed)		No	
26.	Federally designated Scenic or Wild River		No	
27.	State land designated for wildlife or game management		No	
28.	State-designated Scenic or Wild River		No	
29.	State-designated Natural Areas	Yes		In 1976, the National Park Service designated Iona Island a National Natural Landmark.
30.	Particular areas, relatively small in size, important to maintenance of unique biotic communities		No	
31.	State-designated areas for protection or maintenance of aquatic life		No	
32.	Wetlands	Yes		Iona Island includes one of the largest tidal wetlands (270-acre tidal wetland) in the Hudson River. Iona Island includes a freshwater emergent wetland. Freshwater forested/shrub wetlands are present between Iona and Round Island and within the southern portion of Round Island. The Hudson River Estuarine Reserve is a network of coastal wetlands which includes the brackish wetlands of Iona Island and is managed

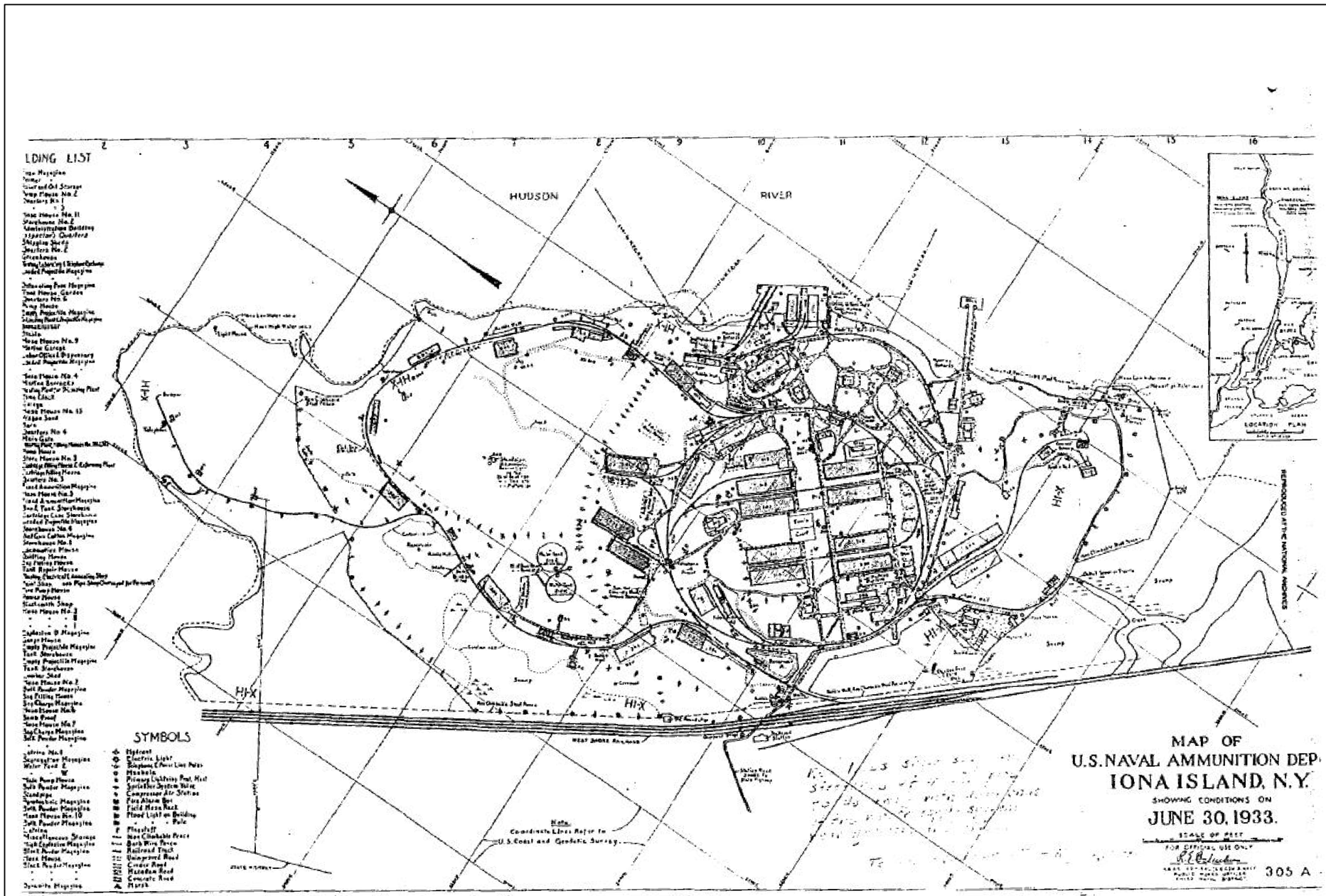
Table 2-3 Army Checklist for Important Ecological Places

Iona Island Naval Ammunition Depot

No.	Checklist Item	Yes / No		Comments
				under the New York's Coastal Management Program.
33.	Fragile landscapes, land sensitive to degradation if vegetative habitat or cover diminishes	Yes		Inventory Project Report (INPR) completed on 30 March 1995 stated that "site is susceptible to effect of erosion".

Note: One or more "yes" responses indicates the need for a SLERA

Iona Island
Naval Ammunition Depot
Rockland, New York



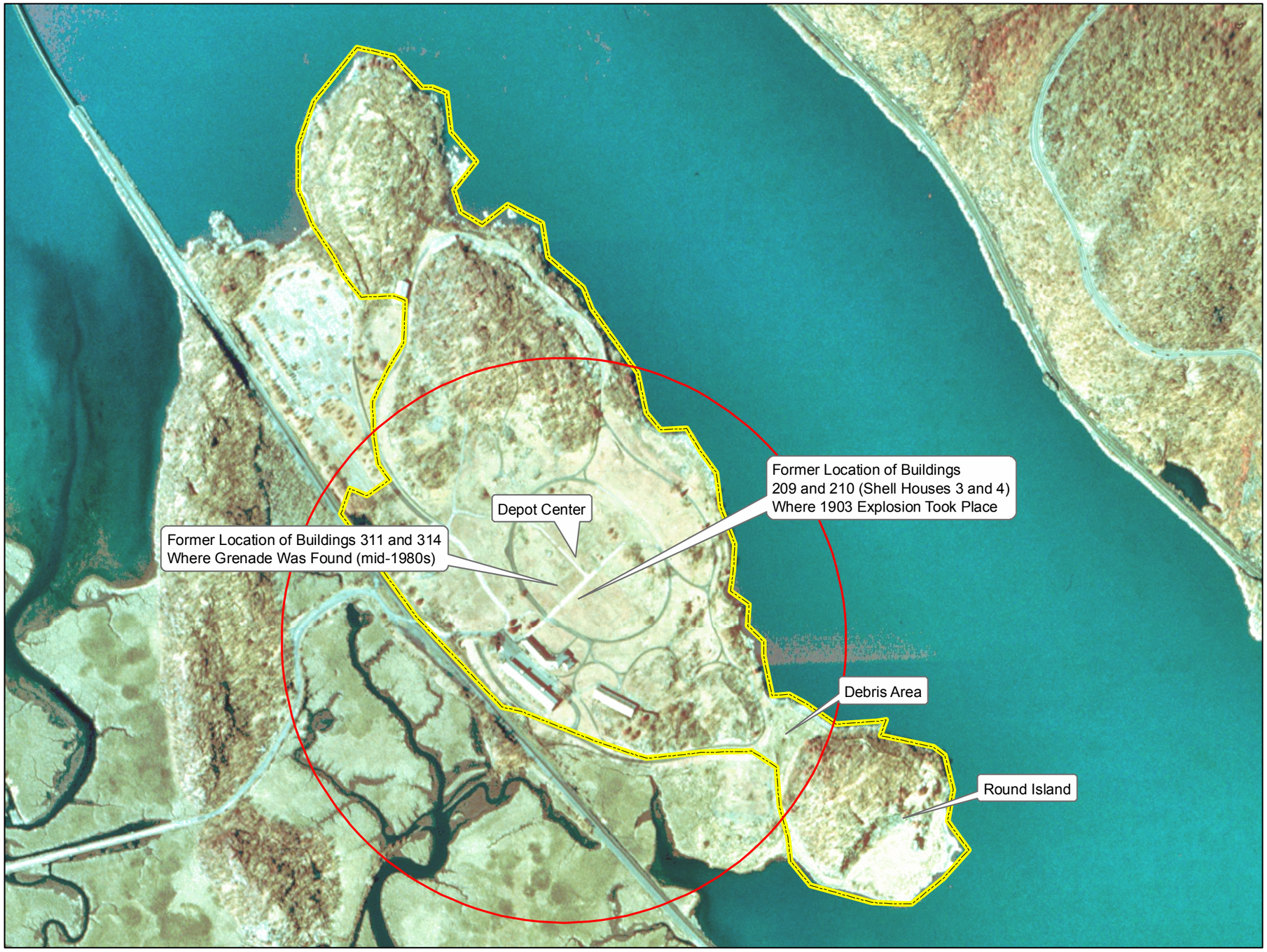
Map of U.S. Naval Ammunition Depot,
Iona Island, NY, dated 6-30-1933

RG291; Accession 68A-5714; Box 205, Real Property Files;
File: Iona and/or Round Island.
Washington National Records Center, Suitland, MD

Source:
USACE, 1997

Q:\projects\GIS\62023012007\Iona Island\SIR_DRAFT\MXD\Figure2-1

Figure 2-1. Historic Site Layout.



Iona Island
Naval Ammunition Depot
Rockland, New York

Legend

MRS1 - 1903 Explosion Area

FUDS Boundary

Sources:
USACE, 2004
USDA-NRCS, 2003

0 200 400
Meters

Q:\projects\GIS\62023011\2007\Iona Island\SIR_DRAFT\MXD\Figure2-2

Figure 2-2. Munitions Response Site Boundary Location

Iona Island
Naval Ammunition Depot
Rockland, New York

Legend

- 1/4, 1/2, 1, 2, and 4 Mile Radii
- FUDS Boundary

Sources:
USACE, 2004
USGS-NRCS, 2002

0 1 2
Miles

Q:\projects\GIS\62023012007\Iona Island\SIR_DRAFT\MXD\Figure2-3

Figure 2-3. Site Location and Topography

Iona Island
Naval Ammunition Depot
Rockland, New York

Legend

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- FUDS Boundary

Sources:
USACE, 2004
USGS-NRCS, 2002
USFWS, 2006

N

0 1 2
Miles

Q:\projects\GIS\62023011\2007\Iona Island\SIR_DRAFT\MXD\Figure2-4

Figure 2-4. Water Bodies and Wetlands

3. SITE INSPECTION ACTIVITIES

3.1 TECHNICAL PROJECT PLANNING

3.1.1 The TPP Meeting for the Iona Island Naval Ammunition Depot was conducted on 24 May 2007 at Bear Mountain, New York. The Final TPP Memorandum documenting the meeting was issued in May 2007 (Alion 2007b) and is located in Appendix B. The meeting participants included representatives from CENAN, CENAB, the New York State Department of Environmental Conservation (NYSDEC), the Rockland County Department of Health, PIPC, and the Alion Team. The participants in the TPP discussed the proposed SI approach and field sampling plan, the potential need for an emergency response action and/or removal action of MEC, the development of the CSM, data needs, Data Quality Objectives (DQOs). During the TPP meeting, the participants provided valuable information that guided the SI activities. Four DQOs were defined for this SI. The TPP discussion involved a presentation of general decision rules for completing the SI objectives. These decision rules were summarized in the DQO worksheets and are summarized below.

3.1.2 DQO 1 – Determine if the site requires additional investigation through an RI/FS or if the site may be recommended for No Department of Defense Action Indicated (NDAI) based on the presence or absence of MEC and MC. The basis of recommendation for RI/FS related to the presence/absence of MEC includes:

- Historic data that indicate the presence of MEC or MD
- Visual evidence or anomalies classified as MEC, MD, or material potentially presenting an explosive hazard (MPPEH)
- One or more anomalies in a target area near historic or current MEC/MD finds or within an impact crater
- Physical evidence indicating the presence of MEC (e.g., distressed vegetation, stained soil, ground scarring, bomb craters, burial pits, etc.)

3.1.3 The basis of recommendation for RI/FS related to the presence/absence of MC includes:

- Maximum concentrations at the FUDS that exceed United States Environmental Protection Agency (EPA) Region IX Preliminary Remediation Goals (PRGs) based on current and future land use

- Maximum concentrations at the FUDS that exceed ecological risk screening values

- Maximum concentrations at the FUDS that exceed site-specific background levels

- Data reporting the presence or absence (less than Method Detection Limits [MDLs] for metals and less than the Reporting Limits [RLs] for explosives) of analytes for which no screening criteria (decision limits: PRGs, etc.) are available are to be used to support the weight-of-evidence evaluation of MC at the FUDS.

3.1.4 In each of these instances, all lines of evidence (e.g., historical data, field data, etc.) are to be used to make a final recommendation for an NDAI or RI/FS. If none of these scenarios occur above for MEC or MC, then the recommendation for NDAI is a possible option.

3.1.5 DQO 2 – Determine the potential need for a Time Critical Removal Action (TCRA) for MEC and MC by collecting and analyzing data from previous investigations/reports, conducting site visits, and performing analog geophysical activities, and by collecting MC samples.[3] The basis for the recommendations is specified below:

- A TCRA would be recommended if there is a complete pathway between source and receptor and if the MEC and the situation are viewed as an imminent danger posed by the release or threat of a release, where cleanup or stabilization actions must be initiated within six months to reduce risk the risk to public health or the environment.

- A non-TCRA (NTCRA) would be recommended if a release or threat of a release that poses a risk where more than six months planning time is available.

[3] MMRP Programmatic guidance has suggested the terminology "emergency response action" be replaced with TCRA and NTCRA. The DQO as written is what was presented in the SS-WP, but the decision criteria match the current guidance.

3.1.6 In each of these instances, all lines of evidence (e.g., historic data, field data, etc.) are to be used to make a final recommendation for a TCRA or NTCRA.

3.1.7 DQO 3 – Collect, or develop, additional data, as appropriate, for potential HRS scoring by the EPA.

- Verification that data were collected in accordance with the Final SS-WP.

3.1.8 DQO 4 – Collect the additional data necessary to complete the MRSPP

- Completion of the MRSPP for each MRS with all available data and documentation of any data gaps for future annual MRSPP updates.

3.1.9 The TPP meeting participants concurred with the DQOs and the general technical approach for the planned SI activities discussed during the TPP (Alion 2007b) and subsequently documented in the Final SS-WP (Alion 2007a). In summary, these agreements were to inspect the cited areas of concern and to complete multimedia sampling in accordance with the DQOs and plans documented in the Final SS-WP. Please refer to the Final TPP Memorandum (Alion 2007b) (Appendix B) for more specific details of the TPP meeting. As part of this SI Report, Alion evaluated the DQOs presented in the SS-WP and completed a DQO attainment verification worksheet to document completion and achievement of the DQOs (Appendix B).

3.2 SUPPLEMENTAL RECORDS REVIEW

3.2.0.1 State agencies were contacted regarding T&E species and cultural and ecological resources at the FUDS property (NYSDEC 2007). See Appendix L for related correspondence.

3.2.1 Threatened and Endangered Species

3.2.1.1 Information on T&E species for this FUDS was requested from the New York Natural Heritage Program. In October 2007, the New York Natural Heritage Program responded with a report listing rare or state-listed animals and plants, significant natural communities, and other significant habitats associated with Iona Island and Round Island (NYSDEC 2007). However, the information provided was utilized during field activities in order to avoid sensitive areas. No listed T&E species were observed during the SI field activities.

3.2.2 Cultural and Archaeological Resources

3.2.2.1 During the SS-WP development, the Alion Team/USACE consulted with Ed McGowan, PIPC, Bear Mountain, New York; New York Coastal Zone Management Program; Tara Seaone, NYSDEC, Division of Fish, Wildlife and Marine Resources; and Cynthia Blakemore, New York State Office of Parks, Historic Preservation, Historic Preservation Field Services Peebles Island to determine if planned SI field activities would impact potential cultural resources. No cultural or archaeological resources were identified by these individuals within the sample location and geophysical reconnaissance areas (Appendix B). Concurrence was given for SI sampling activities. The project was reviewed in accordance with Section 106 of the National Historic Preservation Act of 1966. No impacts to cultural or archaeological resources were identified on the FUDS during field activities.

3.3 SITE INSPECTION FIELDWORK

3.3.1 The SI field work was conducted on 4 December 2007 in accordance with the PWP (Alion 2005) and the Final SS-WP for the Iona Island Naval Ammunition Depot (Alion 2007a). A qualitative site reconnaissance for MEC and sample collection and analysis for MC was completed. A total of approximately 14.9 acres was assessed through the qualitative reconnaissance. A total of 23 surface soil samples (including five background samples) were collected using a 7-point wheel composite method. In addition, a total of five sediment samples (including three background samples) were collected.

3.3.2 MEC reconnaissance findings and MC sample results are discussed in Sections 4 and 5, respectively. As-collected sample locations (i.e., coordinates where samples where actually collected after any minor adjustments were made due to field conditions), sample designations, sampling rationale, and descriptions of each sample are summarized in Table 3-1. Sampling locations and geophysical reconnaissance routes also are depicted on Figure 3-1. Additional information pertaining to the field activities, including field notes and forms, are included in Appendix D. Photograph locations and descriptions are presented in Figure 3-2 and Appendix E.

3.4 WORK PLAN DEVIATIONS AND FIELD DETERMINATIONS

3.4.1 Slight deviations from the Final SS-WP occurred with respect to the location of collected samples. The SS-WP specified the location of 18 surface soil samples, five background soil samples, two sediment samples, and three background sediment samples (Alion 2007a). Throughout the SI field activities, samples were relocated to sample areas containing soil and

sediment. The remaining SI field activities were conducted in accordance with the SS-WP. DQO Verification Worksheets are included in Appendix B along with the TPP Memorandum.

3.5 SITE INSPECTION LABORATORY DATA QUALITY INDICATORS

3.5.1 This section summarizes the data quality assessment for the Iona Island Naval Ammunition Depot SI analytical data. Data were generated by GPL under the DoD Quality Systems Manual (QSM) Version III and validated by a third-party validator (EDS) using EPA Region II Data Validation Guidelines. The data were also analyzed using the Automated Data Review (ADR) version 8.1 based on the DoD QSM Version III guidelines (dated January 2006), and these results are included in the EDMS database. The detailed GPL and EDS reports are contained in Appendixes F and G, respectively, and the following text summarizes the findings. Data Quality Indicators (DQIs) include precision, accuracy, representativeness, completeness, and comparability (PARCC) as well as sensitivity.

3.5.2 Precision is a measure of the reproducibility of repetitive measurements of the same process under similar conditions. Precision is determined by measuring the agreement among individual measurements of the same property, under similar conditions, and is calculated as an absolute value. The degree of agreement was expressed as the relative percent difference (RPD) between the separate measurements (usually matrix spike/matrix spike duplicate [MS/MSD] pairs) and the observed RPD compared to acceptable values based on Region II Data Validation Guidelines. Acceptable RPDs were found for all MC of concern (Appendix G), therefore, the precision DQI was achieved. Field precision is measured by the comparison of field duplicate samples, which are also discussed as appropriate in Appendix G.

3.5.3 Accuracy is the degree of agreement of a measurement with an accepted reference or true value. Accuracy measures the bias or systematic error of the entire data collection process. To determine accuracy, a sample which has been spiked with a known concentration is analyzed by the laboratory as the MS, MSD, or laboratory control spike, surrogate, and blank spikes. EDS assessed accuracy according Region II Data Validation Guidelines. Low MS and MSD recoveries were noted for antimony and lead (50-60 and -35 percent, respectively), although all other spike controls (e.g., laboratory control spike, surrogate spikes, blank spikes, and continuing calibration values) were within acceptable limits. This is indicative of a matrix effect, which is reducing the ability to extract the spiked chemical from the matrix. Consequently, all antimony and lead values have been assigned a "J" qualifier by the data validator. Additionally, the mercury MSD was above the recovery limit (125 percent); however, as with antimony and lead, all other spike controls were within normal limits, resulting in assigned "J" qualifiers on all

mercury results. Because of the matrix effects, the reported concentrations for antimony, lead, and mercury have a greater uncertainty, although proper procedures were followed and the accuracy DQI was achieved (Appendix G).

3.5.4 Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point or an environmental condition. Representativeness is achieved through proper development of the field sampling program during the TPP and work plan development. Samples were collected and analyzed as planned; therefore, the representative DQI was achieved for the Iona Island Naval Ammunition Depot.

3.5.5 Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. Data are complete and valid if the data achieve all acceptance criteria including accuracy, precision, and any other criteria specified by the particular analytical method being used. Samples were collected as planned for the Iona Island Naval Ammunition Depot. None of the 432 analytical results associated with this sample effort were rejected; therefore, the completeness indicator is 100 percent, and the Iona Island Naval Ammunition Depot data meets the completeness DQI.

