FINAL

Remedial Investigation Report

Nike Battery LO-13 HTRW Site
Caswell, Maine

FUDS Project No. DO1ME002802

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EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers (USACE) New England District (CENAE) prepared this Remedial Investigation (RI) Report for the Nike LO-13 HTRW Formerly Used Defense Site (FUDS) project , also referred to as the Former Loring Air Force Base (AFB) LO-13 Launch and Control Sites, located off Route 1A in Caswell, Aroostook County, Maine (Site). The Control Site is located approximately 0.5 miles northwest of the Launch Site.

The 17-acre Launch Site is located off Route 1A and was developed with three missile silos, a missile maintenance (assembly and test) building, a warhead building (current shop building), a generator building, an acid storage shed, an oil shed, barracks, and a now-demolished water supply pump house. The 11-acre Control Site is located at a topographic high accessed by a 0.5-mile access road from Route 1A. The Control Site was developed with a former administration building, mess hall, paint shed, a barracks and officer quarters (later used as a garage and residence) and several generator buildings. Currently, all buildings are vacant and in various stages of deterioration except for a portion of the administration building at the Control Site that has been renovated for part time seasonal residential use and the barracks at the Launch Site that have been renovated for residential use. Four former radar towers also remain along the northwest edge of the Site.

This RI was conducted to evaluate whether unacceptable risk to human health or the environment is present at the Site, describe the nature and extent of contaminants of potential concern (COPCs) and evaluate the need for additional Site investigations, a Feasibility Study (FS), and remedial action. The primary objectives of this RI include:

1. Prepare a comprehensive conceptual site model (CSM)
2. Assess the adequacy of site data for determining nature and extent of contamination and risks.
3. Determine if the COPCs at the Sites pose unacceptable risks to human health and the environment
4. Document if data are sufficient to decide if remedial action is required under CERCLA

Additionally, as petroleum is excluded from the definition of a hazardous substance, including substances such as benzene, under Section 101(14) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the petroleum hydrocarbon fraction data was used to evaluate petroleum separately under the Maine Department of Environmental Protection (DEP) Remedial Action Guidelines (RAGs) for Contaminated Sites (Maine DEP, 2023).

Based on review and preliminary risk screening of the historical results collected prior to 2016, data gaps were identified. Subsequently, further site investigation by USACE in November 2016 at the Launch Site identified limited petroleum impacted soil beneath the barracks building. In July 2017, further investigation at the Control Site identified residual petroleum contamination by the former generator building. Additionally, a downgradient residential drinking water well was

sampled in August 2025 to confirm lack of VOCs in the water supply and to ensure there is no ongoing offsite transport of VOCs in groundwater from the Site. Cumulative data were used to prepare a CSM for the Site to gain a clear understanding of the source areas, COPCs, extent of contamination, migration pathways, and contaminant fate, such as persistence, in the environment. Soil, groundwater, and air data were collected and analyzed primarily for petroleum via diesel range organics (DRO)/gasoline range organics (GRO)/extractable petroleum hydrocarbons (EPH)/volatile petroleum hydrocarbons (VPH), with some samples also analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), pesticides, and metals. Samples collected in all available media found no evidence of a Department of Defense (DoD) release requiring remedial action or a continuing source of contamination from hazardous substances regulated under CERCLA. Data were also reviewed for completeness with regard to spatial and temporal assessment and monitoring of the Site in accordance with applicable Federal and State regulations/standards/guidelines. Based on the available data, the Site assessments adequately identify source areas, their extent to evaluate risks, and the need for a subsequent FS, if warranted.

A Human Health Risk Assessment (HHRA) and a Screening Level Ecological Risk Assessment (SLERA) were performed using the available data to assess human and ecological exposures under current and reasonably expected future land uses. The Sites are currently occupied and used for residential purposes (Launch Site barracks), periodic residential use (Control Site administration building), or storage. Therefore, the Sites were assessed for unrestricted residential use, which typically is the most conservative exposure scenario. The HHRA results conclude that the Sites do not pose an unacceptable risk for humans exposed to COPCs under current and reasonably anticipated future use. The SLERA indicated the Site does not pose unacceptable risks to ecological receptors, as the contaminants that exceeded ecological screening levels are at a depth that would not be accessible to these receptors, and a full baseline ecological risk assessment is not required. Since both Sites do not pose unacceptable risks to humans and the environment from DoD-related releases, no actionable risk was identified for the Launch and Control Sites.

Furthermore, the remaining petroleum contamination is evaluated in the Petroleum Assessment Report appended to this RI report. There is no unacceptable risk related to human exposure to petroleum hydrocarbons, as there are no concentrations measured above the Maine DEP risk-based RAGs.

Therefore, USACE recommends that a Proposed Plan is developed proposing that No Further Action (NFA) under CERCLA is warranted for the Former Loring Air Force Base (AFB) LO-13 Launch and Control FUDS for the protection of human health and the environment.

TABLE OF CONTENTS

1. INTRODUCTION 1-1

1.1 Purpose of Report 1-1
1.1.1 Scope 1-1
1.1.2 Statement of Objectives 1-1
1.2 Project Background 1-3
1.2.1 Site Description 1-3
1.2.2 Site History 1-4
1.2.3 Previous Environmental Investigations 1-6

2. PHYSICAL SETTING 2-1

2.1 Topography 2-1
2.2 Geology 2-1
2.2.1 Surficial Geology 2-1
2.2.2 Bedrock Geology 2-2
2.3 Hydrology and Hydrogeology 2-3
2.3.1 Surface Water 2-3
2.3.2 Groundwater 2-3
2.4 Climate 2-5
2.5 Demographics and Land Use 2-5

3. NATURE AND EXTENT OF CONTAMINATION 3-1

3.1 Environmental Summary 3-1
3.2 Source Areas 3-5
3.3 Contaminants of Potential Concern 3-6
3.3.1 Regulatory Criteria 3-6
3.3.2 COPCs 3-7
3.4 Extent of Contamination 3-8
3.4.1 Soil and Vadose Zone 3-8
3.4.2 Groundwater 3-11
3.4.3 Air 3-13

4. CONTAMINANT FATE AND TRANSPORT 4-1

4.1 Migration Pathways 4-1
4.2 Contaminant Persistence 4-3
4.3 CSM Summary 4-4

5. RISK ASSESSMENT 5-1

5.1 HHRA Conclusions 5-1
5.2 SLERA Conclusions 5-4
5.3 Petroleum Assessment 5-5

6. SUMMARY AND CONCLUSIONS 6-1

6.1 Summary 6-1
6.1.1 Nature and Extent of Contamination Summary 6-1
6.1.2 Fate and Transport Summary 6-2
6.1.3 CERCLA Risk Assessment Summary 6-3

6.1.4 Petroleum Assessment 6-4
6.2 Conclusions 6-4
6.2.1 Achievement of Objective 6-4
6.2.2 Recommendations 6-5

7. REFERENCES 7-1

FIGURES

Figure 1A ..... Location Plan - Topographic
Figure 1B .....Location Plan – Aerial View
Figure 1C ..... LO-13 Launch Site Digital Elevation Model Topography
Figure 1D ..... LO-13 Control Site Digital Elevation Model Topography
Figure 2 .....Detailed Site Plan – LO-13 Launch Site
Figure 3 .....Detailed Site Plan – LO-13 Control Site
Figure 4 ..... LO-13 Launch Site - Extent of COPCs in Soil
Figure 5 .....LO-13 Control Site - Extent of COPCs in Soil
Figure 6A ..... LO-13 Control Site Cross Section A-A'
Figure 6B ..... LO-13 Control Site Cross Section B-B'
Figure 6C ..... LO-13 Control Site Topographic Profiles from Google Earth – East to West
Figure 6D .....LO-13 Control Site Topographic Profiles from Google Earth – South to North
Figure 7A ..... LO-13 Launch Site Cross Section A-A'
Figure 7B LO-13 Launch Site Topographic Profiles from Google Earth – Northwest to Southeast