3.5.6 Comparability expresses the confidence with which one data set can be compared to another. There are no previous analyses of data at the Iona Island Naval Ammunition Depot for comparison of reported concentrations from this project. For this SI, standard methods for sampling and analyses were followed as documented in the SS-WP and provide a technically sound basis for data comparisons in the future, should additional information become available. Therefore, the comparability DQI was achieved.

3.5.7 Sensitivity is a measure of the screening criteria as they compare to detection limits. For non-detected analytes, the laboratory reported the MDL for metals which represents the minimum concentration of metal that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. The RL represents the lowest concentrations at which calibration standards have been assessed and the MDL represents a statistically-derived limit below which the instrument signal cannot be differentiated from instrument noise. Standards were not assessed between the RL and MDL; therefore, any estimated quantitation lower than the RL has higher uncertainty. As discussed in Section 5.1.4; the sensitivity DQI was achieved for all analytes in both sediment and soil.

3.6 SECOND TECHNICAL PROJECT PLANNING MEETING

3.6.1 On the 27th of August 2008, stakeholders had the opportunity to participate in a second TPP meeting to discuss the findings, conclusions and recommendations of the Draft Final SI Report, review the MRSPP (Appendix K), and confirm the project objectives and DQOs have been achieved (Alion 2008). A memorandum, which summarizes the discussions that occurred during this meeting and the DQO verification worksheet, are included in Appendix B.

3.6.2 The following discussions were agreed upon during the second TPP meeting which included PIPC, Rockland County – Department of Health and the New York State Department of Environmental Conservation:

- Alion Team will summarize the meeting in a TPP #2 memorandum and it will be included in Appendix B of the Final SI Report *(Follow up: Action completed)*.

- On 2 September 2008, Mr. Swahn will send a reminder email to the participants reminding them that comments are due on the draft final SI Report by 5 September 2008 *(Follow up: Action completed)*.

Table 3-1 Sample Locations and Field Observations, Iona Island Naval Ammunition Depot

Iona Island Naval Ammunition Depot

Range Name (MRS)	Sub-Range Name	Sampling ID	Coordinates (UTM, NAD 83, ZONE 18)		Work Plan Rationale for Sampling Locations (Alion 2006)	Comments
			Easting (m)	Northing (m)		
1903 Explosion (MRS 1)	Not Applicable	II-EA-SS-02-01	0585711	4573209	Northern most portion of 1903 explosion area that is easily accessible on Iona Island	Sample slightly relocated for accessibility and soil. Sample located within outcrop area and contained organic material (i.e. leaves, roots).
		II-EA-SS-02-02	0585531	4573081	North west portion of 1903 explosion area that is easily accessible on Iona Island	Sample slightly relocated for accessibility and soil
		II-EA-SS-02-03	0585665	4573060	Within the 1903 explosion area, northwest quadrant on Iona Island	Sample slightly relocated for accessibility and soil
		II-EA-SS-02-04	0585736	4573121	Within the 1903 explosion area, north central portion on Iona Island	Sample slightly relocated for accessibility and soil
		II-EA-SS-02-05	0585917	4573115	Within the 1903 explosion area, northeast quadrant on Iona Island	Sample slightly relocated for accessibility and soil
		II-EA-SS-02-06	0585874	4573046	Within the 1903 explosion area, northeast quadrant on Iona Island	None
		II-EA-SS-02-07	0585804	4573023	Within the 1903 explosion area and in general area of former depot center on Iona Island	Sample slightly relocated for accessibility and soil
		II-EA-SS-02-08	0585751	4572962	Within the 1903 explosion area and former location of Building 311 and 314 where grenade was found on Iona Island	Sample slightly relocated for accessibility and soil
		II-EA-SS-02-09	0585668	4572991	Within the 1903 explosion area, northwest quadrant on Iona Island	Sample slightly relocated for accessibility and soil

Table 3-1 Sample Locations and Field Observations, Iona Island Naval Ammunition Depot

Iona Island Naval Ammunition Depot

Range Name (MRS)	Sub-Range Name	Sampling ID	Coordinates (UTM, NAD 83, ZONE 18)		Work Plan Rationale for Sampling Locations (Alion 2006)	Comments
			Easting (m)	Northing (m)		
		II-EA-SS-02-10	0585657	4572832	Within the 1903 explosion area, southwest quadrant and adjacent to current buildings on Iona Island	Sample slightly relocated for accessibility and soil
		II-EA-SS-02-11	0585762	4572804	Within the 1903 explosion area, south central area and adjacent to current buildings on Iona Island	Sample slightly relocated for accessibility and soil. Organic material (i.e. leaves, roots) was present within the sample location area.
		II-EA-SS-02-12	0585854	4572849	Within the 1903 explosion area, east central portion on Iona Island	Sample slightly relocated for accessibility and soil
		II-EA-SS-02-13	0585926	4572930	Within the 1903 explosion area, east central portion on Iona Island	Sample slightly relocated for accessibility and soil
		II-EA-SS-02-14	0585830	4572722	Within the 1903 explosion area, south central portion on Iona Island	Sample slightly relocated for accessibility and soil
		II-EA-SS-02-15	0586020	4572816	Within the 1903 explosion area, southeast most portion on Iona Island	Sample relocated for accessibility and soil
		II-EA-SS-02-16	0586049	4572722	Within the 1903 explosion area, located in the debris area between Iona island and Round Island	Sample relocated for accessibility and soil
		II-EA-SS-02-17	0585785	4572917	Former location of Building 209 and 210 (Shell Houses 3 and 4) where the 1903 explosion occurred on Iona Island	Sample slightly relocated for accessibility and soil
		II-EA-SS-02-18	0585847	4572967	Directly northeast of where the 1903 explosion occurred on Iona Island	Sample slightly relocated for accessibility and soil

Table 3-1 Sample Locations and Field Observations, Iona Island Naval Ammunition Depot

Iona Island Naval Ammunition Depot

Range Name (MRS)	Sub-Range Name	Sampling ID	Coordinates (UTM, NAD 83, ZONE 18)		Work Plan Rationale for Sampling Locations (Alion 2006)	Comments
			Easting (m)	Northing (m)		
		II-BG-SS-02-01	0585301	4572753	Background soil sample located upgradient and outside of the MRS-1 in an area that does not appear to have been impacted by past Department of Defense military munitions activity (not located on Iona Island or Round Island).	Sample relocated for accessibility and soil
		II-BG-SS-02-02	0585276	4572845	Background soil sample located upgradient and outside of the MRS-1 in an area that does not appear to have been impacted by past Department of Defense military munitions activity (not located on Iona Island or Round Island).	Sample relocated for accessibility and soil
		II-BG-SS-02-03	0585302	4572941	Background soil sample located upgradient and outside of the MRS-1 in an area that does not appear to have been impacted by past Department of Defense military munitions activity (not located on Iona Island or Round Island).	Sample relocated for accessibility and soil. Sample located in outcrop area.

Table 3-1 Sample Locations and Field Observations, Iona Island Naval Ammunition Depot

Iona Island Naval Ammunition Depot

Range Name (MRS)	Sub-Range Name	Sampling ID	Coordinates (UTM, NAD 83, ZONE 18)		Work Plan Rationale for Sampling Locations (Alion 2006)	Comments
			Easting (m)	Northing (m)		
		II-BG-SS-02-04	0585247	4573014	Background soil sample located upgradient and outside of the MRS-1 in an area that does not appear to have been impacted by past Department of Defense military munitions activity (not located on Iona Island or Round Island).	Sample relocated for accessibility and soil. Organic material (i.e., leaves, roots) was present within sample.
		II-BG-SS-02-05	0585275	4573332	Background soil sample located upgradient and outside of the MRS-1 in an area that does not appear to have been impacted by past Department of Defense military munitions activity (not located on Iona Island or Round Island).	Original proposed sample was located atop an outcrop under tree cover; therefore, the location was relocated north of the original proposed sample location to access soil rather than organic material.
		II-EA-SD-02-01	0585962	4573106	Within the 1903 explosion area, located off of the northeastern shoreline on Iona Island	Sample relocated for accessibility and sediment
		II-EA-SD-02-02	0586064	4572777	Within the 1903 explosion area, located between Iona and Round Island within the debris fill area.	Sample relocated for accessibility and sediment
		II-BG-SD-02-01	0585235	4572618	Background sediment sample located outside of the MRS-1 in an area that does not appear to have been impacted by past Department of Defense military munitions activity (not located on Iona Island or Round Island).	Sample was relocated due to impassable outcrop and marshland. Sample was collected on the north side of the causeway avoiding any runoff areas.

Table 3-1 Sample Locations and Field Observations, Iona Island Naval Ammunition Depot

Iona Island Naval Ammunition Depot

Range Name (MRS)	Sub-Range Name	Sampling ID	Coordinates (UTM, NAD 83, ZONE 18)		Work Plan Rationale for Sampling Locations (Alion 2006)	Comments
			Easting (m)	Northing (m)		
		II-BG-SD-02-02	0585242	4572596	Background sediment sample located outside of the MRS-1 in an area that does not appear to have been impacted by past Department of Defense military munitions activity (not located on Iona Island or Round Island).	Sample was relocated due to impassable outcrop and marshland. Sample was collected on the south side of the causeway (across from sample II-BG-SD-02-01) avoiding any runoff areas.
		II-BG-SD-02-03	0585345	4572933	Background sediment sample located outside of the MRS-1 in an area that does not appear to have been impacted by past Department of Defense military munitions activity (not located on Iona Island or Round Island).	Sample relocated for accessibility and sediment

Iona Island
Naval Ammunition Depot
Rockland, New York

Legend

- Sample Locations
- Geophysical Reconnaissance Routes
- MRS1 - 1903 Explosion Area
- FUDS Boundary

Sample ID Designation
"II-EA-SS-02-01"
Site Name-Sampling Location-Sample Type-Sample Depth-Sample #

BG-Background
EA-Explosion Area

Sources:
USACE, 2004
USDA-NRCS, 2003

0 200 400
Meters

Q:\projects\GIS\62023011\2007\Iona Island\SIR_DRAFT\MXD\Figure3-1

Figure 3-1. Sample Locations and Geophysical Site Reconnaissance Findings

Iona Island
Naval Ammunition Depot
Rockland, New York

Legend

- Photograph Location
- MRS1 - 1903 Explosion Area
- FUDS Boundary

Sources:
USACE, 2004
USDA-NRCS, 2003

0 200 400
Meters

Q:\projects\GIS\6202301\2007\Iona Island\SIR_DRAFT\MXD\Figure3-2

Figure 3-2. Site Inspection Photograph Locations

4. MUNITIONS AND EXPLOSIVES OF CONCERN SCREENING LEVEL RISK ASSESSMENT

4.1 MUNITIONS HISTORY

4.1.1 Common munitions used at the Iona Island Naval Ammunition Depot included small arms, large caliber, aerial rocket (3.5-in. rocket aircraft Mk4, FFAR), flares, signals, and simulators. Table 2-2 identifies these munitions and their constituents.

4.2 SITE INSPECTION MUNITIONS AND EXPLOSIVES OF CONCERN FIELD OBSERVATIONS

4.2.0.1 A qualitative reconnaissance based on both visual observations and analog geophysics was completed. A visual reconnaissance of the property surface was completed to identify MPPEH, MEC, or MD, as well as visual indicators of suspect areas impacted by munitions including distressed vegetation, stained soil, targets, and visual metallic debris. Analog geophysics was used by the field crew primarily to support anomaly avoidance activities and to conduct a qualitative reconnaissance of the eastern shorelines along the former dock areas, areas where ordnance items were viewable at low tide, and the "dump site," as shown on Figure 3-1. Where appropriate, anomalies possibly attributable to MEC or MD were documented. The total estimated acreage subject to the qualitative reconnaissance is approximately 14.9 acres. The SI findings are presented below.

4.2.1 1903 Explosion (MRS 1)

4.2.1.1 MRS 1 encompasses 99.2 land acres and 25 inland water acres for a total of 124.2 acres with a radius of 1,250 ft. The Alion Team completed qualitative reconnaissance of the former 1903 Explosion area for MPPEH, MEC, and MD within MRS 1 using visual observations and analog geophysics (magnetometer). Site reconnaissance and sampling locations are shown on Figure 3-1. Field observations related to cultural debris, range related features, and MD/MEC finds are presented below.

- The 1903 Explosion was located in the south center portion of Iona Island as shown on Figure 2-2.

- A qualitative reconnaissance was completed during low tide of the eastern shorelines along the former dock areas, areas where ordnance items were viewable at low tide in the past, and the "dump site," as shown on Figure 3-1. Anomalies encountered during the reconnaissance were attributed to surface / cultural debris not related to MPPEH, MEC, and/or MD.

- Eighteen surface soil samples and three sediment samples were collected within the 1903 Explosion area.

- No MD or MEC was observed visually during the field event.

4.2.2 Background Samples

4.2.2.1 Five surface soil background samples were collected from an area west and upgradient of the FUDS boundary. Background samples were collected approximately 400 ft from planned locations, for collection within similar lithology. Site reconnaissance and sampling locations are shown on Figure 3-1. Locations selected were from areas deemed unimpacted by DoD or current owner operations and of similar soil characteristics as the biased soil samples. There was no observed visual or magnetic evidence of MEC, MD, or any other military-related disturbance at either of the background sample locations.

4.3 MUNITIONS AND EXPLOSIVES OF CONCERN RISK ASSESSMENT

4.3.0.1 A qualitative MEC screening-level risk assessment for potential explosive safety risks were conducted based on the SI qualitative reconnaissance, as well as historical data documented in the INPR, ASR, and the ASR Supplement. An explosive safety risk is the probability for an MEC item to detonate and potentially cause harm as a result of human activities. An explosive safety risk exists if a person can come near or in contact with MEC and act on it to cause a detonation. The potential for an explosive safety risk depends on the presence of three elements: a source (presence of MEC), a receptor (person), and interaction (e.g., touching or picking up an item). The CSMs for MRS 1 reflect this MEC assessment strategy (Appendix J).

4.3.0.2 The exposure route for a MEC receptor typically is direct contact with a MEC item on the surface or through subsurface activities (e.g., digging during construction activities). A MEC tends to remain in-place unless disturbed through human activity or other natural forces (e.g., frost heaving and erosion). If MEC movement occurs, the probability of direct human contact may increase, but may not necessarily result in direct contact or exposure.

4.3.0.3 Each of these primary risk factors was used to evaluate the field and historic data to generate an overall hazard assessment rating of either low, moderate, or high. The MEC source is based on the MEC type, sensitivity, density, and depth distribution. The likelihood of exposure and thereby injury, may be severe (lethal if detonation occurs), moderate (minor or major injury if detonation occurs), or low (no detonation, and consequently, injury occurs). MEC sensitivity, the likelihood of detonation and severity of exposure (fuzing and weathering, for instance), may be very sensitive (e.g., electronic fuzing, land mines, booby traps), less sensitive (standard fuzing), and insensitive/inert (residual risk or no injury). MEC density and depth are generally unknown and evaluated during follow on studies (RI/FS).

4.3.0.4 Site characteristics are based on site accessibility (no restrictions, limited restrictions, and complete restrictions to access) and site stability (stable, moderately stable, and unstable). Finally, human interaction includes the type of human contact (low, moderate, and significant) and population number and frequency of access (low, moderate, high).

4.3.0.5 Based on these criteria, low, moderate, and high MEC risks are defined in Table 4-1.

4.3.1 1903 Explosion (MRS 1)

4.3.1.1 MRS 1 includes a 124.2-acre area with a radius of 1,250 ft encompassing the 1903 Explosion area. As discussed in Sections 3 and 4, no MD or MEC items were observed during the SI in MRS 1. During the SI, qualitative reconnaissance was conducted in locating planned sample locations and of the eastern shoreline (Figure 3-1) along the former dock areas, areas where ordnance items were viewable at low tide in the past, and the "dump site." The INPR, ASR, and ASR Supplement indicated that during low water conditions, ammunition has been seen in the "dump site" area along the eastern shoreline (USACE 1995, USACE 1997 and USACE 2004c). As documented in the ASR and ASR Supplement, a grenade was found near Building Nos. 311 and 314 (located within the radius of the 1903 Explosion) in the mid-1980s, and it was rendered safe by a demolition team from Fort Smith. During the ASR SI in 1997, MD were found on the island and viewed in the Sign Shop which included small arms cartridge cases, 6-pound projectile cartridge case, signal flare, and a fragment from a 3.5-in. rocket warhead (FFAR). No MEC or MD was identified during the SI field reconnaissance. Given the limited SI reconnaissance and the fact that an explosion occurred along with MD and MEC findings in the past within this MRS, MEC could be present in undisturbed areas of the FUDS (e.g., wetland areas, heavily vegetated areas, outcrop areas, and within the location of the former docks where MEC may have not detonated and could remain intact). The presence of MEC is likely due to the 1903 explosion and visual observations of items in the former dock areas

including the "dump site." The presence of Discarded Military Munitions (DMM) is likely due to the "dump site" observations. The presence of MC is possible due to the 1903 explosion and history of the FUDS which included testing ammunition.

4.3.1.2 No documented injuries have occurred since the FUDS was transferred from the GSA. The FUDS is closed to the public. However, Iona Island currently is partially fenced and the main gate is unmanned which provides limited access to Iona Island from Bear Mountain State Park. In addition, the FUDS is used for various biological studies, including a 4-year plant study on the southern end of Round Island. PIPC currently uses Iona Island as a storage facility. The MRS is also part of the Hudson River National Estuarine Research Reserve and Significant Coastal Fish and Wildlife Habitat Area. The most likely human receptors are trespassers of the area.

4.3.1.3 The FUDS was used for preparing, assembling, maintaining, inspecting, testing, and issuing ammunition (USACE 2004c). The potential exists for MD and MEC to be scattered due to the 1903 explosion. These factors, including the limited access to the FUDS, result in a "moderate" MEC risk.

Table 4-1. Low, moderate, and High MEC Risk Assessment Categories

Iona Island Naval Ammunition Depot

MEC Factor	Low MEC Risk	Moderate MEC Risk	High MEC Risk
MEC Source	Low MEC Type (no detonation and no injury) Insensitive/Inert MEC	Moderate MEC Type (minor/major injury) Moderate Sensitive MEC	Severe MEC Type (lethal) Very Sensitive MEC
Site Characteristics	Complete restrictions to access Stable (no MEC exposure by natural events)	Limited restrictions to access Moderately stable (MEC may be exposed by natural events)	No restrictions to access Unstable (MEC exposure most likely by natural events)
Human Interaction	Low potential for and frequency of contact (e.g., no general public access, infrequent site access primarily by site personnel, no subsurface activity)	Moderate potential for and frequency of contact (e.g., a limited number of the general public has open and somewhat frequent access, few site uses, surface/subsurface intrusive activity possible)	High potential for and frequency of contact (e.g., general public has open and frequent access, high potential for surface/subsurface intrusive activity)

5. MUNITIONS CONSITUENTS SAMPLING AND ANALYSIS

5.0.1 The analytical results for the MC sampling are presented below along with the screening methodology and the results of the screening assessment with respect to the one MRS identified at the Iona Island Naval Ammunition Depot.

5.1 DATA EVALUATION METHODOLOGY

5.1.0.1 The following sections present the process used to evaluate the MC data collected for the FUDS. This process is consistent with the decision rules outlined in Section 3.1. Identification and refinement of MC associated with munitions used at the FUDS is discussed below.

5.1.1 Refinement of Munitions Constituents

5.1.1.1 During the SI process, the Alion Team further evaluated the munitions reportedly used at the FUDS. Research was conducted to refine the specific list of constituents potentially associated with the MRS based on munitions reportedly used when the FUDS was active. Refinement of the MC list is presented in Table 2-2. Samples were analyzed for a select list of metals and explosives in accordance with the approved SS-WP (Alion 2007a). Tables 5-1 and 5-2 provide a summary of the complete analytical results for surface soil and sediment, respectively. Specific MC associated with MRS 1, as presented in Table 2-2, are summarized below.

1903 Explosion (MRS 1)

- Metals – antimony, copper, lead, mercury, nickel, iron, and zinc

- Explosives – 2,4,6-trinitrotoluene; 2,4-dinitrotoluene; 2,6-dinitrotoluene; 2-amino-4,6-dinitrotoluene; 2-nitrotoluene; 3-nitrotoluene; 4-amino-2,6-dinitrotoluene; 4-nitrotoluene; methyl-2,4,6-trinitrophenylnitrsmine; nitroglycerin.

5.1.1.2 Iron was not analyzed at the Iona Island Naval Ammunition Depot FUDS as per the approved SS-WP because iron is not a CERCLA hazardous substance (Alion 2007a; 40 CFR 302.4). Iron was listed as an MC for completeness.

5.1.2 Data Quality

5.1.2.1 All of the samples noted in this bulleted list have been sampled by Alion, analyzed by GPL, and validated using EPA Region II validation guidance, to include:

- Eighteen surface soil samples (collected between 0 and 2 in. bgs)
- Three sediment samples
- Five background surface soil samples
- Two background sediment samples
- Three surface soil duplicate samples
- One sediment duplicate sample.