TABLES

Table 1A..... Summary of Historical Soil Analytical Results – LO-13 Launch Site
Table 1B..... Summary of 2016 Soil Analytical Results – LO-13 Launch Site
Table 2A..... Summary of Historical Soil Analytical Results – LO-13 Control Site
Table 2B.....Summary of 2017 Soil Analytical Results – LO-13 Control Site
Table 3 ..... Summary of Historical Groundwater Analytical Results – LO-13 Launch Site
Table 4A..... Summary of Historical Groundwater Analytical Results – LO-13 Control Site
Table 4B..... Summary of 2017 Groundwater Analytical Results – LO-13 Control Site
Table 5 .....Summary of Historical Indoor Air Analytical Results – LO-13 Launch Site

APPENDICES

Appendix A ..... Photo Logs
Appendix B .....Cumulative Boring and Well Construction Logs
Appendix C ..... CERCLA Human Health Risk Assessment
Appendix D ..... Maine DEP Petroleum Assessment
Appendix E ..... Historical Tables/Laboratory Reports for Data Quality Reference
Appendix F..... PFAS Response Memo for LO-13 Nike Battery FUDS

LIST OF ACRONYMS

°F – degrees Fahrenheit
AFB – Air Force Base
AMSL – above mean sea level
AST – aboveground storage tank
bgs – below ground surface
BTAG - Biological Technical Assistance Group
BTEX – benzene, toluene, ethylbenzene, and xylenes
CENAE – Corp of Engineers New England District
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
CFR – Code of Federal Regulations
COPC – contaminant of potential concern (screening based)
Credere – Credere Associates, LLC
CSM – conceptual site model
cy – cubic yards
DCE - dichloroethene
DEM – digital elevation model
DEP – Department of Environmental Protection, Maine
DERP - Defense Environmental Restoration Program
DHS – Department of Human Services
DO – dissolved oxygen
DoD – Department of Defense
DRO – diesel range organics
EcoSSL – Ecological Soil Screening Levels
ELCR – excess lifetime cancer risk
EM – Engineer Manual
EPA – U.S. Environmental Protection Agency
EPH – extractable petroleum hydrocarbons
ESV – Ecological Screening Values
FS – Feasibility Study
ft^2 – square feet
ft/d – feet per day
ft/yr – feet per year
FUDS – Formerly Used Defense Site
GRO – gasoline range organics
GSA – General Service Administration
HHRA – Human Health Risk Assessment
HI – hazard index
HQ – hazard quotient
ID/IQ – Indefinite Delivery/Indefinite Quantity
JCO – Johnson Company, Inc.
JP-4 - jet petroleum fuel #4
kVa – kilovolt amps
LTM – long-term monitoring
MACTEC – MACTEC Engineering and Consulting, Inc.
Mason – Mason Environmental
MassDEP – Massachusetts Department of Environmental Protection
MCL – Maximum Contaminant Level
MEE – Maine Environmental Engineering
MEG – Maximum Exposure Guideline
mg/kg – milligrams per kilogram
MGS – Maine Geological Survey
NCP – National Oil and Hazardous Substances Pollution Contingency Plan
NFA – No Further Action
Northern Aroostook – Northern Aroostook Registry of Deeds
NPL – National Priority List
NR – not formally reported
NS – not sampled
PAH – polycyclic aromatic hydrocarbons
PCB – polychlorinated biphenyls
PID – photoionization detector
ppm – parts per million
QA – quality assurance
QAPP – Quality Assurance Project Plan
QC – quality control
RA – risk assessment
RAG – Remedial Action Guideline (Maine DEP)
RAGS – Risk Assessment Guidance for Superfund
RCRA – Resource Conservation and Recovery Act
RI – Remedial Investigation