5.1.2.2 The first step in the process of identifying chemicals of potential concern (COPCs) and chemicals of potential ecological concern (COPECs) was the evaluation of analytical data on the basis of qualifiers in each medium of concern. Inclusion or exclusion of data on the basis of analytical qualifiers is performed in accordance with EPA guidance (EPA 1989) and considers the following:

- Analytical results bearing the U qualifier (indicating that the analyte was not detected at the given detection limit) are retained in the data set.

- Analytical results bearing the J qualifier (indicating that the reported value was estimated) are retained at the measured concentration.

5.1.2.3 All concentrations of antimony, lead, and mercury were estimated (J qualified, Tables 5-1 and 5-2). Antimony, lead, and mercury were qualified with a J because the percent recovery for either the MS or MSD sample was outside of the limits. Appendix G provides additional detail. These results increases the level of uncertainty regarding the true concentrations of antimony, lead, and mercury present on-site. In addition, Appendix G includes the Chemical Data Quality Assessment Report (CDQAR) completed by the USACE, Baltimore District.

5.1.3 Screening Values

5.1.3.1 Screening for human health COPCs is conducted by comparing maximum detected chemical concentrations to EPA Region IX PRGs, as shown in Tables 5-1 and 5-2 (EPA 2004). The complete report of the analytical results and the analytical quality assurance/quality control (QA/QC) report are included in Appendixes F and G, respectively. For the human health risk screening, the surface soil sample analytical results are compared to residential and industrial soil PRGs (EPA 2004). In accordance with EPA guidance, PRG values used are those at a cancer risk level of 1×10^{-6} and a non-cancer Hazard Quotient (HQ) of 0.1, for the purposes of screening. To account for potential additivity of non-carcinogenic hazards, non-carcinogenic PRGs have been divided by 10 for screening purposes. Sediment sample analytical results are compared to the residential and industrial soil PRGs; however, with the exception of lead, soil screening values are increased by a factor of 10 to account for typical reduced sediment exposures compared to that of soil, based on best professional judgment. Lead soil screening values have not been increased because they are based on blood lead levels instead of cancer or non-cancer endpoints.

5.1.3.2 For the ecological risk screening, the surface soil and sediment sample results are compared to ecological screening levels presented in Table 5-3. If the concentration exceeded the screening value, that analyte was retained for further consideration as a COPEC.

5.1.3.3 Per EPA guidance, the following screening process is utilized:

1. The maximum concentration of each detected chemical in each medium is identified.

2. If the maximum concentration of a specific chemical exceeds its screening value and background concentrations, the chemical is retained as a COPC/COPEC.

3. If a screening concentration is not available for a specific chemical in a particular medium, the screening concentration for a structurally similar compound is used, if warranted. The screening tables list any surrogates that are used.

4. An analyte is eliminated from the list of COPCs/COPECs if it is an essential nutrient of low toxicity, and its reported maximum concentration is unlikely to be associated with adverse health impacts.

5.1.3.4 All target analytes (associated with munitions used at the FUDS) detected at concentrations exceeding the MDL are evaluated. An HQ is defined as the measured concentration divided by the ecological screening criteria. If the maximum concentration was less than the screening value (HQ <1.0), that analyte was eliminated from consideration. If the maximum concentration exceeded the screening value (HQ >1.0), that analyte was retained as a COPEC. The maximum HQs for each analyte identified as a COPEC are presented below.

5.1.4 Comparison of Screening Levels with Detection Limits for Non-Detected Analytes

5.1.4.1 Current EPA guidance (EPA 1989, 2001) requires that detection limits be addressed, particularly as related to the screening values used to select COPCs/COPECs. If a chemical is never detected, but the detection limit is higher than the screening value, or there is no screening value, then it may or may not be appropriate to designate the chemical as a COPC/COPEC, depending on whether the chemical is site-related or not. There is insufficient information in such a case to exclude or include the chemical. This would be noted as a source of uncertainty in the risk assessment screening. Table 5-4 shows a comparison of the RLs and human health and ecological risk screening values for the analyte of concern in soil and sediment that was never detected. As shown in Table 5-4, the detection limits for all analytes are lower than screening values; consequently, the sensitivity DQI for Iona Island Naval Ammunition Depot FUDS data has been achieved. Where no screening values are available, it is not possible to say whether the available RLs were sufficient to detect these chemicals at concentrations that may pose risk to ecological receptors.

5.2 CONCEPTUAL SITE MODEL

5.2.1 CSM diagrams were prepared for MRS 1 at the Iona Island Naval Ammunition Depot (Appendix J). The CSM defines the source (e.g., the secondary source/media), interaction (e.g., the secondary release mechanism, the tertiary source, and the exposure route), and human and ecological receptors.

5.2.2 Potential current and future human receptors for MC are expected to be visitors and trespassers, employees of PIPC, researchers, and potentially construction workers, as depicted in the CSM diagrams for MRS 1 (Appendix J). Residential screening values were used to represent the following receptor subtypes: employees and researchers. In this assessment, these screening values are readily available for use and more specific screening values for these receptor subtypes are not available. The ecological receptors of concern for the MRS include terrestrial plant/invertebrates (insects and worms), benthic organisms, terrestrial-feeding/predatory animals,

terrestrial feeding/predatory birds, aquatic-feeding mammals, and aquatic-feeding birds. These receptors are referred collectively to as biota.

5.2.3 Based on the possible existence of MEC/MC at ground surface, the medium of concern for human receptors at MRS 1 was determined to be surface soil. No disposal or burial areas were identified in the ASR or ASR Supplement; therefore, subsurface soil was not determined to be a media of concern for potential human or ecological receptors (USACE 1997 and USACE 2004c). No permanent, non-tidal, freshwater features are located on the Iona Island Naval Ammunition Depot; therefore, surface water was determined not to be a medium of concern for potential human or ecological receptors. Sediment is present in the marsh areas of the FUDS and this is possibly where MEC/MC contamination would likely be present or accessible to site receptors. Therefore, sediment was a medium of concern for potential human or ecological receptors. Since groundwater at the Iona Island Naval Ammunition Depot is not used as a potable water source and there is not an exposure pathway for ecological receptors, groundwater was not to be a media of concern for human or ecological receptors. In conclusion, surface soil and sediment were the only media of concern for human and ecological receptors at MRS 1.

5.2.4 A pathway is potentially complete if all of the following conditions are present:

1. Source and mechanism of chemical release (e.g., a munitions-related organic chemical [other than nitrobenzene] is detected or site metal concentration exceeds background concentrations)

2. Transfer mechanisms (e.g., overland flow of contaminants into an adjacent stream, advection of contaminants with groundwater flow)

3. Point of contact (exposure point, e.g., drinking water, soil)

4. Exposure route to receptor (e.g., ingestion, inhalation, etc.).

5.2.5 Once it has been determined that complete pathways exist between contaminated media and receptors as discussed in Section 5.2.4, comparisons of maximum detected site concentrations to risk-based screening values are used to determine if the MC is a COPC or COPEC, depending on the risk screening being conducted (human health and ecological respectively). An RI/FS may be recommended where COPECs and COPCs are identified using a weight-of-evidence approach. An NDAI may be recommended if no COPCs or COPECs are identified through the risk screening process.

5.2.6 In conclusion, pathway completeness will result in an RI/FS recommendation only in the instance where risk screening criteria exceedances occur. A pathway can be complete but no RI/FS recommended if there is no risk screening criteria exceedances, indicating acceptable risk levels. When a pathway is incomplete, an RI/FS recommendation will not be made. Note: A RI/FS recommendation can be based on finding of MEC only with no exceedances of MC.

5.2.7 Consistent with DQOs, a weight-of-evidence approach is used to determine if identified COPCs/COPECs should be retained. In the case where screening criteria are exceeded, a weight-of-evidence approach is used to determine if the identified exceedances warrant an RI/FS recommendation. See the discussion in Sections 5.1 and 5.4 for additional detail on the risk screening process.

5.3 BACKGROUND DATA EVALUATION

5.3.1 Tables 5-5 and 5-6 present a range of concentrations in the five background soil samples and three background sediment samples for chemicals detected on-site. A qualitative comparison was made between the maximum and average concentrations of the Iona Island Naval Ammunition Depot FUDS samples with background samples for antimony, copper, lead, mercury, nickel, and zinc. The maximum and mean surface soil concentrations for the constituents except for mercury, nickel, and zinc at the Iona Island Naval Ammunition Depot FUDS exceeded background concentrations; the mean concentration for antimony did not exceed the background concentration (Table 5-5). The maximum and mean sediment concentrations for the constituents except for mercury at the Iona Island Naval Ammunition Depot FUDS exceeded background concentrations (Table 5-6). Consequently, the pathway to human and ecological receptors is potentially complete. Significant exceedance of background is indicative of a potential release, not necessarily a complete pathway.

5.4 1903 EXPLOSION (MRS 1)

5.4.0.1 As presented in Section 5.1.1, six metals (antimony, copper, lead, mercury, nickel, and zinc) and nine explosives (2,4,6-trinitrotoluene; 2,4-dinitrotoluene; 2,6-dinitrotoluene; 2-amino-4,6-dinitrotoluene; 2-nitrotoluene; 3-nitrotoluene; 4-amino-2,6-dinitrotoluene; 4-nitrotoluene; methyl-2,4,6-trinitrophenyl nitramine; and nitroglycerin) are the MC of interest for MRS 1. Table 5-1 (surface soil) and Table 5-2 (sediment) includes a summary of all laboratory data analyses.

5.4.1 Groundwater Pathway and Screening Results

5.4.1.1 Groundwater was not a potentially complete pathway for this FUDS in the SS-WP (Alion 2007a). No groundwater sampling was conducted in this MRS. The pathway in the CSM is identified as incomplete in this SI Report.

5.4.2 Surface Water and Sediment Pathway and Screening Results

5.4.2.1 There are no permanent, non-tidal, freshwater features on the Iona Island Naval Ammunition Depot FUDS. Surface water was not a potentially complete pathway for MC for MRS 1 in the SS-WP (Alion 2007a); therefore, no surface water sampling was conducted in this MRS. The pathway in the CSM is identified as incomplete in this SI Report.

5.4.2.2 Sediment is present in the marsh areas of the FUDS and this is possibly where MEC/MC contamination would likely be present or accessible to site receptors. Therefore, sediment was a medium of concern for potential human or ecological receptors and five sediment soil samples (including three on-site [including one duplicate] and two background samples) were collected from MRS 1. Based on the analyses of the sediment samples, lead and antimony exceeded background and its associated screening value and was identified as a COPC. Antimony, copper, lead, mercury, nickel, and zinc exceeded ecological screening values. Antimony, copper, lead, nickel, and zinc were also detected above the background concentrations (Table 5-6). Table 5-1 presents a summary of sediment sample results compared to residential and industrial human health screening values, as well as ecological screening values for MRS 1.

5.4.2.3 The following factors were considered as part of the weight-of-evidence evaluation approach in developing recommendations for potential future actions at MRS 1 due to human and ecological screening value exceedances in the sediment matrix:

- COPCs
  - Lead
    - One of two samples exceed industrial and residential human health screening value
    - One of two samples exceeded the sediment background maximum concentration
    - The maximum detect of 2,340 milligram per kilogram (mg/kg) is significantly above the human health screening value of 400 mg/kg.

— Antimony
  – Neither of the two samples exceeded human health screening value however the field duplicate for one of the samples exceeded the residential human health screening value at 43.3 mg/kg.
  – Neither of the two samples exceed human health screening value however the field duplicated for one of the samples exceeded the sediment background maximum concentration
  – The maximum detect of 43.3 mg/kg is slightly above the residential human health screening value of 31 mg/kg.

- COPECs
  – Antimony
    – One of two samples exceeded the ecological screening value
    – One of two samples exceeded the sediment background maximum concentration
    – The maximum HQ is 11.

  — Copper
    – Two of two samples exceeded the ecological screening value
    – One of two samples exceeded the sediment background maximum concentration
    – The maximum HQ is 35.

  — Lead
    – One of two samples exceeded the ecological screening value
    – One of two samples exceeded the sediment background maximum concentration
    – The maximum HQ is 65.

  — Nickel
    – One of two samples exceeded the ecological screening value
    – One of two samples exceeded the sediment background maximum concentration
    – The maximum HQ is 2.3.

  — Zinc
    – Two of two samples exceeded the ecological screening value
    – One of two samples exceeded the sediment background maximum concentration
    – The maximum HQ is 20.

5.4.2.4 Based on this assessment the sediment pathway is complete, and antimony and lead are COPCs and antimony, copper, lead, nickel, and zinc are COPECs.

5.4.3 Terrestrial Pathway and Screening Results

5.4.3.1 The FUDS contains natural barriers that include dense vegetation, wetlands, and rugged terrain (outcrops). However, in the SS-WP (Alion 2007a), surface soil in MRS 1 was viewed as a potentially complete pathway for human and ecological receptors for MC. A total of 23 surface soil samples (including 18 on-site [including two duplicates] and five background samples) were collected from MRS 1. Table 5-2 presents a summary of surface soil sample results compared to residential and industrial human health screening values, as well as ecological screening values for MRS 1.

5.4.3.2 Based on the analyses of the soil samples, no explosives were detected above the applicable screening criteria as shown on Table 5-2.

5.4.3.3 Based on the analyses of the soil samples, lead was found to exceed the human health screening value, and antimony, copper, lead, mercury, and zinc exceeded ecological screening values. Antimony, copper, and lead also were detected above the background concentrations (Table 5-5). The following factors were considered as part of the weight-of-evidence evaluation approach in developing recommendations for potential future actions at MRS 1 due to human and ecological screening value exceedances in the soil matrix:

- COPC
  - Lead
    - One of 16 samples exceed the residential human health screening value
    - One of two samples exceeded the soil background maximum concentration
    - The maximum concentration was 772 mg/kg compared to the human health screening value of 400 mg/kg.

- COPECs
  - Antimony
    - Eleven of 16 samples exceeded the ecological screening value
    - Two of 16 samples exceeded the soil background maximum concentration
    - The maximum HQ is 9.

- Copper
  - Ten of 16 samples exceeded the ecological screening value
  - Five of 16 samples exceeded the soil background maximum concentration
  - The maximum HQ is 35.

- Lead
  - Sixteen of 16 samples exceeded the ecological screening value
  - Five of 16 samples exceeded the soil background maximum concentration
  - The maximum HQ is 70.

- Mercury
  - Eight of 16 samples exceeded the ecological screening value
  - None of the 16 samples exceeded the soil background maximum concentration
  - The maximum HQ is 5.7.

- Zinc
  - All of 16 samples exceeded the ecological screening value
  - None of 16 samples exceeded the soil background maximum concentration
  - The maximum HQ is 5.

5.4.3.4 Based on this assessment the soil pathway is complete, lead is a COPC and antimony, copper, and lead are COPECs. Mercury and zinc are not COPECs since they did not exceed their respective soil background maximum concentration.

5.4.4 Air Pathway

5.4.4.1 The air migration pathway for MRS 1 has an extremely low potential, if any, for human and/or environmental receptors to come into contact with the MC detected in surface soil and sediment (metals) due to the dense vegetative cover and outcrop areas.

Table 5-1 Summary of Soil Analytical Results
Iona Island Naval Ammunition Depot

	Sample Name:		USEPA Region IX PRG Screening Value [1]	USEPA Region IX PRG Screening Value [2]	Ecological Screening Value [3]	II-EA-SS-02-01	FD#1	II-EA-SS-02-02	II-EA-SS-02-03	II-EA-SS-02-04	II-EA-SS-02-05	II-EA-SS-02-06	II-EA-SS-02-07	II-EA-SS-02-08	II-EA-SS-02-09	II-EA-SS-02-10
	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	12/4/2007
	Parent Name:						II-EA-SS-02-01									
	MRS:					MRS 1	MRS 1	MRS 1	MRS 1	MRS 1	MRS 1	MRS 1	MRS 1	MRS 1	MRS 1	MRS 1
Analyte	**CAS**	**Unit**														
Explosives																
2,4-DINITROTOLUENE	121-14-2	mg/kg	0.72	2.5	30	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
2,6-DINITROTOLUENE	606-20-2	mg/kg	0.72	2.5	30	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
2-AMINO-4,6-DINITROTOLUENE	35572-78-2	mg/kg	1.2	12	20	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
2-NITROTOLUENE	88-72-2	mg/kg	0.88	2.2	30	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
3-NITROTOLUENE	99-08-1	mg/kg	73	100	30	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
4-AMINO-2,6-DINITROTOLUENE	19406-51-0	mg/kg	1.2	12	20	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
4-NITROTOLUENE	99-99-0	mg/kg	12	30	30	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
NITROGLYCERIN	55-63-0	mg/kg	35	120	NSL	8.1 U	8 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
TETRYL	479-45-8	mg/kg	61	620	25	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
TNT	118-96-7	mg/kg	3.1	31	30	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
Metals																
ANTIMONY	7440-36-0	mg/kg	3.1	41	0.27	*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
COPPER	7440-50-8	mg/kg	310	4100	28	*36.1*	*34.2*	20.3	*52.9*	*31.9*	*76.1*	*44*	24.3	*64.1*	*106*	17.5
LEAD	7439-92-1	mg/kg	400	800	11	*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*
MERCURY	7439-97-6	mg/kg	2.3	31	0.1	*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
NICKEL	7440-02-0	mg/kg	160	2000	38	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
ZINC	7440-66-6	mg/kg	2300	10000	46	*82.4*	*74.2*	*54.5*	*80.3*	*96.4 J*	*134 J*	*129 J*	*69 J*	*234 J*	*66.3*	*69.8*

Table 5-1 Summary of Soil Analytical Results
Iona Island Naval Ammunition Depot

Sample Name:			II-EA-SS-02-11	II-EA-SS-02-12	II-EA-SS-02-13	II-EA-SS-02-14	II-EA-SS-02-15	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
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	12/4/2007	12/4/2007	12/4/2007	12/4/2007
Parent Name:								II-EA-SS-02-15			II-EA-SS-02-17					
MRS:			MRS 1	MRS 1	MRS 1	MRS 1	MRS 1	MRS 1	MRS 1	MRS 1	MRS 1	MRS 1				
Analyte	**CAS**	**Unit**														
Explosives																
2,4-DINITROTOLUENE	121-14-2	mg/kg	0.04 U	0.04 U	0.04 U	0.079 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	-	-	-	-
2,6-DINITROTOLUENE	606-20-2	mg/kg	0.04 U	0.04 U	0.04 U	0.079 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	-	-	-	-
2-AMINO-4,6-DINITROTOLUENE	35572-78-2	mg/kg	0.04 U	0.04 U	0.04 U	0.079 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	-	-	-	-
2-NITROTOLUENE	88-72-2	mg/kg	0.08 U	0.08 U	0.08 U	0.16 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-	-	-
3-NITROTOLUENE	99-08-1	mg/kg	0.08 U	0.08 U	0.08 U	0.16 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-	-	-
4-AMINO-2,6-DINITROTOLUENE	19406-51-0	mg/kg	0.04 U	0.04 U	0.04 U	0.079 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	-	-	-	-
4-NITROTOLUENE	99-99-0	mg/kg	0.08 U	0.08 U	0.08 U	0.16 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-	-	-
NITROGLYCERIN	55-63-0	mg/kg	4 U	4 U	4 U	7.9 U	4 U	4 U	4 U	4 U	4 U	4 U	-	-	-	-
TETRYL	479-45-8	mg/kg	0.08 U	0.08 U	0.08 U	0.16 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	-	-	-	-
TNT	118-96-7	mg/kg	0.04 U	0.04 U	0.04 U	0.079 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	-	-	-	-
Metals																
ANTIMONY	7440-36-0	mg/kg	*0.68 J*	0.3 UJ	*0.58 J*	*1.6 J*	*1.6 J*	*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*
COPPER	7440-50-8	mg/kg	27.9	21.1	*30.6*	*112*	*31.9*	*35.1*	*73.8*	26.3	26.5	*41.4*	*45.7*	*54.9*	*55.1*	12.3
LEAD	7439-92-1	mg/kg	*66.5 J*	*50.1 J*	*161 J*	*195 J*	*220 J*	*239 J*	*101 J*	*132 J*	*131 J*	*33.5 J*	*178 J*	*201 J*	*88.2 J*	*24.4 J*
MERCURY	7439-97-6	mg/kg	*0.12 J*	0.094 J	*0.35 J*	*0.44 J*	*0.57 J*	*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*
NICKEL	7440-02-0	mg/kg	13.3	15	18 J	21.9	16.3 J	18.2	12.3 J	13 J	13.5	9.8 J	26.8	23.4	13.5	12.1
ZINC	7440-66-6	mg/kg	*75.5*	*76.3*	*104 J*	*134*	*93.4 J*	*105*	*136 J*	*102 J*	*96.6*	*67.2 J*	*268*	*212*	*53.4*	*57*

Table 5-1 Summary of Soil Analytical Results
Iona Island Naval Ammunition Depot

		Sample Name:	II-BG-SS-02-05
		Sample Date:	12/4/2007
		Parent Name:	
		MRS:	
Analyte	**CAS**	**Unit**	
Explosives			
2,4-DINITROTOLUENE	121-14-2	mg/kg	-
2,6-DINITROTOLUENE	606-20-2	mg/kg	-
2-AMINO-4,6-DINITROTOLUENE	35572-78-2	mg/kg	-
2-NITROTOLUENE	88-72-2	mg/kg	-
3-NITROTOLUENE	99-08-1	mg/kg	-
4-AMINO-2,6-DINITROTOLUENE	19406-51-0	mg/kg	-
4-NITROTOLUENE	99-99-0	mg/kg	-
NITROGLYCERIN	55-63-0	mg/kg	-
TETRYL	479-45-8	mg/kg	-
TNT	118-96-7	mg/kg	-
Metals			
ANTIMONY	7440-36-0	mg/kg	*1.9 J*
COPPER	7440-50-8	mg/kg	*45.7*
LEAD	7439-92-1	mg/kg	*164 J*
MERCURY	7439-97-6	mg/kg	*0.52 J*
NICKEL	7440-02-0	mg/kg	22.5
ZINC	7440-66-6	mg/kg	*124*

(1) USEPA Region IX Preliminary Remediation Goals (PRGs) Table, USEPA, December 2004. For non-carcinogens except lead, value shown is equal to 1/10 the residential soil PRG value. For carcinogens the value shown is equal to the residential soil PRG value. To account for sediment exposure, the resulting values have been increased by a factor of ten.
(2) USEPA Region IX Preliminary Remediation Goals (PRGs) Table, USEPA, December 2004. For non-carcinogens except lead, value shown is equal to 1/10 the industrial soil PRG value. For carcinogens the value shown is equal to the industrial soil PRG value. To account for sediment exposure, the resulting values have been increased by a factor of ten.
(3) Ecological Screening Value references are found in Table 5-3.