RSL – Regional Screening Level
R. Weston – Roy F. Weston, Inc.
SAP – Sampling and Analysis Plan
SARA – Superfund Amendments and Reauthorization Act
SLERA – Screening Level Ecological Risk Assessment
SOW – scope of work
SVOC – semi-volatile organic compounds
TCE – trichloroethene
THQ – target hazard quotient
TPH-GRO – total petroleum hydrocarbons-gasoline range organics
TPH-DRO – total petroleum hydrocarbons-diesel range organics
TR – target lifetime cancer risk
µg/L – micrograms per Liter
U – results below the laboratory reporting limit
USACE – U.S. Army Corp of Engineers
USGS – U.S. Geological Survey
UST – underground storage tank
UTM – Universal Transverse Mercator
VISL – vapor intrusion screening levels
VOC – volatile organic compounds
VPH – volatile petroleum hydrocarbons
Weston – Weston Solutions, Inc.
WHG – Woods Hole Group, Inc.

1. INTRODUCTION

The U.S. Army Corps of Engineers (USACE) New England District (CENAE) prepared this Remedial Investigation (RI) report for the Former Loring Air Force Base (AFB) LO-13 Launch and Control Sites (FUDS Project Number DO1ME002802) located off Route 1A in Caswell, Aroostook County, Maine (LO-13 Site).

1.1 PURPOSE OF REPORT

1.1.1 Scope

This RI was prepared under the Defense Environmental Restoration Program (DERP) for Formerly Used Defense Sites (FUDS) by Credere Associates, LLC (Credere). The U.S. Department of Defense (DoD) has designated USACE as the lead Executive Agent for the FUDS program. This RI was completed pursuant to the USACE Environmental Quality FUDS Program Policy (USACE, 2020) and FUDS Handbook (USACE, 2022) and in compliance with U.S. Environmental Protection Agency (EPA) and USACE guidance for RIs (EPA, 1988 and USACE, 1994).

This RI and prior executed work have been executed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA; 42 USC § 9620 et seq.), subsequent Superfund Amendments and Reauthorization Act (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 Code of Federal Regulations [CFR] Part 300; EPA, 1994). The LO-13 Site is a non-National Priority List (NPL) FUDS, and the Maine Department of Environmental Protection (DEP) is the lead state regulator (USACE, 2020).

This RI was prepared to evaluate the results of previous site investigations, including groundwater monitoring at the Sites, to determine the nature and extent of contaminants of potential concern (COPCs), potential human health and ecological risks, and the need for additional remedial investigations, a feasibility study, or remedial actions under CERCLA. Additionally, as the primary contaminant released at the LO-13 Site is petroleum, the Launch and Control Sites have also been evaluated based on the Maine DEP Remedial Action Guidelines (RAGs) for Contaminated Sites (Maine DEP, 2023). CERCLA section 101(14) excludes petroleum, including hazardous substances such as benzene that are naturally present, or "indigenous" to petroleum, from the definition of hazardous substance.

1.1.2 Statement of Objectives

The primary objectives of this RI include:

1. Prepare a comprehensive conceptual site model (CSM).
2. Assess the adequacy of Site data for determining nature and extent of contamination and risks.
3. Determine if the COPCs at the Sites pose unacceptable risks to human health and the environment.
4. Document data are sufficient to decide if remedial action is warranted under CERCLA.

Since petroleum is not a CERCLA contaminant, similar objectives are applied in a separate appendix for evaluation of petroleum according to the Maine DEP RAGs (Maine DEP, 2023).

The following guidelines were used for preparation of this RI:

- Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, October 1988 (EPA, 1988)
- Risk Assessment Guidance for Superfund (RAGS) – Part A: Human Health Evaluations, December 1989 (EPA, 1989)
- Ecological Risk Assessment Guidance for Superfund, June 1997 (EPA, 1997)
- Standard Scopes of Work for Environmental Risk Assessments, EP 200-1-5 (USACE, 2016)
- Risk Assessment Handbook Volume I: Human Health Evaluation U.S. Army Corps of Engineers, Engineer Manual (EM) 200-1-4 (USACE, 1999)
- Risk Assessment Handbook Volume 2: Environmental Evaluation U.S. Army Corps of Engineers, EM 200-1-4 (USACE, 2010)
- Conceptual Site Models, EM 200-1-12 (USACE, 2023)
- Engineer Regulation 200-3-1, Environmental Quality - FUDS Program Policy, September 1, 2020 (USACE, 2020)
- FUDS Program Implementation Guidance; FUDS Handbook (USACE, 2022)