BG=background sample
SS=surface soil
J=Analyte is present. Reported value may not be accurate or precise.
U=Not detected. The associated number indicates the approximate sample concentration necessary to be detected.
UJ=Not detected, quantitation limit may be inaccurate or imprecise.
mg/kg=milligrams per kilogram
CAS=Chemical Abstract Service
NA=not available
NSL=No Screening Level
NUT=Essential Nutrient
- =analysis not completed for that sample as per the SS-WP
Notes:
Blue shaded and bolded values represent exceedance of human health screening criteria.
Blue shaded and italicized values represent exceedance of ecological screening criteria.
Blue shaded, bolded and italicized values represent exceedance of both human health and ecological screening criteria.

Lavender shaded compounds are the maximum detected MC of concern for a given MRS that is above a screening criteria..

Table 5-2 Summary of Sediment Analytical Results
Iona Island Naval Ammunition Depot

Sample Name:			USEPA Region IX PRG Screening Value [1]	USEPA Region IX PRG Screening Value [2]	Ecological Screening Value [3]	II-EA-SD-02-01	II-EA-SD-02-02	FD#3	II-BG-SD-02-01	II-BG-SD-02-02	II-BG-SD-02-03
Sample Date:						12/4/2007	12/4/2007	12/4/2007	12/4/2007	12/4/2007	12/4/2007
Parent Name:								II-EA-SD-02-02			
MRS:						MRS 1	MRS 1	MRS 1			
Analyte	**CAS**	**Unit**									
Explosives											
2,4-DINITROTOLUENE	121-14-2	mg/kg	7.2	25	0.09	0.04 U	0.04 U	0.04 U	-	-	-
2,6-DINITROTOLUENE	606-20-2	mg/kg	7.2	25	0.09	0.04 U	0.04 U	0.04 U	-	-	-
2-AMINO-4,6-DINITROTOLUENE	35572-78-2	mg/kg	12	120	NSL	0.04 U	0.04 U	0.04 U	-	-	-
2-NITROTOLUENE	88-72-2	mg/kg	8.8	22	0.09	0.08 U	0.08 U	0.08 U	-	-	-
3-NITROTOLUENE	99-08-1	mg/kg	730	1000	0.09	0.08 U	0.08 U	0.08 U	-	-	-
4-AMINO-2,6-DINITROTOLUENE	19406-51-0	mg/kg	12	120	NSL	0.04 U	0.04 U	0.04 U	-	-	-
4-NITROTOLUENE	99-99-0	mg/kg	120	300	0.09	0.08 U	0.08 U	0.08 U	-	-	-
NITROGLYCERIN	55-63-0	mg/kg	350	1200	NSL	4 U	4 U	4 U	-	-	-
TETRYL	479-45-8	mg/kg	610	6200	NSL	0.08 U	0.08 U	0.08 U	-	-	-
TNT	118-96-7	mg/kg	31	310	0.09	0.04 U	0.04 U	0.04 U	-	-	-
Metals											
ANTIMONY	7440-36-0	mg/kg	31	410	2	0.55 J	*22.3 J*	***43.3 J***	1.1 UJ	1.4 UJ	1.9 J
COPPER	7440-50-8	mg/kg	3100	41000	31.6	*48.8*	*1110*	*2740*	*45.8*	*46.1*	*104*
LEAD	7439-92-1	mg/kg	400	800	35.8	*79 J*	***2340 J***	***5030 J***	*64.5 J*	*117 J*	*100 J*
MERCURY	7439-97-6	mg/kg	23	310	0.18	0.082 J	0.026 J	0.05 J	*0.47 J*	*0.68 J*	*0.45 J*
NICKEL	7440-02-0	mg/kg	1600	20000	22.7	20.6 J	*53.1 J*	*85.4*	*31.6*	*29.8*	*35.7*
ZINC	7440-66-6	mg/kg	23000	100000	121	*184 J*	*2470 J*	*2980*	*178*	*217*	*224*

(1) USEPA Region IX Preliminary Remediation Goals (PRGs) Table, USEPA, December 2004. For non-carcinogens except lead, value shown is equal to 1/10 the residential soil PRG value.
For carcinogens the value shown is equal to the residential soil PRG value. To account for sediment exposure, the resulting values have been increased by a factor of ten.
(2) USEPA Region IX Preliminary Remediation Goals (PRGs) Table, USEPA, December 2004. For non-carcinogens except lead, value shown is equal to 1/10 the industrial soil PRG value.
For carcinogens the value shown is equal to the industrial soil PRG value. To account for sediment exposure, the resulting values have been increased by a factor of ten.
(3) Ecological Screening Value references are found in Table 5-3.

BG=background sample
SD=sediment
J=Analyte is present. Reported value may not be accurate or precise.
U=Not detected. The associated number indicates the approximate sample concentration necessary to be detected.
UJ=Not detected, quantitation limit may be inaccurate or imprecise.
mg/kg=milligrams per kilogram
CAS=Chemical Abstract Service
NA=not available
NSL=No Screening Level
NUT=Essential Nutrient
- =analysis not completed for that sample as per the SS-WP

Notes:

Blue shaded and bolded values represent exceedance of human health screening criteria.
Blue shaded and italicized values represent exceedance of ecological screening criteria.
Blue shaded, bolded and italicized values represent exceedance of both human health and ecological screening criteria.

Lavender shaded compounds are the maximum detected MC of concern for a given MRS that is above a screening criteria..

Table 5-3. Sediment and Soil Ecological Screening Values and Sources
Iona Island Naval Ammunition Depot

Analyte	Screening Value	Screening Source
Sediment (mg/kg)		
2,4-DINITROTOLUENE	0.09	TNT as surrogate
2,6-DINITROTOLUENE	0.09	TNT as surrogate
2-AMINO-4,6-DINITROTOLUENE	NSL	
2-NITROTOLUENE	0.09	TNT as surrogate
3-NITROTOLUENE	0.09	TNT as surrogate
4-AMINO-2,6-DINITROTOLUENE	NSL	
4-NITROTOLUENE	0.09	TNT as surrogate
NITROGLYCERIN	NSL	
TNT	0.09	Talmage et al. (1999)
ANTIMONY	2	Long and Morgan (1990)
COPPER	31.6	MacDonald et al. (2000)
LEAD	35.8	MacDonald et al. (2000)
MERCURY	0.18	MacDonald et al. (2000)
NICKEL	22.7	MacDonald et al. (2000)
ZINC	121	MacDonald et al. (2000)

NSL - No screening level
mg/kg = milligram per kilogram

Analyte	Screening Value	Screening Source
Surface Soil (mg/kg)		
2,4-DINITROTOLUENE	30	TNT as surrogate
2,6-DINITROTOLUENE	30	TNT as surrogate
2-AMINO-4,6-DINITROTOLUENE	20	Talmage et al. (1999)
2-NITROTOLUENE	30	TNT as surrogate
3-NITROTOLUENE	30	TNT as surrogate
4-AMINO-2,6-DINITROTOLUENE	20	2-amino-4,6-dinitrotoluene as surrogate
4-NITROTOLUENE	30	TNT as surrogate
NITROGLYCERIN	NSL	
TNT	30	Talmage et al. (1999)
ANTIMONY	0.27	USEPA (2005a)
COPPER	28	USEPA (2007a)
LEAD	11	USEPA (2005b)
MERCURY	0.1	Efroymson et al. (1997)
NICKEL	38	USEPA (2007b)
ZINC	46	USEPA (2007c)

NSL - No screening level
mg/kg = milligram per kilogram

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U.S. Environmental Protection Agency (USEPA). 2007c. Ecological Soil Screening Level for Zinc. OSWER Directive 9285.7-73. June.

Table 5-4
Non-Detection Concentrations and Screening Values for Human Health and Ecological Risk
Iona Island Naval Ammunition Depot

Analyte	Cas no.	Units	Minimum Non-Detect Concentration	Maximum Non-Detect Concentration	USEPA Region IX PRG Screening Value (1)	Ecological Screening Value (2)
Sediment						
Explosives						
2,4-DINITROTOLUENE	121-14-2	mg/kg	0.04	0.04	7.2	0.09
2,6-DINITROTOLUENE	606-20-2	mg/kg	0.04	0.04	7.2	0.09
2-AMINO-4,6-DINITROTOLUENE	35572-78-2	mg/kg	0.04	0.04	12	NSL
2-NITROTOLUENE	88-72-2	mg/kg	0.08	0.08	8.8	0.09
3-NITROTOLUENE	99-08-1	mg/kg	0.08	0.08	730	0.09
4-AMINO-2,6-DINITROTOLUENE	19406-51-0	mg/kg	0.04	0.04	12	NSL
4-NITROTOLUENE	99-99-0	mg/kg	0.08	0.08	120	0.09
NITROGLYCERIN	55-63-0	mg/kg	4	4	350	NSL
TETRYL	479-45-8	mg/kg	0.08	0.08	610	NSL
TNT	118-96-7	mg/kg	0.04	0.04	31	0.09
Surface Soil						
Explosives						
2,4-DINITROTOLUENE	121-14-2	mg/kg	0.04	0.0805	0.72	30
2,6-DINITROTOLUENE	606-20-2	mg/kg	0.04	0.0805	0.72	30
2-AMINO-4,6-DINITROTOLUENE	35572-78-2	mg/kg	0.04	0.0805	1.2	20
2-NITROTOLUENE	88-72-2	mg/kg	0.08	0.16	0.88	30
3-NITROTOLUENE	99-08-1	mg/kg	0.08	0.16	73	30
4-NITROTOLUENE	99-99-0	mg/kg	0.08	0.16	12	30
NITROGLYCERIN	55-63-0	mg/kg	4	8.05	35	NSL
TETRYL	479-45-8	mg/kg	0.08	0.16	61	25

(1) USEPA Region IX Preliminary Remediation Goals (PRGs) Table, USEPA, December 2004. For non-carcinogens, value shown is equal to 1/10 the PRG value. For carcinogens the value shown is equal to the PRG value. To account for sediment and surface water exposure, the resulting values have been increased by a factor of ten.

(2) Ecological Screening Value references are found in Table 5-3.

NSL=No Screening Level

mg/kg=milligrams per kilogram

TABLE 5-5
COMPARISON OF ON-SITE AND BACKGROUND SOIL CONCENTRATIONS
IONA ISLAND NAVAL AMMUNITION DEPOT

		On-site				Background				Comparisons	
Chemical	Unit	Minimum Concentration/Qualifier	Maximum Concentration/Qualifier	Mean Concentration	Detection Frequency	Minimum Concentration/Qualifier	Maximum Concentration/Qualifier	Mean Concentration	Detection Frequency	Site Maximum > Background Maximum	Site Mean > Background Mean
ANTIMONY	mg/kg	0.29 UJ/UJ	2.4 J	0.863	15/21	1.1 J	1.9 J	1.62	5/5	Yes	No
COPPER	mg/kg	17.5	112	44.5	21/21	12.3	55.1	42.7	5/5	Yes	Yes
LEAD	mg/kg	11.8 J	772 J	163	21/21	24.4 J	201 J	131	5/5	Yes	Yes
MERCURY	mg/kg	0.028 J	0.66 J	0.259	21/21	0.14 J	0.82 J	0.524	5/5	No	No
NICKEL	mg/kg	8.8	21.9	16.50	21/21	12.1	26.8	19.7	5/5	No	No
ZINC	mg/kg	54.5	234 J	99.0	21/21	53.4	268	143	5/5	No	No

Qualifiers:
J=Analyte is present. Reported value may not be accurate or precise.
UJ=Not detected, quantitation limit may be inaccurate or imprecise.

TABLE 5-6
COMPARISON OF ON-SITE AND BACKGROUND SEDIMENT CONCENTRATIONS
IONA ISLAND NAVAL AMMUNITION DEPOT

		On-site				Background				Comparisons	
Chemical	Unit	Minimum Concentration/Qualifier	Maximum Concentration/Qualifier	Mean Concentration	Detection Frequency	Minimum Concentration/Qualifier	Maximum Concentration/Qualifier	Mean Concentration	Detection Frequency	Site Maximum > Background Maximum	Site Mean > Background Mean
ANTIMONY	mg/kg	0.55 J	43.3 J	22.0	3/3	1.1 UJ	1.9 J	1.47	1/3	Yes	Yes
COPPER	mg/kg	48.8	2740	1300	3/3	45.8	104	65.3	3/3	Yes	Yes
LEAD	mg/kg	79 J	5030 J	2480	3/3	64.5 J	117 J	93.8	3/3	Yes	Yes
MERCURY	mg/kg	0.026 J	0.082 J	0.0527	3/3	0.45 J	0.68 J	0.533	3/3	No	No
NICKEL	mg/kg	20.6 J	85.4	53.0	3/3	29.8	35.7	32.4	3/3	Yes	Yes
ZINC	mg/kg	184 J	2980	1880	3/3	178	224	206	3/3	Yes	Yes

Qualifiers:
J=Analyte is present. Reported value may not be accurate or precise.
UJ=Not detected, quantitation limit may be inaccurate or imprecise.

6. SUMMARY AND CONCLUSIONS

6.0.1 The former Iona Island Naval Ammunition Depot is located on Iona Island and Round Island in the Town of Stony Point, County of Rockland, New York. The United States Naval Department used the property from 1900 to 1947 as an ammunition depot. One MRS was identified at the Iona Island Naval Ammunition Depot FUDS and is addressed in this SI consistent with the MMRP Inventory in the DERP Fiscal Year 2005 Annual Report to Congress (DoD 2005). The one range, identified as the 1903 Explosion, consists of a 124.2-acre area with a radius of 1,250 ft. A summary of the results and conclusions is presented below.

6.1 1903 EXPLOSION (MRS 1)

6.1.1 As presented in the MRS and CSM discussions, one MRS (1903 Explosion) was identified within the FUDS. According to historical records, activities included preparing, assembling, maintaining, inspecting, testing, and issuing ammunition. Range munitions included small arms, large caliber, aerial rocket (3.5-in. rocket aircraft Mk4, FFAR), flares, signals, and simulators.

6.1.2 There have been documented findings of MEC at the Iona Island Naval Ammunition Depot FUDS, however, no MEC was found during the SI field reconnaissance. MD was found in numerous locations in the past. Given the MD discoveries and the limited SI reconnaissance compared to the overall size of the FUDS property, MEC may remain within MRS 1. The MRS contains densely vegetated rocky terrain with partial fencing and an unmanned gate which provides limited access to the FUDS.

6.1.3 No documented injuries from MEC were reported since DoD transferred the property. An undocumented and unknown military incident occurred during the 1980s which was responded to by the New York State Police and resolved by the Army (USACE 1997). The overall MEC risk is “moderate” given documented evidence of MD and unconfirmed discoveries of MEC historically. MD has been identified in multiple locations within the 1903 explosion area including the “dump site.”

6.1.4. Antimony, copper, and lead exceeded background concentrations and their respective ecological screening values were identified as COPECs in surface soil. Lead also was identified as a human health COPC in surface soil since it exceeded background and the human health screening value. Antimony, copper, lead, nickel, and zinc exceeded background sediment concentrations and their associated ecological screening values and were identified as a

COPECs. Lead and antimony also exceeded background concentrations and human health screening criteria and were identified as a COPCs in sediment. The pathways for soil and sediment in the CSM are complete given the exceedance of background concentrations for munition-related MC metals (Table 6-1).

Table 6-1. Summary of Human Health and Ecological Screening-Level Risk Assessment Results.

Iona Island Naval Ammunition Depot

Medium of Concern	Human Health COPCs[1]	Ecological COPECs (SLERA)[2]
	MRS 1 – 1903 Explosion	MRS 1 – 1903 Explosion
Surface Soil	Lead exceeded the applicable residential risk screening value and the range of background concentrations. Based on this weight of evidence, this constituent is identified as a COPC.	Antimony, copper, lead, mercury, and zinc exceeded risk screening values. However, only antimony, copper, and lead exceeded the maximum of background concentrations. Based on this weight of evidence, antimony, copper and lead were identified as COPECs.
Sediment	Lead exceeded the applicable residential and industrial risk screening value and the range of background concentrations. Antimony exceeded the applicable residential risk screening value. Based on this weight of evidence, this constituent is identified as COPCs.	Antimony, copper, lead, nickel, and zinc exceeded risk screening values. These constituents also exceeded the range of background concentrations. Based on this weight of evidence, antimony, copper, lead, nickel and zinc were identified as COPECs.
Subsurface Soil	No subsurface soil sampling completed.	Not a media of concern for ecological receptors.
Groundwater	No groundwater sampling completed.	Not a media of concern for ecological receptors.
Surface Water	No surface water sampling completed.	No surface water sampling completed.

1 For the Human Health Risk Screen, EPA Region IX Preliminary Remediation Goals (PRGs) were used for soil and sediment sample comparisons. See Table 5-1 and 5-2.
2 For Ecological Risk Screen, the screening values identified in Tables 5-3 were applied.

7. RECOMMENDATIONS

7.1 USACE programmatic range documents identified one range at Iona Island Naval Ammunition Depot, 1903 Explosion (C02NY074403). The 1903 Explosion consists of a 124.2-acre area with a radius of 1,250 ft.

7.2 The recommendation for this MRS is noted below:

- ***MRS 1 (1903 Explosion)*** – An RI/FS is recommended. Additional studies should focus on both MEC and MC for the Iona Island Naval Ammunition Depot based on the results of the MEC assessment and risk screening. There have been past discoveries of MD and the potential exists for both MEC and MD to remain at MRS-1. Potential for risks to ecological and human receptors are present given the metal concentrations in surface soil and sediment which exceeded ecological screening criteria, human health screening criteria, and background concentrations.

7.3 Neither a TCRA nor a NTRCA is recommended for MRS 1.

7.4 Historical documents should be reviewed and possibly revised to account for the acreage of MRS 1 (1903 Explosion) that falls outside of the FUDS boundary. Additionally, background sample locations from this SI Report should be reviewed and new background samples further away from the FUDS in the same geologic formation should be selected and agreed upon with NYSDEC.

8. REFERENCES

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APPENDIX A –- SCOPE OF WORK

Located on CD

APPENDIX B –- TECHNICAL PROJECT PLANNING MEMORANDUM

- Data Quality Objective Verification Worksheets (Located on CD)
- Technical Project Planning Memorandum #1 (Located on CD)
- Technical Project Planning Memorandum #2 (Located On CD)

APPENDIX C – INTERVIEW DOCUMENTATION

Appendix not used

APPENDIX D – FIELD NOTES AND FIELD FORMS

- Daily Quality Control Reports
- Logbook
- Fieldsheets
- Chain-of-Custody

Alion Science and Technology, Inc.

DAILY QUALITY CONTROL REPORT

Report Number:	12-4-07-01	**Date:** 12-4-07	
Project Name:	Iona Island Naval Ammunition Depot C02NY074403	**Contract Number:** W912DY-04-D-0017	
Location of Work:	Bear Mountain, New York		
Description of Work:	Meandering path geophysical reconnaissance and sampling.		

Weather:	Cloudy , Cold, AM Snow	**Rainfall:**	>1 inch	**Temperature:**	**Min.**	30	**Max.** 32
							Wind Chill = 20's

1. Work performed today by Alion Team.

Prior to field activities the field team (including Tim Reese, Tim McJilton, Maria Magilton and Rusty Mitchell) met to go over planned field activities and health and safety concerns. The field team performed MEC avoidance and reconnaissance (meandering paths) to access the sample locations. Once at the sample location, the sampling area was screened with the Schonstedt for any MEC, and the sample was collected. Five sediment samples and twenty-five soil samples along with four field duplicate samples were collected at the Iona Island FUDS.

Reconnaissance Acreage / Discussion:

Reconnaissance was conducted in the meandering path fashion. Travel paths varied slightly from the geophysical site reconnaissance figures in the SS-WP due to natural terrain and access issues (rocky outcrops, inaccessible areas). The sampling points did not vary from the SS-WP except for three background locations. Planned background samples could not be reached due to an impassable marshland / steep hill.

Samples Collected:

II-EA-SS-02-01	II-EA-SS-02-12	II-BG-SS-02-03
II-EA-SS-02-02	II-EA-SS-02-13	II-BG-SS-02-04
II-EA-SS-02-03	II-EA-SS-02-14	II-BG-SS-02-05*
II-EA-SS-02-04	II-EA-SS-02-15	II-BG-SD-02-01*
II-EA-SS-02-05	II-EA-SS-02-16	II-BG-SD-02-02*
II-EA-SS-02-06	II-EA-SS-02-17	II-BG-SD-02-03
II-EA-SS-02-07	II-EA-SS-02-18	FD#1 – Surface Soil (SS-02-01)
II-EA-SS-02-08	II-EA-SD-02-01	FD#2 – Surface Soil (SS-02-15)
II-EA-SS-02-09	II-EA-SD-02-02	FD#3 – Sediment (SD-02-02)
II-EA-SS-02-10	II-BG-SS-02-01	FD#4 – Surface Soil (SS-02-17)
II-EA-SS-02-11	II-BG-SS-02-02	

* Sample relocated from area outlined in the SS-WP; see Item 9 next page.

Field Tests:

The Trimble GPS was determined to be inoperable due to computer malfunctions therefore the handheld Garmin GPS was used for the sampling event; this deviation is approved in the SS-WP. No onsite control monuments could be located thus a measurement was taken at a flagpole in the morning prior to sampling. The GPS gave a reading of E (0584629) N (4574012). A second reading was taken with the GPS at the end of the sampling event at the flagpole and was identical to the first benchmark reading (E (0584629) N (4574012)).

The handheld GPS was determined to be in operable and accurate condition.

The Schonstedt checked OK.

Calibration of Instruments:

None

Other:

None.

2. Work performed today by other subcontractors.

None

3. Type and results of Control Phases and Inspection. (Indicate whether Preparatory – P, Initial – I, or Follow-Up – F and include satisfactory work completed or deficiencies with actions to be taken)

Preparatory phase inspections for field work were completed prior to mobilizing to Bear Mountain, New York. Initial phase of inspections were completed upon site arrival. A follow-up inspection of equipment was completed upon arrival at Bear Mountain (12/4/07) and the Trimble was deemed inoperable. The handheld Garmin was used as a substitute.

4. List type and location of tests performed and results of these tests.

None

5. List material and equipment received.

Trimble GPS Unit

6. Submittals reviewed. (Include Transmittal No., Item No., Spec/Plan Reference, by whom, and any action.

None.

7. Off-site surveillance activities, including action taken.

None.

8. Job Safety. (Report safety violations observed and actions taken)

No safety violations or incidents.

9. Remarks. (Instructions received or given. Conflicts in Plans or Specifications)

The Field Team (T. Reese, T. McJilton, M. Magilton and C. Mitchell) initially performed benchmark validation (at the beginning of the day). The Field Team traveled to Iona Island to complete field work and started collecting samples in the southern part of the FUDS.

The Alion Team Performed meandering path geophysical reconnaissance around Iona Island, within the FUDS. Geophysical reconnaissance and sample collection was conducted within Iona Island as well as in Background areas. Background sample collection was performed in the western part of the FUDS. No MEC or MD was observed in the area of the background samples or on the FUDS.

The Alion Team performed meandering path geophysical reconnaissance around Iona Island, especially along the eastern shore at the location of the former piers / docks. The northern end contained hilly, rocky areas with ground vegetation and open meadows. The central portion of the FUDS contained open meadows and old buildings associated with the site. The eastern portion of the island was bordered by the Hudson river while the western side was bordered by marshland. Reconnaissance was conducted across the island using the hand held analog magnetometer (Schonstedt -52). Reconnaissance was also conducted along the banks of the Hudson River. During geophysical reconnaissance, nine anomalies were noted/recorded in the fill area between Round Island and Iona Island; however, no visual / surficial evidence of MD/MEC was identified. Cultural debris to

include pieces of wood and metal rebar, fencing and man made walls were observed. The Field Team found no visual/surficial evidence of any MEC/MD or MPPEH during the sampling and geophysical reconnaissance events at Iona Island FUDS.

Deviations from the work plan included minor adjustments to sample locations due to site conditions (rocky terrain, inaccessible due to river levels) and soil availability. Five sediment samples were collected from the Iona Island FUDS. Of those five, three were taken from background locations. An additional duplicate sediment sample was collected. Twenty-three soil samples were collected, five of which were background samples. In addition to the twenty three soil samples, three field duplicate samples were collected. Overall, 28 samples were collected along with four field duplicates totaling thirty two samples.

Sample II-BG-SD-02-01 was relocated due to impassable marshland / rocky hill. The sample was taken to the north side of the causeway onto the island but not within the runoff area of the causeway. Sample II BG-SD-02-02 was moved as well due to impassable marshland/rocky hill. The sample was moved along the southern side of the causeway directly across from sample II-BG-DS-02-01 but not within the runoff area of the causeway. The designated location of Sample II BG-SS-02-05 was located atop of a rocky hill under tree cover and was moved north of the predetermined sample site to access soil rather than organic material.

Photographs were taken of sampling locations and areas of interest throughout the FUDS. GPS coordinates were recorded for each sample and anomaly. Samples were later recorded on lab specific Chain of Custody forms, placed on ice, and prepared for shipment. Samples were picked by GPL Labs (on 12/6/07). No health and safety issues and/or incidents occurred during field work.

The Field Team found no visual / surficial evidence of any MEC/MD or MPPEH during the sampling and geophysical reconnaissance events at the Iona Island FUDS.

Alion Science and Technology, Inc's Verification: On behalf of Alion, I certify this report is complete and correct, and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications, to the best of my knowledge, except as noted above.

Quality Control System Manager (Sign and Print Name)

Field Logbook for
The MMRP Site
Inspection of:

"Rite in the Rain."
ALL-WEATHER
ENVIRONMENTAL
No. 550

Iona Island
Naval Ammunition
Depot
(C02NY074403)

"Rite in the Rain"®
ALL-WEATHER WRITING PAPER

ALL-WEATHER
ENVIRONMENTAL FIELD BOOK

Name EA Engineering

Address 15 Loveton Circle
Sparks MD 21152

Phone 410-771-4950

Project Iona - Island

This book is printed on "Rite in the Rain" All-Weather Writing Paper. A unique paper created to shed water and enhance the written image. It is widely used throughout the world for recording critical field data in all kinds of weather. For best results, use a pencil or an all-weather pen.

Specifications for this book:

Page Pattern		Cover Options	
Left Page	Right Page	Polydura Cover	Fabrikoid Cover
Columnar	1/4" Grid	Item No. 550	Item No. 550F

CONTENTS

Reference Page Index

CONTENTS

PAGE	REFERENCE	DATE

Location Ice Island Date 12-4-07

Project / Client USACE / CENAB

755 Verified GPS at Sky pole
Way Pt 008
0584629
4577012
will recheck later
800 Held Health & Safety Meeting
815 Sonarsteat checked and verified working condition

830 Walked around round Island found cultural debris fence posts Fences man made walls.

850 Collected Sample SS-02-12
Mark 009 0586049
4572722

855 Walked around fill area between Ice & Round Island - 9 sub-surface anomaly hits

916 Collected sample SD02-12
01C 0586064
4572777 FD#3 TM

4

Location Iona Island Date 12-4-07

Project / Client USACE CENAB

855 Collected Sample SS-02-15 FD#2
0.1 0585620
4572816

910 Collected Sample
SS-02-13
012 0585926
4572930

920 Collected Sample
SD-02-01 TM
0013 0585962
4573106
Sample very Rocky

920 Collected Sample SS-02-05
0014 0585917
4573115

TAR

935 Collected Sample SS-02-04
Collected FD#4 SS-0217
Waypoint 0016 0585785
4572917

TM

dl

D-7

5

Location Iona Island Date 12-4-07

Project / Client USACE CENAB

1000 Collected Sample SS-0208
Waypoint 17 0585751
4572962

1007 Collected Sample SS-02-07
Waypoint 18 0585804
4573023

1015 Collected Sample
SS-02-18

~~Coll~~ 019 0585817
4572967

1020 Collected Sample SS-02-06
020 0585873
4573046

1030 Collected SS-02-04
021 0585736
4573131

TM

dl

6

Location Iona Island Date 12-4-07

Project / Client USACE CENAB

1035 Collected Sample SS-02-03
022 0585665
4573660

1040 Collected sample SS-02-09
waypoint 23 0585668
4572991

1050 Collected sample SS-02-02
024 0585531
4573081

1100 Collected Sample SS02-01+FD#1
025 0585711
4573209
high organic content,
outcrop area

1122. SS-02-12 @ 1122 sample
027 0585854
4572849

TM

D-8

7

Location Iona Island Date 12-4-07

Project / Client USACE CENAB

1135 Collected SS-02-14
028 0585830
4572722

1142 Collected SS-02-~~10~~ 11 TM
waypoint 30 0585762
4572804

Mulch in area of sample

1150 Collected SS-02-10
waypoint 31 0585657
4572832
behind bldg

1200 - Counted Samples in truck

1210 Collected BG-SS-02-02
waypoint 32 0585276
4572845

1216 Collected BG-SS-02-01
waypoint 34 0585301
4572753

TM

8

Location Iona Island Date 12 4 07

Project / Client USACE CENAB

1230 BG SD-02-01
moved sample south-impasse
way. vi 35 0585235
4572618

1235 BG-SD-02-02
36 component
0585242
4572596.
moved sample to the south of
causeway.

1250 BG-SS-02-03
component 37 0585302
4572941
Top of hill.

1258 BG-SS-02-04
component 38 0585248
4573014
original material

TM

D-9

9

Location Iona Island Date 12-4-07

Project / Client USACE CENAB

1315 Collected sample
BG-SD-02-03
37 0585345
4572933

1325 Collected sample
BG-SS-02-05
40 0585275
4573332
relocated last Background to
N-S this site to get to
soil rather than organic
material.

1345 Re-check of GPS at
flagpole
#41 r0584629
4574012

Not used

TM

SITE ENTRY AND EXIT LOG

Project/Site : Iona Island Naval Ammunition Depot
Project No.: C02NY074403

Date	Name	Representing	Time	
			In	Out
12/4/07	Tim Reese	EA / Alion	0750	1345
12/4/07	Curtis Mitchell	HFA	0750	1345
12/4/07	Mark Magilton	EA / Alion	0750	1345
12/4/07	Tim McJilton	EA / Alion	0750	1345

ACCIDENT PREVENTION PLAN REVIEW RECORD

SITE: Iona Island Naval Ammunition Depot

Project No. C02NY074403

I have read the Accident Prevention Plan and have been briefed on the nature, level, and degree of exposure likely as a result of participation of field activities. I agree to conform to all the requirements of this Plan.

Name	Signature	Affiliation	Date
Curtis Mitchell		HFA	12/4/07
Timothy Reese		EA / Alion Team	12/4/07
Maria Magilton		EA / Alion Team	12/4/04
Timothy McJilton		Ea / Alion Team	12/4/07

HEALTH AND SAFETY ACTIVITY REPORT

Site: Iona Island Location: Bear Mtn, NY

Weather Conditions: 30°F Onsite Hours: From 0750 To 1345

Morning Briefing Topic: Discussed Munition safety, walking on rocks, and cold weather

General Activities Complete: To conduct site reconnaissance and surface and sediment samples.

Morning Briefing Attendance: Tim Reese Maria Magilton Tim McJilton

Changes in PPE Levels*	Work Operations	Reasons for Change
None		

Site Safety and Health Plan Violations	Corrective Action Specified	Corrective Action Taken (yes/no)
None		

Observations and Comments:
See logbook

Completed by: C Nitkiewicz Date: 12/4/07

Site Health and Safety Supervisor

*Only Site Safety and Health Officer may change PPE levels, using only criteria specified in Programmatic APP.

GPL LABORATORIES, LLLP

7210A Corporate Court
Frederick, MD 21703
(301) 694-5310
Fax (301) 620-0731

Contract #/Billing Reference:

Project: Long Island
Client: Alion
Send Results To: Corinne Shic
Address: 3975 Fair Ridge Drive Suite 125 S
Fairfax VA 22033
Phone: 703-259-5147

Turnaround Time: STANDARD

Sample ID#	Date Sampled	Time Sampled	Sample Matrix	Sampler's Initials	# of Containers	Container Type	Preservative Used	Type of Analysis: Metals - Antimony, Copper, Lead, Mercury, Nickel, Zinc (6010B)	Type of Analysis: Explosives UC (8330A Mod) (7471B/M)	Lab Cooler No.	CLIENT COMMENTS
II-EA-SS-02-16	12-4-07	0830	SS	TM	12	8 oz Glass	—	X	X		
II-EA-SD-02-02		0840	SD	TM	12	8 oz Glass	—	X	X		
II-EA-SS-02-15		0855	SS	TM				X	X		
II-EA-SS-02-13		0910	SS	TM				X	X		
II-EA-SD-02-01		0920	SD	TM				X	X		
II-EA-SS-02-05		0920	SS	TM				X	X		
II-EA-SS-02-17		0955	SS	TM				X	X		
II-EA-SS-02-08		1000	SS	TM				X	X		
II-EA-SS-02-07		1007	SS	TM				X	X		
II-EA-SS-02-18		1015	SS	TM				X	X		
II-EA-SS-02-06		1020	SS	TM				X	X		
II-EA-SS-02-04		1030	SS	TM				X	X		

TM

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:	Date/Time
[signature]	12-5-07 9:45am				

Relinquished By:	Date/Time	Received By:	Date/Time	Shipper:	Airbill No.:

Relinquished By:	Date/Time	Received By:	Lab Comments:	Temp:

G.P. W.O. _____

GPL LABORATORIES, LLLP

7210A Corporate Court
Frederick, MD 21703
(301) 694-5310
Fax (301) 620-0731

Contract #/Billing Reference

2 of 3 Pgs.

Project: Ione Island
Client: Alion
Send Results To: Corinne Shia
Address: 3975 Fair Ridge Drive Suite 125 S
Fairfax VA 22033
Phone: 703-259-5147

Turnaround Time: STANDARD

Sample ID#	Date Sampled	Time Sampled	Sample Matrix	Sampler's Initials	# of Containers	Container Type	Preservative Used	Type of Analysis: Metals - Antimony, Copper, Lead, Zinc (6010 B)	Type of Analysis: Explosives (8330 A)	Type of Analysis: Explosives (8330 A Mod)	Lab Cooler No.	CLIENT COMMENTS
II-EA-SS-02-03	12-4-07	1035	SS	TM	12	8 oz Glass	—	X	X			
II-EA-SS-02-04		1040	SS	TM				X	X			
II-EA-SS-02-02		1050	SS	TM				X	X			
II-EA-SS-02-01		1100	SS	TM				X	X			
II-EA-SS-02-12		1122	SS	TM				X	X			
II-EA-SS-02-14		1135	SS	TM				X	X			
II-EA-SS-02-11		1142	SS	TM				X	X			
II-EA-SS-02-10		1150	SS	TM				X	X			
II-BG-SS-02-02		1210	SS	TM				X				
II-BG-SS-02-01		1216	SS	TM				X				
II-BG-SD-02-01		1230	SD	TM				X				
II-BG-SD-02-02		1235	SD	TM				X				

TM

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:	Date/Time
[signature]	12-5-07 9:45am				

Relinquished By:	Date/Time	Received By:	Date/Time	Shipper:	Airbill No.:

Relinquished By:	Date/Time	Received By:	Lab Comments:	Temp:

G.P. W.O. _____

GPL LABORATORIES, LLLP

7210A Corporate Court
Frederick, MD 21703
(301) 694-5310
Fax (301) 620-0731

Contract #/Billing Reference

3 of 3 Pgs.

Project: Iona Island
Client: Alia
Send Results To: Corinne Shia
Address: 3975 Fair Ridge Drive suite 125S
Fairfax VA 22033
Phone: 703-259-5147

Turnaround Time: STANDARD

Sample ID#	Date Sampled	Time Sampled	Sample Matrix	Sampler's Initials	# of Containers	Container Type	Preservative Used	Type of Analysis: Metals - Antimony, Copper, Lead, Mercury, Nickel, Zinc (6010B)(7471B(HG))	Type of Analysis: EXP Isomers NJ (8330A MOD) (8330A)	Lab Cooler No.	CLIENT COMMENTS
					8	8 oz glass	—				
					4	8 oz glass	—				
II-BG-SS-0203	12-4-07	1250	SS	TM				X			
II-BG-SS-02-04		1255	SS	TM				X			
II-BG-SD02-03		1315	SD	TM				X			
II BG-SS-02-05		1325	SS	TM				X			
FD #1		—	SS	TM				X	X		
FD #2		—	SS	TM				X	X		
FD #3		—	SD	TM				X	X		
FD #4		—	SS	TM				X	X		

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:	Date/Time
[signature]	12-5-07 945am				
Relinquished By:	Date/Time	Received By:	Date/Time / Shipper:	Airbill No.:	
Relinquished By:	Date/Time	Received By:	Lab Comments:	Temp:	

G.P. W.O. _____

APPENDIX E – PHOTO DOCUMENTATION LOG

APPENDIX E - PHOTOGRAPHIC LOG

Project/Site: MMRP SI for the Iona Island Naval Ammunition Depot
Project No.: C02NY074403

Date	Taken By	Photo ID	Description
12/4//2007	T. Reese	E.1	Qualitative Site Reconnaissance along perimeter of Round Island.
12/4//2007	T. Reese	E.2	Cultural debris and railroad tracks in water.
12/4//2007	T. Reese	E.3	Southwest view from Round Island.
12/4//2007	T. Reese	E.4	Wildlife on Iona Island.
12/4//2007	T. Reese	E.5	Qualitative Site Reconnaissance in the fill area between Round Island and Iona Island.
12/4//2007	T. Reese	E.6	Sediment sampling on Iona Island.
12/4//2007	T. Reese	E.7	Sediment sampling on Iona Island.
12/4//2007	T. Reese	E.8	Soil sampling on Iona Island.
12/4//2007	T. Reese	E.9	Qualitative Site Reconnaissance near remaining buildings on Iona Island.
12/4//2007	T. Reese	E.10	Soil sampling on Iona Island.
12/4//2007	T. Reese	E.11	Collecting background soil sampling.

Photo E.1 – Qualitative Site Reconnaissance along perimeter of Round Island.

Photo E.2 – Cultural debris and railroad tracks in water.

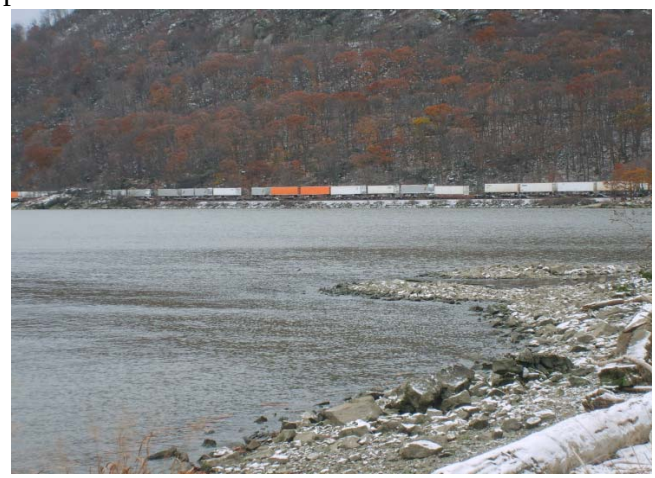


Photo E.3 – Southwest view from Round Island.

Photo E.4 – Wildlife on Iona Island.

Photo E.5 – Qualitative Site Reconnaissance in the fill area between Round Island and Iona Island.

Photo E.6 – Sediment sampling on Iona Island.

Photo E.7 – Sediment sampling on Iona Island.

Photo E.8 – Soil sampling on Iona Island.

Photo E.9 – Qualitative Site Reconnaissance near remaining buildings on Iona Island.