Additionally, the following manuals and guidelines were considered in evaluating data quality and sufficiency:

- Maine DEP RAGs for Contaminated Sites, November 15, 2023 (Maine DEP, 2023)
- Maine DEP Final Development of Risk-Based Cleanup Levels for Petroleum Hydrocarbons Measured as Diesel Range Organics (DRO) and Gasoline Range Organics (GRO), Prepared by MACTEC Engineering and Consulting, Inc. (MACTEC), April 2010 (MACTEC, 2010)

Achieving these objectives will aid in achieving FUDS program goals of reducing risk to human health and the environment, implementing final remedies, and moving projects toward milestones (USACE, 2020).

This RI is organized as follows:

- **Section 1** Introduction discusses study area objectives and site background including previous investigations, the source of which this RI was completed
- **Section 2** Physical Setting presents the topographic, geologic, and hydrologic setting as well as the demographics and land uses of the LO-13 Site and vicinity
- **Section 3** Nature and Extent of Contamination discusses potential sources, contaminants of potential concern and their distribution in site media

- **Section 4** Contaminant Fate and Transport describes contaminant migration pathways and persistence
- **Section 5** Risk Assessment summarizes the evaluation of receptors, exposure pathways and risk to human health and the environment
- **Section 6** Summary and Conclusions presents conclusions regarding objectives and recommendations

Collectively **Sections 1** through **4** present the CSM (with a summary provided in **Section 4.3**) upon which the subsequent risk evaluations and conclusions are based.

1.2 PROJECT BACKGROUND

1.2.1 Site Description

The LO-13 Site comprises two parcels known as the Launch and Control Sites identified by the Town of Caswell as Map 9, Lot 23 and Map 12, Lot 2 (Weston Solutions Inc. [Weston], 2009a), respectively. Both Sites are located west of Route 1A/Route 165 in Caswell, Maine, and the Control Site is located approximately 0.5 miles northwest of the Launch Site. A LO-13 Launch and Control Sites Location Plan is provided as **Figure 1A** with an aerial view on **Figure 1B**. The following provides a description of each Site:

Launch Site Description

The 17-acre (Weston, 2009a) Launch Site is located off Route 1A and was developed with three missile silos, a missile maintenance (assembly and test) building, a warhead building (current shop building), a generator building, acid storage shed, an oil shed, barracks, and a water pump house (currently demolished). The Site perimeter remains secured with a chain-link barbed wire topped fence that divides the Site into two portions: the eastern unlocked residential portion, which contains the barracks building and foundation of the demolished water supply pump house, and the western launch portions, which contains the launch related structures.

The barracks building was adapted to comprise three residential apartments that were vacant since approximately 2007 but were recently renovated in May 2021 for residential use. The eastern half of the barracks is used for miscellaneous storage. The pump house adjacent to the barracks building was demolished around 2012 or 2013, and a remnant pile of concrete blocks remained at the Site (unknown if it was removed). The remainder of the Site buildings are used for storage and vehicle maintenance. One missile silo had been modified for storage of large items during winter (e.g., boats, recreational vehicles, automobiles; Weston, 2009a), while the other silos are inoperable.

The Launch Site receives water from a private drinking water supply well located approximately 75-feet west of the barracks building (see LSDW-1 on **Figure 2**). A private septic system and leach field are also reportedly located southwest of the barracks building and north of the Shop Building based on historical site plans (R. Weston, 1996) but the actual location was not determined.

A detailed Site plan for the Launch Site is provided as **Figure 2**, and Site condition photographs from 2015 are provided in **Appendix A**.