Photo E.10 – Soil sampling on Iona Island.

Photo E.11 – Collecting background soil sampling.

APPENDIX F – ANALYTICAL DATA

- Screening Tables
- Automated Data Review Library
- Automated Data Review Electronic Data Deliverables
- Electronic Document Management System
- Analytical Summary Reports
- Analytical Data Reports
- Staged Electronic Data Deliverable

Located on CD

APPENDIX G – ANALYTICAL DATA QUALITY ASSURANCE/ QUALITY CONTROL REPORTS

- Validated Data from Environmental Data Services, Inc.
- CDQAR from USACE, Baltimore District

Located on CD

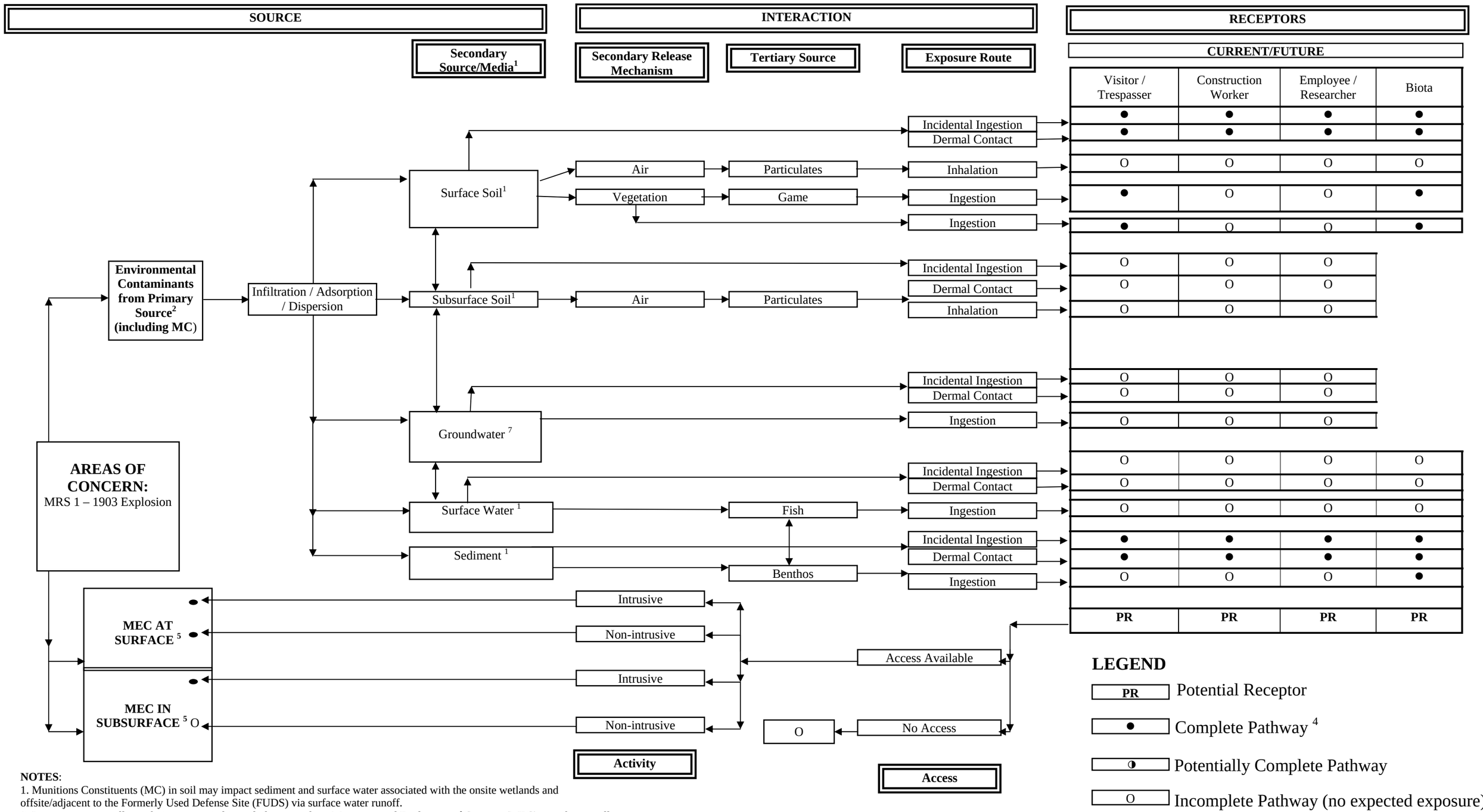
APPENDIX H – GEOGRAPHIC INFORMATION SYSTEMS DATA

Located on CD

APPENDIX I – GEOPHYSICAL DATA

Appendix not used

APPENDIX J – CONCEPTUAL SITE MODEL



NOTES:

1. Munitions Constituents (MC) in soil may impact sediment and surface water associated with the onsite wetlands and offsite/adjacent to the Formerly Used Defense Site (FUDS) via surface water runoff.
2. Primary sources will vary but are expected to include areas where Munitions and Explosives of Concern (MEC) were historically used.
3. The Conceptual Site Model (CSM) has been refined as more site-specific data was obtained and will be finalized in the Site Inspection (SI) Report.
4. For a pathway to be complete, it must include a source, an exposure medium, an exposure route, and a receptor. A complete pathway may also include a release mechanism and a transport medium.
5. Interaction between a potential receptor and MEC has two components: access and activity.
6. For the MMRP SI at the Iona Island Naval Ammunition Depot, one Munitions Response Sites (MRS) has been identified.
7. Groundwater is not used as a drinking water source from this MRS.

APPENDIX J. DIAGRAM OF THE INTEGRATED CONCEPTUAL SITE MODEL FOR MRS 1- 1903 EXPLOSION AT IONA ISLAND NAVAL AMMUNITION DEPOT.

Source: U.S. Army Corps of Engineers (USACE). 2003. *Conceptual Site Models for Ordnance and Explosives and Hazardous, Toxic, and Radioactive Wastes Projects.* Engineer Manual 1110-1-1200. Revised: June 2008

APPENDIX K – MUNITIONS RESPONSE SITE PRIORITIZATION PROTOCOL RESULTS

Table A
MRS Background Information

DIRECTIONS: Record the background information below for the MRS to be evaluated. Much of this information is available from DoD databases, such as RMIS. If the MRS is located on a FUDS property, the suitable FUDS property information should be substituted. In the MRS summary, briefly describe the UXO, DMM, or MC that are known or suspected to be present, the exposure setting (the MRS's physical environment), any other incidental non-munitions related contaminants found at the MRS (e.g., benzene, trichloroethylene), and any potentially exposed human and ecological receptors. Include a map of the MRS, if one is available.

Munitions Response Site Name: MRS 1 – 1903 Explosion

Component: U. S. Army

Installation/Property Name: Iona Island Naval Ammunition Depot [FFID # NY9799F1250]

Location (City, County, State): Stony Point, Rockland County , New York

Site Name (RMIS ID)/Project Name (Project No.): Iona Island Naval Ammunition Depot (C02NY074403M01)/ (C02NY074403)

Date Information Entered/Updated: March 2008/August 2008

Point of Contact (Name/Phone): James Moore – USACE / (732) 435-0079

Project Phase (check only one):

❑ PA	☑ SI	❑ RI	❑ FS	❑ RD
❑ RA-C	❑ RIP	❑ RA-O	❑ RC	❑ LTM

Media Evaluated (check all that apply):

▫ Groundwater	☑ Sediment (human receptor)
☑ Surface soil	▫ Surface Water (ecological receptor)
☑ Sediment (ecological receptor)	▫ Surface Water (human receptor)

MRS Summary:

MRS Description: Describe the munitions-related activities that occurred at the installation, the dates of operation, and the UXO, DMM (by type of munition, if known) or munitions constituents (by type, if known) known or suspected to be present):

The site was used by the U.S. Naval Department from 1900 to 1947 as an ammunition depot which included preparing, assembling, maintaining, inspecting, testing, and issuing ammunition. Range munitions included small arms, large caliber, aerial rocket (3.5-inch rocket aircraft Mk4), flares, signals, and simulators. Items found onsite since closure include a grenade, fragment from a 3.5-inch rocket warhead, small arms, cartridge cases, 6-lb projectile cartridge case, and signal flare. USACE programmatic range documents identified one range, 1903 Explosion, at the Iona Island Naval Ammunition Depot FUDS. The 1903 Explosion (MRS 1) consists of a 124.2 acre area, which was determined by calculating the fragmentation range (radius of 1,250 ft) of the explosion (USACE 2004c) (Table 2-1, 2-2, and Figure 2-1).

Description of Pathways for Human and Ecological Receptors: Surface Soil and Sediment.

Description of Receptors (Human and Ecological): Receptors include visitor/trespasser, construction worker, employee/researcher, and biota.

Table 1

EHE Module: Munitions Type Data Element Table

DIRECTIONS: Below are 11 classifications of munitions and their descriptions. Circle the score(s) that correspond with **all** munitions types known or suspected to be present at the MRS.

Note: The terms *practice munitions, small arms, physical evidence,* and *historical evidence* are defined in Appendix C of the Primer.

Classification	Description	Score
Sensitive	◆ All UXO that are considered likely to function upon any interaction with exposed persons [e.g., submunitions, 40mm high-explosive (HE) grenades, white phosphorus (WP) munitions, high-explosive antitank (HEAT) munitions, and practice munitions with sensitive fuzes, but excluding all other practice munitions]. ◆ All hand grenades containing energetic filler. ◆ Bulk primary explosives, or mixtures of these with environmental media, such that the mixture poses an explosive hazard.	30
High explosive (used or damaged)	◆ All UXO containing a high-explosive filler (e.g., RDX, Composition B), that are not considered "sensitive." ◆ All DMM containing a high-explosive filler that have: ▪ Been damaged by burning or detonation ▪ Deteriorated to the point of instability.	**25**
Pyrotechnic (used or damaged)	◆ All UXO containing pyrotechnic fillers other than white phosphorous (e.g., flares, signals, simulators, smoke grenades). ◆ All DMM containing pyrotechnic fillers other than white phosphorous (e.g., flares, signals, simulators, smoke grenades) that have: ▪ Been damaged by burning or detonation ▪ Deteriorated to the point of instability.	**20**
High explosive (unused)	◆ All DMM containing a high explosive filler that: ▪ Have not been damaged by burning or detonation ▪ Are not deteriorated to the point of instability.	**15**
Propellant	◆ All UXO containing mostly single-, double-, or triple-based propellant, or composite propellants (e.g., a rocket motor). ◆ All DMM containing mostly single-, double-, or triple-based propellant, or composite propellants (e.g., a rocket motor) that are: ▪ Damaged by burning or detonation ▪ Deteriorated to the point of instability.	**15**
Bulk secondary high explosives, pyrotechnics, or propellant	◆ All DMM containing mostly single-, double-, or triple-based propellant, or composite propellants (e.g., a rocket motor), that are deteriorated. ◆ Bulk secondary high explosives, pyrotechnic compositions, or propellant (not contained in a munition), or mixtures of these with environmental media such that the mixture poses an explosive hazard.	**10**
Pyrotechnic (not used or damaged)	◆ All DMM containing a pyrotechnic fillers (i.e., red phosphorous), other than white phosphorous filler, that: ▪ Have not been damaged by burning or detonation ▪ Are not deteriorated to the point of instability.	**10**
Practice	◆ All UXO that are practice munitions that are not associated with a sensitive fuze. ◆ All DMM that are practice munitions that are not associated with a sensitive fuze and that have not: ▪ Been damaged by burning or detonation ▪ Deteriorated to the point of instability.	5
Riot control	◆ All UXO or DMM containing a riot control agent filler (e.g., tear gas).	3
Small arms	◆ All used munitions or DMM that are categorized as small arms ammunition [Physical evidence or historical evidence that no other types of munitions (e.g., grenades, subcaliber training rockets, demolition charges) were used or are present on the MRS is required for selection of this category.].	2
Evidence of no munitions	◆ Following investigation of the MRS, there is physical evidence that there are no UXO or DMM present, or there is historical evidence indicating that no UXO or DMM are present.	0
MUNITIONS TYPE	**DIRECTIONS:** Record **the single highest score** from above in the box to the right (maximum score = 30).	**25**

Table 1
EHE Module: Munitions Type Data Element Table

DIRECTIONS: Below are 11 classifications of munitions and their descriptions. Circle the score(s) that correspond with **all** munitions types known or suspected to be present at the MRS.

Note: The terms *practice munitions, small arms, physical evidence,* and *historical evidence* are defined in Appendix C of the Primer.

Classification	Description	Score

DIRECTIONS: Document any MRS-specific data used in selecting the ***Munitions Type*** classifications in the space provided.

The following munitions were onsite as documented in the ASR Supplement: small arms, small arms complete rounds; large caliber (37-millimeter and larger), High Explosive (CTT18); aerial rockets (Live) (CTT26); Flares, signals, simulators or screening smoke (other than White Phosphorus) (CTT35) (USACE 2004c). Items found onsite in the past include a grenade, fragment from a 3.5 inch rocket warhead, small arms cartridge cases, 6-lb projectile cartridge case, and signal flare. These items have been found within the range of the 1903 Explosion (MRS-1). During low tide, ammunition has been seen in the former dock areas and "dump site" area (which is also located in the radius of the 1903 Explosion) (USACE 1997 and 2004c). See Sections 4.1, 4.2.1, 4.3.1 and Table 2-2 of the SI Report.

Table 2
EHE Module: Source of Hazard Data Element Table

DIRECTIONS: Below are 11 classifications describing sources of explosive hazards. Circle the score(s) that correspond with **all** sources of explosive hazards known or suspected to be present at the MRS.

Note: The terms *former range, practice munitions, small arms, physical evidence,* and *historical evidence* are defined in Appendix C of the Primer.

Classification	Description	Score
Former range	◆ The MRS is a former military range where munitions (including practice munitions with sensitive fuzes) have been used. Such areas include: impact or target areas, associated buffer and safety zones, firing points, and live-fire maneuver areas.	10
Former munitions treatment (i.e., OB/OD) unit	◆ The MRS is a location where UXO or DMM (e.g., munitions, bulk explosives, bulk pyrotechnic, or bulk propellants) were burned or detonated for the purpose of treatment prior to disposal.	8
Former practice munitions range	◆ The MRS is a former military range on which only practice munitions without sensitive fuzes were used.	6
Former maneuver area	◆ The MRS is a former maneuver area where no munitions other than flares, simulators, smokes, and blanks were used. There must be evidence that no other munitions were used at the location to place an MRS into this category.	5
Former burial pit or other disposal area	◆ The MRS is a location where DMM were buried or disposed of (e.g., disposed of into a water body) without prior thermal treatment.	**5**
Former industrial operating facilities	◆ The MRS is a location that is a former munitions maintenance, manufacturing, or demilitarization facility.	4
Former firing points	◆ The MRS is a firing point, where the firing point is delineated as an MRS separate from the rest of a former military range.	4
Former missile or air defense artillery emplacements	◆ The MRS is a former missile defense or air defense artillery (ADA) emplacement not associated with a military range.	2
Former storage or transfer points	◆ The MRS is a location where munitions were stored or handled for transfer between different modes of transportation (e.g., rail to truck, truck to weapon system).	**2**
Former small arms range	◆ The MRS is a former military range where only small arms ammunition was used [There must be evidence that no other types of munitions (e.g., grenades) were used or are present to place an MRS into this category.].	1
Evidence of no munitions	◆ Following investigation of the MRS, there is physical evidence that no UXO or DMM are present, or there is historical evidence indicating that no UXO or DMM are present.	0
SOURCE OF HAZARD	**DIRECTIONS:** Record **the single highest score** from above in the box to the right (maximum score = 10).	**5**

DIRECTIONS: Document any MRS-specific data used in selecting the ***Source of Hazard*** classifications in the space provided.

The site was used by the U.S. Naval Department from 1900 to 1947 as an ammunition depot which included preparing, assembling, maintaining, inspecting, testing, and issuing ammunition (USACE 2004c). The possibility exists that MEC could have been buried on site and accidentally dropped into the Hudson River during a loading operation at three loading docks at the site (USACE 1997). "The Naval Ammunition Depot served as the main supply and preparation depot for ammunition in New York District and furnished ammunition for battleships, transports, convoys, patrol vessels and armed merchantmen" (USACE 1997). See Sections 2.4.1 through 2.4.3 of the SI Report.

Table 3

EHE Module: Location of Munitions Data Element Table

DIRECTIONS: Below are eight classifications of munitions locations and their descriptions. Circle the score(s) that correspond with **all** locations where munitions are located or suspected of being found at the MRS.

Note: The terms *surface, subsurface, physical evidence,* and *historical evidence* are defined in Appendix C of the Primer.

Classification	Description	Score
Confirmed surface	◆ Physical evidence indicates that there are UXO or DMM on the surface of the MRS ◆ Historical evidence (e.g., a confirmed incident report or accident report) indicates there are UXO or DMM on the surface of the MRS.	**25**
Confirmed subsurface, active	◆ Physical evidence indicates the presence of UXO or DMM in the subsurface of the MRS, and the geological conditions at the MRS are likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena (e.g., drought, flooding, erosion, frost, heat heave, tidal action), or intrusive activities (e.g., plowing, construction, dredging) at the MRS are likely to expose UXO or DMM. ◆ Historical evidence indicates that UXO or DMM are located in the subsurface of the MRS and the geological conditions at the MRS are likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena (e.g., drought, flooding, erosion, frost, heat heave, tidal action), or intrusive activities (e.g., plowing, construction, dredging) at the MRS are likely to expose UXO or DMM.	**20**
Confirmed subsurface, stable	◆ Physical evidence indicates the presence of UXO or DMM in the subsurface of the MRS and the geological conditions at the MRS are not likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena, or intrusive activities at the MRS are not likely to cause UXO or DMM to be exposed. ◆ Historical evidence indicates that UXO or DMM are located in the subsurface of the MRS and the geological conditions at the MRS are not likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena, or intrusive activities at the MRS are not likely to cause UXO or DMM to be exposed.	15
Suspected (physical evidence)	◆ There is physical evidence (e.g., munitions debris, such fragments, penetrators, projectiles, shell casings, links, fins), other than the documented presence of UXO or DMM, indicating that UXO or DMM may be present at the MRS.	**10**
Suspected (historical evidence)	◆ There is historical evidence indicating that UXO or DMM may be present at the MRS.	**5**
Subsurface, physical constraint	◆ There is physical or historical evidence indicating that UXO or DMM may be present in the subsurface, but there is a physical constraint (e.g., pavement, water depth over 120 feet) preventing direct access to the UXO or DMM.	2
Small arms (regardless of location)	◆ The presence of small arms ammunition is confirmed or suspected, regardless of other factors such as geological stability [There must be evidence that no other types of munitions (e.g., grenades) were used or are present at the MRS to place an MRS into this category.].	1
Evidence of no munitions	◆ Following investigation of the MRS, there is physical evidence that there are no UXO or DMM present, or there is historical evidence indicating that no UXO or DMM are present.	0
LOCATION OF MUNITIONS	**DIRECTIONS:** Record **the single highest score** from above in the box to the right (maximum score = 25).	**25**

Table 3

EHE Module: Location of Munitions Data Element Table

DIRECTIONS: Below are eight classifications of munitions locations and their descriptions. Circle the score(s) that correspond with **all** locations where munitions are located or suspected of being found at the MRS.

Note: The terms *surface, subsurface, physical evidence,* and *historical evidence* are defined in Appendix C of the Primer.

Classification	Description	Score
	The INPR, ASR, and ASR Supplement indicated that during low water conditions, ammunition has been seen in the "dump site" area along the eastern shoreline. As documented in the ASR and ASR supplement, a grenade was found near buildings 311 and 314 (located within the radius of the explosion) in the mid 1980s, and was taken care of by a demolition team from Fort Smith. During the ASR site inspection in 1997, MD were found on the island and viewed in the Sign Shop which included small arms cartridge cases, 6-lb projectile cartridge case, signal flare, and a fragment from a 3.5-inch rocket warhead. No MEC / MD was identified during the SI field reconnaissance in December 2007. Given the limited SI reconnaissance and the fact that an explosion occurred along with MD and MEC findings in the past within this MRS, MEC could be present in undisturbed areas of the FUDS (e.g., wetland areas, heavily vegetated areas, outcrop areas, and within the location of the former docks where MEC may have not detonated and could remain intact). The presence of MEC is likely due to the 1903 explosion and visual observations of items in the former dock areas. The presence of DMM is likely due to the "dump site" observations. The presence of MC is possible due to the 1903 explosion and history of the site which included testing ammunition. See Sections 2.4.1, 2.4.2, and 4.3.1 in the SI Report.	

Table 4

EHE Module: Ease of Access Data Element Table

DIRECTIONS: Below are four classifications of barrier types that can surround an MRS and their descriptions. The barrier type is directly related to the ease of public access to any explosive material. Circle the score that corresponds with the ease of access to the MRS.

Note: The term *barrier* is defined in Appendix C of the Primer.