Control Site Description

The 11-acre (Weston, 2009a) Control Site is located at a topographic high and is accessed by a 0.5-mile access road from Route 1A. The Control Site was developed with a former administration building, mess hall, paint shed, and a barracks and officer quarters (later used as a garage and residence) as well as several generator buildings (the larger of which has been demolished). Currently, all buildings are vacant and in various stages of deterioration except for a portion of the administration building that has been renovated for part time seasonal residential use. Four former radar towers also remain along the northwest edge of the Site. The Site formerly had two generator buildings along the road to the towers, which were demolished in conjunction with prior underground storage tank (UST) removal and associated remediation. The Site perimeter is locked with a chain-link barbed wire topped fence.

The Control Site receives water from a private drinking water supply well north of the barracks building (see CSDW-1 on **Figure 3**). A private septic system and leach field are located in the southwest portion of the Site though the specific location of these is not documented in prior reports.

A detailed Site plan for the Control Site is provided as **Figure 3**, and current conditions photographs are provided in **Appendix A**.

Surrounding Vicinity

The area surrounding the Launch and Control Sites is undeveloped with sparse residences along Route 1A and agricultural uses within the surrounding mile. The nearest population center is located 3 miles northeast in Grand Falls, New Brunswick, Canada.

1.2.2 Site History

Prior to construction of the Launch and Control Sites, the LO-13 Site was undeveloped woods and farmland. The Control Site was purchased by U.S. government on December 8, 1955; the western portion of the Launch Site was purchased on December 27, 1955; and the barracks portion of the Launch Site was purchased on February 27, 1957, and May 25, 1963. The Launch Site and the Control Site (i.e., then known as the Nike Battery) were constructed between 1955 and 1957 for use as a surface to air anti-aircraft missile facility. The LO-13 Site was declared excess under order SF-118 numbers NED-154 for the Launch Site on February 1, 1967, and NED-154A for the Control Site on November 27, 1967 (CENAE, 1992). The following summarizes Site-specific history for each of the two Sites.

Launch Site History

The Launch Site was historically operated as part of the Nike missile program between 1955 and 1967 where assembly, testing, maintenance, battery installation, ethylene oxide fueling, and prepping of Nike missiles occurred. The Launch Site was equipped to handle Nike Ajax and Hercules-class missiles and has three subsurface launch silos. Missiles were handled primarily in the warhead building that contained an acid neutralization pit. This area was used to fuel and

refuel missiles during maintenance and comprised a concrete pad design to collect the jet fuel, red fuming nitric acid, and unsymmetrical dimethylhydrazine and discharge it to the exterior swale. Fuel was stored in a limestone gravel floor shed. Although the collection system discharged to the exterior swale, any discharges were reportedly neutralized with water and acetic acid immediately to prevent fire (R. Weston, 1999b). Other excess quantities or waste propellants were disposed of by burning (USACE, 2003). A 1962 Aerial Photograph (MGS, 2024) depicts an area of open soil behind the berm and swale area that was likely the acid storage building (USACE, 2003). The acid storage building was typically constructed with a limestone gravel base to neutralize acid leaks.

The Launch Site was also developed with a barracks building in the eastern portion of the Site and shop and generator buildings between the barracks and the warhead building.

After 1967, the Launch Site was sold into private ownership by the General Service Administration (GSA) and has been used for various purposes since 1969 including vehicle maintenance and storage (Weston, 2009a). In the 1990s, the barracks building had occupied residences; they were vacant in the early 2000s and were renovated in 2021. Per a phone conversation with the current owner of the property on 25 November 2024, the barracks remain unoccupied. No improvements have been made to the building aside from replacing the I-beams. The following table summarizes ownership history for the Launch Site:

Launch Site Ownership History (Northern Aroostook, 2018)	
Approximate Date Purchased	**Owner**
Prior to 1955	Private Owners
December 27, 1955	U.S. Government DoD
1967	GSA
August 15, 1969	Private Owner A
1985	Private Owner B
1994	Private Owner C
2021	Current Private Owner