Classification	Description	Score
No barrier	◆ There is no barrier preventing access to any part of the MRS (i.e., all parts of the MRS are accessible).	**(10)**
Barrier to MRS access is incomplete	◆ There is a barrier preventing access to parts of the MRS, but not the entire MRS.	**8**
Barrier to MRS access is complete but not monitored	◆ There is a barrier preventing access to all parts of the MRS, but there is no surveillance (e.g., by a guard) to ensure that the barrier is effectively preventing access to all parts of the MRS.	5
Barrier to MRS access is complete and monitored	◆ There is a barrier preventing access to all parts of the MRS, and there is active, continual surveillance (e.g., by a guard, video monitoring) to ensure that the barrier is effectively preventing access to all parts of the MRS.	0
EASE OF ACCESS	**DIRECTIONS:** Record **the single highest score** from above in the box to the right (maximum score = 10).	**10**

DIRECTIONS: Document any MRS-specific data used in selecting the ***Ease of Access*** classification in the space provided.

The site is closed to the public. However, Iona Island is currently partially fenced and the main gate is unmanned which provides limited access to Iona Island from Bear Mountain State Park. The former Iona Island Naval Ammunition Depot currently is part of the Hudson River National Estuarine Research Reserve and Significant Coastal Fish and Wildlife Habitat Area. The former Iona Island Naval Ammunition Depot also is used for various biological studies, including a 4-year plant study on the southern end of Round Island. See Sections 2.3.3 and 2.3.4 of the SI Report.

Table 5

EHE Module: Status of Property Data Element Table

DIRECTIONS: Below are three classifications of the status of a property within the Department of Defense (DoD) and their descriptions. Circle the score that corresponds with the status of property at the MRS.

Classification	Description	Score
Non-DoD control	◆ The MRS is at a location that is no longer owned by, leased to, or otherwise possessed or used by DoD. Examples are privately owned land or water bodies; land or water bodies owned or controlled by state, tribal, or local governments; and land or water bodies managed by other federal agencies.	**(5)**
Scheduled for transfer from DoD control	◆ The MRS is on land or is a water body that is owned, leased, or otherwise possessed by DoD, and DoD plans to transfer that land or water body to the control of another entity (e.g., a state, tribal, or local government; a private party; another federal agency) within 3 years from the date the rule is applied.	3
DoD control	◆ The MRS is on land or is a water body that is owned, leased, or otherwise possessed by DoD. With respect to property that is leased or otherwise possessed, DoD must control access to the MRS 24 hours per day, every day of the calendar year.	0
STATUS OF PROPERTY	**DIRECTIONS:** Record **the single highest score** from above in the box to the right (maximum score = 5).	**5**

DIRECTIONS: Document any MRS-specific data used in selecting the ***Status of Property*** classification in the space provided.

Currently, the former Iona Island Naval Ammunition Depot which includes Iona Island and Round Island is under the administration of the PIPC. The staff of Bear Mountain State Park maintains the former Iona Island Naval Ammunition Depot. PIPC currently uses Iona Island as a storage facility. The former Iona Island Naval Ammunition Depot currently is part of the Hudson River National Estuarine Research Reserve and Significant Coastal Fish and Wildlife Habitat Area. The former Iona Island Naval Ammunition Depot also is used for various biological studies, including a 4-year plant study on the southern end of Round Island. As of 2007, there are no current plans to change the limited use of the former Iona Island Naval Ammunition Depot. See Section 2.3.4 of the SI Report.

Table 6

EHE Module: Population Density Data Element Table

DIRECTIONS: Below are three classifications of population density and their descriptions. Determine the population density per square mile in the vicinity of the MRS and circle the score that corresponds with the associated population density.

Note: If an MRS is located in more than one county, use the largest population density value among the counties. If the MRS is within or borders a city or town, use the population density for the city or town, rather than that of the county.

Classification	Description	Score
> 500 persons per square mile	◆ There are more than 500 persons per square mile in the county in which the MRS is located, based on U.S. Census Bureau data.	**5** (circled)
100–500 persons per square mile	◆ There are 100 to 500 persons per square mile in the county in which the MRS is located, based on U.S. Census Bureau data.	**3**
< 100 persons per square mile	◆ There are fewer than 100 persons per square mile in the county in which the MRS is located, based on U.S. Census Bureau data.	1
POPULATION DENSITY	**DIRECTIONS:** Record **the single highest score** from above in the box to the right (maximum score = 5).	**5**

DIRECTIONS: Document any MRS-specific data used in selecting the ***Population Density*** classification in the space provided.

The Iona Island Naval Ammunition Depot FUDS boundary includes 99.2 acres of land located in the Town of Stony Point in the County of Rockland. The site is closed to the public. However, Iona Island is currently partially fenced and the main gate is unmanned which provides limited access to Iona Island from Bear Mountain State Park. The population for Stony Point, New York is approximately 11,744 people with 3,991 households and 3,160 families residing in the town as stated in the 2000 census (U.S. Census Bureau 2000). The population density for Stony Point, New York is 2,134.8 people per square mile, while the population density for Rockland County is 1,648.4 people per square mile (U.S. Census Bureau 2000). See Section 2.3.3 of the SI Report.

Table 7

EHE Module: Population Near Hazard Data Element Table

DIRECTIONS: Below are six classifications describing the number of inhabited structures near the MRS. The number of inhabited buildings relates to the population near the hazard. Determine the number of inhabited structures within two miles of the MRS boundary and circle the score that corresponds with the associated population near the known or suspected hazard.

Note: The term *inhabited structures* is defined in Appendix C of the Primer.

Classification	Description	Score
26 or more inhabited structures	◆ There are 26 or more inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	**5**
16 to 25 inhabited structures	◆ There are 16 to 25 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	4
11 to 15 inhabited structures	◆ There are 11 to 15 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	3
6 to 10 inhabited structures	◆ There are 6 to 10 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	2
1 to 5 inhabited structures	◆ There are 1 to 5 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	1
0 inhabited structures	◆ There are no inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	0
POPULATION NEAR HAZARD	**DIRECTIONS:** Record **the single highest score** from above in the box to the right (maximum score = 5).	**5**

DIRECTIONS: Document any MRS-specific data used in selecting the ***Population Near Hazard*** classification in the space provided.

The Iona Island Naval Ammunition Depot FUDS boundary includes 99.2 acres of land located in the Town of Stony Point in the County of Rockland. See Section 2.3.3 in the SI Report.

Table 8

EHE Module: Types of Activities/Structures Data Element Table

DIRECTIONS: Below are five classifications of activities and/or inhabited structures near the hazard and their descriptions. Review the types of activities that occur and/or structures that are present within two miles of the MRS and circle the score(s) that correspond with **all** the activities/structure classifications at the MRS.

Note: The term *inhabited structure* is defined in Appendix C of the Primer.

Classification	Description	Score
Residential, educational, commercial, or subsistence	◆ Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with any of the following purposes: residential, educational, child care, critical assets (e.g., hospitals, fire and rescue, police stations, dams), hotels, commercial, shopping centers, playgrounds, community gathering areas, religious sites, or sites used for subsistence hunting, fishing, and gathering.	**5**
Parks and recreational areas	◆ Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with parks, nature preserves, or other recreational uses.	4
Agricultural, forestry	◆ Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with agriculture or forestry.	3
Industrial or warehousing	◆ Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with industrial activities or warehousing.	2
No known or recurring activities	◆ There are no known or recurring activities occurring up to two miles from the MRS's boundary or within the MRS's boundary.	1
TYPES OF ACTIVITIES/STRUCTURES	**DIRECTIONS:** Record **the single highest score** from above in the box to the right (maximum score = 5).	**5**

DIRECTIONS: Document any MRS-specific data used in selecting the ***Types of Activities/Structures*** classifications in the space provided.

The Iona Island Naval Ammunition Depot FUDS boundary includes 99.2 acres of land located in the Town of Stony Point in the County of Rockland. Currently, the former Iona Island Naval Ammunition Depot which includes Iona Island and Round Island is under the administration of the PIPC. The staff of Bear Mountain State Park maintains the former Iona Island Naval Ammunition Depot. PIPC currently used Iona Island as a storage facility. The site is closed to the public. However, Iona Island is currently partially fenced and the main gate is unmanned which provides limited access to Iona Island from Bear Mountain State Park. The former Iona Island Naval Ammunition Depot currently is part of the Hudson River National Estuarine Research Reserve and Significant Coastal Fish and Wildlife Habitat Area. The former Iona Island Naval Ammunition Depot also is used for various biological studies, including a 4-year plant study on the southern end of Round Island. See Sections 2.3.3 and 2.3.4 in the SI Report.

Table 9

EHE Module: Ecological and/or Cultural Resources Data Element Table

DIRECTIONS: Below are four classifications of ecological and/or cultural resources and their descriptions. Review the types of resources present and circle the score that corresponds with the ecological and/or cultural resource classifications at the MRS.

Note: The terms *ecological resources* and *cultural resources* are defined in Appendix C of the Primer.

Classification	Description	Score
Ecological and cultural resources present	◆ There are both ecological and cultural resources present on the MRS.	5
Ecological resources present	◆ There are ecological resources present on the MRS.	**3** (circled)
Cultural resources present	◆ There are cultural resources present on the MRS.	3
No ecological or cultural resources present	◆ There are no ecological resources or cultural resources present on the MRS.	0
ECOLOGICAL AND/OR CULTURAL RESOURCES	**DIRECTIONS:** Record **the single highest score** from above in the box to the right (maximum score = 5).	**3**

DIRECTIONS: Document any MRS-specific data used in selecting the ***Ecological and/or Cultural Resources*** classification in the space provided.

In October 2007, the New York Natural Heritage Program responded with a report listing rare or state-listed animals and plants, significant natural communities, and other significant habitats associated with Iona Island and Round Island. The New York Natural Heritage Program letter stated the information provided is sensitive and should not be released to the public. Therefore, this information was not included in this SI Report. No impacts to cultural or archaeological resources were identified on the site. See Sections 3.2.1 and 3.2.2 in the SI Report.

Table 10
Determining the EHE Module Rating

DIRECTIONS:

1. From Tables 1–9, record the data element scores in the **Score** boxes to the right.
2. Add the **Score** boxes for each of the three factors and record this number in the **Value** boxes to the right.
3. Add the three **Value** boxes and record this number in the **EHE Module Total** box below.
4. Circle the appropriate range for the **EHE Module Total** below.
5. Circle the **EHE Module Rating** that corresponds to the range selected and record this value in the **EHE Module Rating** box found at the bottom of the table.

Note:
An alternative module rating may be assigned when a module letter rating is inappropriate. An alternative module rating is used when more information is needed to score one or more data elements, contamination at an MRS was previously addressed, or there is no reason to suspect contamination was ever present at an MRS.

	Source	Score	Value
Explosive Hazard Factor Data Elements			
Munitions Type	Table 1	25	30
Source of Hazard	Table 2	5	
Accessibility Factor Data Elements			
Location of Munitions	Table 3	25	40
Ease of Access	Table 4	10	
Status of Property	Table 5	5	
Receptor Factor Data Elements			
Population Density	Table 6	5	18
Population Near Hazard	Table 7	5	
Types of Activities/ Structures	Table 8	5	
Ecological and /or Cultural Resources	Table 9	3	
EHE MODULE TOTAL			**88**

EHE Module Total	EHE Module Rating
92 to 100	A
82 to 91	**B**
71 to 81	C
60 to 70	D
48 to 59	E
38 to 47	F
less than 38	G
Alternative Module Ratings	Evaluation Pending
	No Longer Required
	No Known or Suspected Explosive Hazard
EHE MODULE RATING	**B**

Table 11

CHE Module: CWM Configuration Data Element Table

DIRECTIONS: Below are seven classifications of CWM configuration and their descriptions. Circle the score(s) that correspond to **all** CWM configurations known or suspected to be present at the MRS.

Note: The terms *CWM/UXO, CWM/DMM, physical evidence,* and *historical evidence* are defined in Appendix C of the Primer.

Classification	Description	Score
CWM, explosive configuration either UXO or damaged DMM	The CWM known or suspected of being present at the MRS is: ◆ Explosively configured CWM that are UXO (i.e., CWM/UXO). ◆ Explosively configured CWM that are DMM (i.e., CWM/DMM) that have been damaged.	30
CWM mixed with UXO	◆ The CWM known or suspected of being present at the MRS are explosively configured CWM/DMM that have not been damaged, or nonexplosively configured CWM/DMM, or CWM not configured as a munition, that are commingled with conventional munitions that are UXO.	25
CWM, explosive configuration that are undamaged DMM	◆ The CWM known or suspected of being present at the MRS are explosively configured CWM/DMM that have not been damaged.	20
CWM, not explosively configured or CWM, bulk container	The CWM known or suspected of being present at the MRS is: ◆ Nonexplosively configured CWM/DMM. ◆ Bulk CWM/DMM (e.g., ton container).	15
CAIS K941 and CAIS K942	◆ The CWM/DMM known or suspected of being present at the MRS is CAIS K941-toxic gas set M-1 or CAIS K942-toxic gas set M-2/E11.	12
CAIS (chemical agent identification sets)	◆ Only CAIS, other than CAIS K941 and K942, are known or suspected of being present at the MRS.	10
Evidence of no CWM	◆ Following investigation, the physical evidence indicates that CWM are not present at the MRS, or the historical evidence indicates that CWM are not present at the MRS.	**0**
CWM CONFIGURATION	**DIRECTIONS:** Record **the single highest score** from above in the box to the right (maximum score = 30).	**0**

DIRECTIONS: Document any MRS-specific data used in selecting the ***CWM Configuration*** classifications in the space provided.

The ASR states that "documents did not indicate the use of any chemical warfare material during this period" (USACE 1997). See Section 2.4.2 of the SI Report.

TABLES 12 THROUGH 19 EXCLUDED AS PER CX GUIDANCE

Table 20
Determining the CHE Module Rating

DIRECTIONS:

1. From Tables 11–19, record the data element scores in the **Score** boxes to the right.
2. Add the **Score** boxes for each of the three factors and record this number in the **Value** boxes to the right.
3. Add the three **Value** boxes and record this number in the **CHE Module Total** box below.
4. Circle the appropriate range for the **CHE Module Total** below.
5. Circle the **CHE Module Rating** that corresponds to the range selected and record this value in the **CHE Module Rating** box found at the bottom of the table.

Note:
An alternative module rating may be assigned when a module letter rating is inappropriate. An alternative module rating is used when more information is needed to score one or more data elements, contamination at an MRS was previously addressed, or there is no reason to suspect contamination was ever present at an MRS.

	Source	Score	Value
CWM Hazard Factor Data Elements			
CWM Configuration	Table 11		
Sources of CWM	Table 12		
Accessibility Factor Data Elements			
Location of CWM	Table 13		
Ease of Access	Table 14		
Status of Property	Table 15		
Receptor Factor Data Elements			
Population Density	Table 16		
Population Near Hazard	Table 17		
Types of Activities/ Structures	Table 18		
Ecological and /or Cultural Resources	Table 19		
CHE MODULE TOTAL			0

CHE Module Total	CHE Module Rating
92 to 100	A
82 to 91	B
71 to 81	C
60 to 70	D
48 to 59	E
38 to 47	F
less than 38	G
Alternative Module Ratings	Evaluation Pending
	No Longer Required
	No Known or Suspected CWM Hazard
CHE MODULE RATING	**Alternative Rating: No Known or Suspected CWM Hazard**

Table 21

HHE Module: Groundwater Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the **maximum concentrations** of all contaminants in the MRS's groundwater and their **comparison values** (from Appendix B) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the **ratios** for each contaminant by dividing the **maximum concentration** by the **comparison value**. Determine the **CHF** by adding the **ratios** for each medium together, including additional contaminants recorded on Table 27. Based on the **CHF**, use the **CHF Scale** to determine and record the **CHF Value**. If there is no known or suspected MC hazard present in the groundwater, select the box at the bottom of the table.

Note: Use dissolved, rather than total, metals analyses when both are available.

Evaluation Note: No groundwater samples were collected at MRS 1 in accordance with stakeholder agreements that groundwater is not a medium of concern at this site. Refer to Section 5.4.1 of the SI Report.

Contaminant	Maximum Concentration (µg/L)	Comparison Value (µg/L)	Ratios
CHF Scale	**CHF Value**	**Sum The Ratios**	
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		

CONTAMINANT HAZARD FACTOR	**DIRECTIONS:** Record **the CHF Value** from above in the box to the right (maximum value = H).	**N/A (Not Applicable)**

Migratory Pathway Factor

DIRECTIONS: Circle the value that corresponds most closely to the groundwater migratory pathway at the MRS.

Classification	Description	Value
Evident	Analytical data or observable evidence indicates that contamination in the groundwater is present at, moving toward, or has moved to a point of exposure.	H
Potential	Contamination in groundwater has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	M
Confined	Information indicates a low potential for contaminant migration from the source via the groundwater to a potential point of exposure (possibly due to geological structures or physical controls).	L
MIGRATORY PATHWAY FACTOR	**DIRECTIONS:** Record **the single highest value** from above in the box to the right (maximum value = H).	**N/A**

Receptor Factor

DIRECTIONS: Circle the value that corresponds most closely to the groundwater receptors at the MRS.

Classification	Description	Value
Identified	There is a threatened water supply well downgradient of the source and the groundwater is a current source of drinking water or source of water for other beneficial uses such as irrigation/agriculture (equivalent to Class I or IIA aquifer).	H
Potential	There is no threatened water supply well downgradient of the source and the groundwater is currently or potentially usable for drinking water, irrigation, or agriculture (equivalent to Class I, IIA, or IIB aquifer).	M
Limited	There is no potentially threatened water supply well downgradient of the source and the groundwater is not considered a potential source of drinking water and is of limited beneficial use (equivalent to Class IIIA or IIIB aquifer, or where perched aquifer exists only).	L
RECEPTOR FACTOR	**DIRECTIONS:** Record **the single highest value** from above in the box to the right (maximum value = H).	**N/A**

No Known or Suspected Groundwater MC Hazard ☑

Table 22

HHE Module: Surface Water – Human Endpoint Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the **maximum concentrations** of all contaminants in the MRS's surface water and their **comparison values** (from Appendix B) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the **ratios** for each contaminant by dividing the **maximum concentration** by the **comparison value**. Determine the **CHF** by adding the **ratios** for each medium together, including additional contaminants recorded on Table 27. Based on the **CHF**, use the **CHF Scale** to determine and record the **CHF Value**. If there is no known or suspected MC hazard for human endpoints present in the surface water, select the box at the bottom of the table.

Note: Use dissolved, rather than total, metals analyses when both are available.

Evaluation Note: No surface water samples were collected in MRS 1 in accordance with stakeholder agreements that surface water is not a medium of concern at this site. Refer to Section 5.4.2.1 of the SI Report.

Contaminant	Maximum Concentration (µg/L)	Comparison Value (µg/L)	Ratios
CHF Scale	**CHF Value**	**Sum The Ratios**	
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CONTAMINANT HAZARD FACTOR	**DIRECTIONS:** Record **the CHF Value** from above in the box to the right (maximum value = H).		**N/A (Not Applicable)**

Migratory Pathway Factor

DIRECTIONS: Circle the value that corresponds most closely to the surface water migratory pathway at the MRS.

Classification	Description	Value
Evident	Analytical data or observable evidence indicates that contamination in the surface water is present at, moving toward, or has moved to a point of exposure.	H
Potential	Contamination in surface water has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	M
Confined	Information indicates a low potential for contaminant migration from the source via the surface water to a potential point of exposure (possibly due to presence of geological structures or physical controls).	L
MIGRATORY PATHWAY FACTOR	**DIRECTIONS:** Record **the single highest value** from above in the box to the right (maximum value = H).	**N/A**

Receptor Factor

DIRECTIONS: Circle the value that corresponds most closely to the surface water receptors at the MRS.

Classification	Description	Value
Identified	Identified receptors have access to surface water to which contamination has moved or can move.	H
Potential	Potential for receptors to have access to surface water to which contamination has moved or can move.	M
Limited	Little or no potential for receptors to have access to surface water to which contamination has moved or can move.	L
RECEPTOR FACTOR	**DIRECTIONS:** Record **the single highest value** from above in the box to the right (maximum value = H).	**N/A**

No Known or Suspected Surface Water (Human Endpoint) MC Hazard ☑

Table 23

HHE Module: Sediment – Human Endpoint Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the **maximum concentrations** of all contaminants in the site's sediment and their **comparison values** (from Appendix B) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the **ratios** for each contaminant by dividing the **maximum concentration** by the **comparison value**. Determine the **CHF** by adding the **ratios** for each medium together, including additional contaminants recorded on Table 27. Based on the **CHF**, use the **CHF Scale** to determine and record the **CHF Value**. If there is no known or suspected MC hazard for human endpoints present in the sediment, select the box at the bottom of the table.

Evaluation Note: Sample: FD#3 (II-EA-SD-02-02). Refer to Section 5.4.2.2 of the SI Report.

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
Antimony	4.33E+01	3.10E+01	1.40E+00
Copper	2.74E+03	3.10E+03	8.84E-01
Lead	5.03E+03	4.00E+02	1.26E+01
Nickel	8.54E+01	1.60E+03	5.34E-02
Zinc	2.98E+03	2.30E+04	1.30E-01
CHF Scale	**CHF Value**	**Sum The Ratios**	1.50E+01
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		

CONTAMINANT HAZARD FACTOR	**DIRECTIONS:** Record **the CHF Value** from above in the box to the right maximum value = H).	**M**

Migratory Pathway Factor

DIRECTIONS: Circle the value that corresponds most closely to the sediment migratory pathway at the MRS.

Classification	Description	Value
Evident	Analytical data or observable evidence indicates that contamination in the sediment is present at, moving toward, or has moved to a point of exposure.	H
Potential	Contamination in sediment has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	(M)
Confined	Information indicates a low potential for contaminant migration from the source via the sediment to a potential point of exposure (possibly due to presence of geological structures or physical controls).	L
MIGRATORY PATHWAY FACTOR	**DIRECTIONS:** Record **the single highest value** from above in the box to the right (maximum value = H).	**N/A**

Receptor Factor

DIRECTIONS: Circle the value that corresponds most closely to the sediment receptors at the MRS.

Classification	Description	Value
Identified	Identified receptors have access to sediment to which contamination has moved or can move.	H
Potential	Potential for receptors to have access to sediment to which contamination has moved or can move.	(M)
Limited	Little or no potential for receptors to have access to sediment to which contamination has moved or can move.	L
RECEPTOR FACTOR	**DIRECTIONS:** Record **the single highest value** from above in the box to the right (maximum value = H).	**M**

Table 23

HHE Module: Sediment – Human Endpoint Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the **maximum concentrations** of all contaminants in the site's sediment and their **comparison values** (from Appendix B) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the **ratios** for each contaminant by dividing the **maximum concentration** by the **comparison value**. Determine the **CHF** by adding the **ratios** for each medium together, including additional contaminants recorded on Table 27. Based on the **CHF**, use the **CHF Scale** to determine and record the **CHF Value**. If there is no known or suspected MC hazard for human endpoints present in the sediment, select the box at the bottom of the table.

Evaluation Note: Sample: FD#3 (II-EA-SD-02-02). Refer to Section 5.4.2.2 of the SI Report.

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios

No Known or Suspected Sediment (Human Endpoint) MC Hazard ☐

Table 24

HHE Module: Surface Water – Ecological Endpoint Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the **maximum concentrations** of all contaminants in the MRS's surface water and their **comparison values** (from Appendix B) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the **ratios** for each contaminant by dividing the **maximum concentration** by the **comparison value**. Determine the **CHF** by adding the **ratios** for each medium together, including additional contaminants recorded on Table 27. Based on the **CHF**, use the **CHF Scale** to determine and record the **CHF Value**. If there is no known or suspected MC hazard for ecological endpoints present in the surface water, select the box at the bottom of the table.

Note: Use dissolved, rather than total, metals analyses when both are available.

Evaluation Note: No Surface water samples were collected at MRS 1 in accordance with stakeholder agreements that surface water is not a medium of concern at this site. Refer to Section 5.4.2.1 of the SI Report.

Contaminant	Maximum Concentration (µg/L)	Comparison Value (µg/L)	Ratios
CHF Scale	**CHF Value**	**Sum the Ratios**	
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CONTAMINANT HAZARD FACTOR	**DIRECTIONS:** Record **the CHF Value** from above in the box to the right (maximum value = H).		**N/A Not Applicable**

Migratory Pathway Factor

DIRECTIONS: Circle the value that corresponds most closely to the surface water migratory pathway at the MRS.

Classification	Description	Value
Evident	Analytical data or observable evidence indicates that contamination in the surface water is present at, moving toward, or has moved to a point of exposure.	H
Potential	Contamination in surface water has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	M
Confined	Information indicates a low potential for contaminant migration from the source via the surface water to a potential point of exposure (possibly due to presence of geological structures or physical controls).	L
MIGRATORY PATHWAY FACTOR	**DIRECTIONS:** Record **the single highest value** from above in the box to the right (maximum value = H).	**N/A**

Receptor Factor

DIRECTIONS: Circle the value that corresponds most closely to the surface water receptors at the MRS.

Classification	Description	Value
Identified	Identified receptors have access to surface water to which contamination has moved or can move.	H
Potential	Potential for receptors to have access to surface water to which contamination has moved or can move.	M
Limited	Little or no potential for receptors to have access to surface water to which contamination has moved or can move.	L
RECEPTOR FACTOR	**DIRECTIONS:** Record **the single highest value** from above in the box to the right (maximum value = H).	**N/A**

No Known or Suspected Surface Water (Ecological Endpoint) MC Hazard ☑

Table 25

HHE Module: Sediment – Ecological Endpoint Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the **maximum concentrations** of all contaminants in the MRS's sediment and their **comparison values** (from Appendix B) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the **ratios** for each contaminant by dividing the **maximum concentration** by the **comparison value**. Determine the **CHF** by adding the **ratios** for each medium together, including additional contaminants recorded on Table 27. Based on the **CHF**, use the **CHF Scale** to determine and record the **CHF Value**. If there is no known or suspected MC hazard for ecological endpoints present in the sediment, select the box at the bottom of the table.

Evaluation Note: Samples FD#3 (II-EA-SD-02-02). Refer to Section 5.4.2.2 of the SI Report.

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
Antimony	4.33E+01	2.00E+00	2.17E+01
Copper	2.74E+03	3.16E+01	8.67E+01
Lead	5.03E+03	3.58E+01	1.41E+02
Nickel	8.54E+01	2.27E+01	3.76E+00
Zinc	2.98E+03	1.21E+02	2.46E+01
CHF Scale	**CHF Value**	**Sum the Ratios**	2.77E+02
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CONTAMINANT HAZARD FACTOR	**DIRECTIONS:** Record **the CHF Value** from above in the box to the right (maximum value = H).		**H**

Migratory Pathway Factor

DIRECTIONS: Circle the value that corresponds most closely to the sediment migratory pathway at the MRS.

Classification	Description	Value
Evident	Analytical data or observable evidence indicates that contamination in the sediment is present at, moving toward, or has moved to a point of exposure.	H
Potential	Contamination in sediment has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	**(M)**
Confined	Information indicates a low potential for contaminant migration from the source via the sediment to a potential point of exposure (possibly due to presence of geological structures or physical controls).	L
MIGRATORY PATHWAY FACTOR	**DIRECTIONS:** Record **the single highest value** from above in the box to the right (maximum value = H).	**M**

Receptor Factor

DIRECTIONS: Circle the value that corresponds most closely to the sediment receptors at the MRS.

Classification	Description	Value
Identified	Identified receptors have access to sediment to which contamination has moved or can move.	H
Potential	Potential for receptors to have access to sediment to which contamination has moved or can move.	**(M)**
Limited	Little or no potential for receptors to have access to sediment to which contamination has moved or can move.	L

Table 25

HHE Module: Sediment – Ecological Endpoint Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the **maximum concentrations** of all contaminants in the MRS's sediment and their **comparison values** (from Appendix B) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the **ratios** for each contaminant by dividing the **maximum concentration** by the **comparison value**. Determine the **CHF** by adding the **ratios** for each medium together, including additional contaminants recorded on Table 27. Based on the **CHF**, use the **CHF Scale** to determine and record the **CHF Value**. If there is no known or suspected MC hazard for ecological endpoints present in the sediment, select the box at the bottom of the table.

Evaluation Note: Samples FD#3 (II-EA-SD-02-02). Refer to Section 5.4.2.2 of the SI Report.

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
RECEPTOR FACTOR	**DIRECTIONS:** Record **the single highest value** from above in the box to the right (maximum value = H).		**M**

No Known or Suspected Sediment (Ecological Endpoint) MC Hazard ☐

Table 26
HHE Module: Surface Soil Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the **maximum concentrations** of all contaminants in the MRS's surface soil and their **comparison values** (from Appendix B) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the **ratios** for each contaminant by dividing the **maximum concentration** by the **comparison value**. Determine the **CHF** by adding the **ratios** for each medium together, including additional contaminants recorded on Table 27. Based on the **CHF**, use the **CHF Scale** to determine and record the **CHF Value**. If there is no known or suspected MC hazard present in the surface soil, select the box at the bottom of the table.

Evaluation Note: Samples: II-EA-SS-02-01, II-EA-SS-02-08, II-EA-SS-02-14. Refer to Section 5.4.3 of the SI Report.

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratio
Antimony	2.40E+00	3.10E+01	7.74E-02
Copper	1.12E+02	3.10E+03	3.61E-02
Lead	7.72E+02	4.00E+02	1.93E+00
CHF Scale	**CHF Value**	**Sum the Ratios**	2.04E+00
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CONTAMINANT HAZARD FACTOR	**DIRECTIONS:** Record **the CHF Value** from above in the box to the right (maximum value = H).		**M**

Migratory Pathway Factor

DIRECTIONS: Circle the value that corresponds most closely to the surface soil migratory pathway at the MRS.

Classification	Description	Value
Evident	Analytical data or observable evidence indicates that contamination in the surface soil is present at, moving toward, or has moved to a point of exposure.	H
Potential	Contamination in surface soil has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	**M**
Confined	Information indicates a low potential for contaminant migration from the source via the surface soil to a potential point of exposure (possibly due to presence of geological structures or physical controls).	L
MIGRATORY PATHWAY FACTOR	**DIRECTIONS:** Record **the single highest value** from above in the box to the right (maximum value = H).	**M**

Receptor Factor

DIRECTIONS: Circle the value that corresponds most closely to the surface soil receptors at the MRS.

Classification	Description	Value
Identified	Identified receptors have access to surface soil to which contamination has moved or can move.	H
Potential	Potential for receptors to have access to surface soil to which contamination has moved or can move.	**M**
Limited	Little or no potential for receptors to have access to surface soil to which contamination has moved or can move.	L
RECEPTOR FACTOR	**DIRECTIONS:** Record **the single highest value** from above in the box to the right (maximum value = H).	**M**

No Known or Suspected Surface Soil MC Hazard ❑

Table 27

HHE Module: Supplemental Contaminant Hazard Factor Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: **Only use this table if there are more than five contaminants present at the MRS.** This is a supplemental table designed to hold information about contaminants that do not fit in the previous tables. Indicate the **media** in which these contaminants are present. Then record all **contaminants**, their **maximum concentrations** and their **comparison values** (from Appendix B) in the table below. Calculate and record the **ratio** for each contaminant by dividing the **maximum concentration** by the **comparison value**. Determine the **CHF** for each medium on the appropriate media-specific tables.

Note: Remember not to add ratios from different media.

Media	Contaminant	Maximum Concentration	Comparison Value	Ratio

Table 28
Determining the HHE Module Rating

DIRECTIONS:

1. Record the letter values (H, M, L) for the **Contaminant Hazard, Migration Pathway, and Receptor Factors** for the media (from Tables 21–26) in the corresponding boxes below.
2. Record the media's three-letter combinations in the **Three-Letter Combination** boxes below (three-letter combinations are arranged from Hs to Ms to Ls).
3. Using the reference provided below, determine each media's rating (A–G) and record the letter in the corresponding **Media Rating** box below.

Media (Source)	Contaminant Hazard Factor Value	Migratory Pathway Factor Value	Receptor Factor Value	Three-Letter Combination (Hs-Ms-Ls)	Media Rating (A-G)
Groundwater (Table 21)	N/A	N/A	N/A	N/A	N/A
Surface Water/Human Endpoint (Table 22)	N/A	N/A	N/A	N/A	N/A
Sediment/Human Endpoint (Table 23)	M	M	M	MMM	D
Surface Water/Ecological Endpoint (Table 24)	N/A	N/A	N/A	N/A	N/A
Sediment/Ecological Endpoint (Table 25)	H	M	M	HMM	C
Surface Soil (Table 26)	M	M	M	MMM	D

DIRECTIONS (cont.):

4. Select the single highest Media Rating (A is highest; G is lowest) and enter the letter in the **HHE Module Rating** box below.

Note:

An alternative module rating may be assigned when a module letter rating is inappropriate. An alternative module rating is used when more information is needed to score one or more media, contamination at an MRS was previously addressed, or there is no reason to suspect contamination was ever present at an MRS.

Evaluation Note: N/A=not applicable

HHE MODULE RATING	**C**

HHE Ratings (for reference only)

Combination	Rating
HHH	A
HHM	B
HHL	C
HMM	C
HML	D
MMM	D
HLL	E
MML	E
MLL	F
LLL	G
Alternative Module Ratings	Evaluation Pending
	No Longer Required
	No Known or Suspected MC Hazard

Table 29
MRS Priority

DIRECTIONS: In the chart below, circle the letter **rating** for each module recorded in Table 10 (EHE), Table 20 (CHE), and Table 28 (HHE). Circle the corresponding numerical **priority** for each module. If information to determine the module rating is not available, choose the appropriate alternative module rating. The MRS priority is the single highest priority; record this number in the **MRS or Alternative Priority** box at the bottom of the table.

Note: An MRS assigned Priority 1 has the highest relative priority; an MRS assigned Priority 8 has the lowest relative priority. Only an MRS with CWM known or suspected to be present can be assigned Priority 1; an MRS that has CWM known or suspected to be present cannot be assigned Priority 8.

EHE Rating	Priority	CHE Rating	Priority	HHE Rating	Priority
		A	1		
A	2	**B**	2	**A**	2
B	**3**	**C**	3	**B**	3
C	4	**D**	4	**C**	**4**
D	5	**E**	5	**D**	5
E	6	**F**	6	**E**	6
F	7	**G**	7	**F**	7
G	8			**G**	8
Evaluation Pending		Evaluation Pending		Evaluation Pending	
No Longer Required		No Longer Required		No Longer Required	
No Known or Suspected Explosive Hazard		No Known or Suspected CWM Hazard		No Known or Suspected MC Hazard	
MRS or ALTERNATIVE PRIORITY				**3**	

APPENDIX L – REFERENCE COPIES

Located on CD

STAKEHOLDER RESPONSE TO COMMENTS

PROJECT: PROJECT: Iona Island Naval Ammunition Depot (C02NY074403)			
		REVIEW: DRAFT FINAL SI Iona Island Naval Ammunition Depot DATE: 11 June 2008 NAME: Chek Beng Ng 9 (NYSDEC – Remedial Bureau A)	
ITEM	DRAWING NO OR REFERENCE	COMMENT	ACTION
1.	General	A Toxicity Characteristic Leaching Procedure (TCLP) should be performed on the metals in the soil samples. This site might be included in New York State's Inactive Hazardous Waste sites Pending the results of the TCLP	N-NON CONCUR – As discussed during TPP #2 on 27 August 2008, the type of analyses requested maybe within the purview of the RI/FS process. The SI scope does not include conducting TCLP analyses.
2.	General	In the analysis of the soil and sediment results, the soil analysis should be compared to New York State 6 NYCRR Part 375 Soil Cleanup Objectives for Unrestricted Use (Website: http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf). The sediment analysis should be compared to NYSDEC Division of Fish Wildlife and Marine Resources Technical Guidance for Screening Contaminated Sediments (Table 2) (Website: http://www.dec.ny.gov/docs/wildlife_pdf/seddoc.pdf). A copy of both standards is included in the attachment of this letter. If New York State's standards are found to be the most stringent, the comparison of the soil and sediment results should be made in accordance with New York State's standards.	N-NON CONCUR - As discussed during TPP #2 on 27 August 2008, consistent with the scope of this SI, and USACE guidance, risk screening analyses address federal screening criteria (if available) or published values (ecol risk). Application of state criteria, cleanup values, etc. is considered applicable or relevant and appropriate requirements (ARARs), which are not within the scope of this SI. These latter criteria are addressed during the RI/FS process.
3.	General	For each element that is identified as a Chemical of Potential Ecological Concern (COPEC) in the surface soil and sediment, please elaborate on the spatial trends by comparing the concentrations detected throughout the sampling location. For instance, it is of a particular interest to know if an element is found at a higher concentration at a certain location(s) compared to other location(s). Also, is there a particular "hot spot" where all the elements were found at a higher level than other areas?	A-ACCEPTED/CONCUR – This is a site inspection with a limited numbers of samples. An RI/FS has been recommended during which additional data will be gathered and a more meaningful examination of the nature and extent of the contamination will be performed. The COPECs in the soil were reviewed spacially and no trends could be drawn in relation to high concentration areas or "hot spot" areas. Since only two sediment samples were collected, no conclusions on data trends could be drawn for this medium.
4.	General	Please repeat comment (3) for elements that are identified as Chemical of Potential Concern (COPC) in the surface soil and the sediment.	A-ACCEPTED/CONCUR – See response to Ng Comment 3.
5.	Recommendation	a. The Department is in agreement that a Remedial Investigation/Feasibility	a. A-ACCEPTED/CONCUR – Comment noted. Steps I to IIB should be conducted for the RI/FS phase.

PROJECT: PROJECT: Iona Island Naval Ammunition Depot (C02NY074403)			
		REVIEW: DATE: NAME:	DRAFT FINAL SI Iona Island Naval Ammunition Depot 11 June 2008 Chek Beng Ng 9 (NYSDEC – Remedial Bureau A)
		Study (RI/FS) should be conducted on this site based on the findings of the site investigation report. A Fish and Wildlife Impact Analysis (FWIA) should be performed as part of this RI/FS work plan. Steps I to IIB of the FWIA should be included. Please visit http://www.dec.ny.gov/docs/wildlife_pdf/fwia.pdf for more information. b. Please advise the Department on the timeframe for the RI/FS work. If you have any questions in connection with this manner, please contact me a (518) 402-9620 or chng@gw.dec.state.ny.us.	b. A-ACCEPTED/CONCUR – As discussed during the TPP #2 meeting on 27 August , all FUDS sites are ranked in a priority based on the MRSPP scoring. There is not definitive timeframe for the initiation of a RI/FS phase.

PROJECT: PROJECT: Iona Island Naval Ammunition Depot (C02NY074403)			
		REVIEW: DRAFT FINAL SI Iona Island Naval Ammunition Depot DATE: 2 September 2008 NAME: Jennifer Dawson, DFWMR Hazardous Waste Site Evaluation Unit	
ITEM	DRAWING NO OR REFERENCE	COMMENT	ACTION
1.	General	Some of the sediment and soil background samples have contaminant levels equivalent to the contaminated samples obtained from the site. We believe these samples may be influenced by the contamination within the site and that these levels do not represent true 'background' for metal concentrations in soil and sediment. As an example, the lead concentration in background samples from the site is as much as 3x the 63 ppm background concentration for soil lead in NY (6 NYCRR Part 365). In general, contaminant levels in several of the background soil and sediment samples appear more on par with contaminant levels taken from within the site. For the RI/FS, we would like background samples to be obtained from an agreed upon alternate location further from the site.	A-ACCEPTED/CONCUR – As discussed the TPP # 2 meeting on 27 August 2008, this information is beneficial in determining the study areas during the next phase of the CERCLA process. The Executive Summary, as well as Table ES-1 and Section 7.4 have been revised as follows *"Historical documents should be reviewed and possibly revised to account for the acreage of MRS 1 (1903 Explosion) that falls outside of the FUDS boundary. Additionally, background sample locations from this SI Report should be reviewed and new background samples further away from the FUDS but within the same geologic formation should be selected and agreed upon with NYSDEC."*
2.	General	Ecological screening values for sediments and ecological soil clean-up objectives (SCOs) are applicable to this site as it is located within the Hudson River National Estuarine Research Reserve and is a Significant Coastal Fish and Wildlife Habitat Area. Potential end-uses such as park land or playing fields do not influence the choice of clean-up objectives because whether it is a picnic area or a marsh, it will still be within a critical wildlife habitat area and therefore only ecological screening values and SCOs are applicable.	N-NON CONCUR – Refer to Chek Ng's Comment 2.

PROJECT: PROJECT: Iona Island Naval Ammunition Depot (C02NY074403)			
		REVIEW: DRAFT FINAL SI Iona Island Naval Ammunition Depot DATE: 9 September 2008 NAME: Liz Benjamin – Rockland County	
ITEM	DRAWING NO OR REFERENCE	COMMENT	ACTION
1.		No Comments	A-ACCEPTED/CONCUR – No action required.

PROJECT: PROJECT: Iona Island Naval Ammunition Depot (C02NY074403)			
		REVIEW: DRAFT FINAL SI Iona Island Naval Ammunition Depot DATE: 9 September 2008 NAME: Ed McGowan, PIPC - Science Director	
ITEM	DRAWING NO OR REFERENCE	COMMENT	ACTION
1.		No Comments	A-ACCEPTED/CONCUR – No action required.

ACTION CODES: A-ACCEPTED/CONCUR; D-ACTION DEFERRED; W-WITHDRAWN; N-NON CONCUR; V-VE POTENTIAL/VEP ATTACHED