Northern Aroostook – Northern Aroostook County Registry of Deeds

Control Site History

The Control Site was historically operated as part of the Nike missile program between 1955 and 1967 where detection, tracking, and routing of missile launches would have occurred. The Control Site operated with four radar towers, several generator buildings and personnel buildings (administration, mess hall, barracks). Radar towers were frequently cleaned using solvent based cleaning products to ensure continued operational efficiency (USACE, 2003). Additionally, radar controls were often housed in mobile trailers or vans (USACE, 2003). These vans were likely stored in the parking area along the eastern side of the access road into the Site (MGS, 2024).

After 1967, the property was sold into private ownership by GSA. The Site was used for storage by multiple owners through approximately 1978. After that time, the property owner began using the Site for residential homestead purposes. The former barracks building was used as a residence and other portions of the Site were used for growing food. The owner obtained water from the onsite drinking water well. The residence was heated with coal, propane, or fuel oil contained in interior aboveground storage tanks (ASTs). The owner did not use the onsite USTs for beneficial use. No electricity was available to the property; therefore, the owner did not use the onsite

transformers for beneficial use. The other buildings at the Site were used for storage or remained vacant (CENAE, 1992). Since 1998, the property has been primarily vacant and used only for storage or periodic seasonal use by various owners (Weston, 2009a). The following table summarizes ownership history for the Control Site:

Control Site Ownership History (Northern Aroostook, 2018)	
Date Purchased	**Owner**
Prior to 1955	Private Owners
December 8, 1955	U.S. Government DoD
1967	GSA
October 20, 1969	Private Owner A
October 9, 1976	Private Owner B
July 21, 1978	Private Owner C
April 1, 1981	Private Owner D
1998	Private Owner E
2009	Private Owner F
2013	Current Private Owner

1.2.3 Previous Environmental Investigations

The following sections are summaries of previous environmental reports pertinent to the environmental history of the LO-13 Site. These reports were generally prepared for multiple FUDS sites in Aroostook County; however, only portions pertaining to the LO-13 Launch and Control Sites are summarized. Cumulative boring logs for the Launch and Control Sites are included in **Appendix B**, and historical data is summarized in **Table 1A** and **1B** for the Launch Site soil, **Table 2A** and **2B** for Control Site soil, **Table 3** for Launch Site groundwater, **Table 4A** and **4B** for Control Site groundwater and **Table 5** for Launch Site air. Pertinent environmental concerns that relate to the CSM are further summarized for convenience in **Section 3.1**.

1.2.3.1 Previous Environmental Investigations at the Launch Site

Nike Site LO-13 Trip Report, Caswell, ME, August 25, 1992 (CENAE, 1992)

On August 25, 1992, CENAE visited the Launch Site to assess the presence of environmental concerns and need for possible remediation under DERP. The Site visit and associated interviews revealed a general Site history, which is incorporated into **Section 1.2.2** above.

A 2,000-gallon No. 2 fuel oil UST was identified behind the barracks building that had apparently not been used in lieu of a relatively new interior fuel oil tank. A 4,000-gallon diesel UST was known to have been present east of the generator building as well; however, lack of metal detector response and a depression in the ground indicated the tank had likely been removed. Several other ASTs were observed to have been removed from service but remained discarded at the Launch Site. No evidence of releases from the ASTs was noted in the Trip Report.

The acid neutralization pit and refueling area in the southern portion of the Launch Site was identified as an area to be assessed. The neutralization pit and refueling area was reportedly intact. Additionally, it was recommended the hydraulic fluid be drained from the hydraulic lifts in the missile silos if the owner wanted them decommissioned.

Maine DEP Chapter 691 Initial Site Investigation, Mason Environmental Services, Inc. (Mason), March 1, 1995 (Mason, 1995)

On August 23, 1994, Mason removed the 2,000-gallon No. 2 fuel oil UST from behind the barracks building. The fill and vent pipes were found to have been removed and the tank was not properly plugged thereafter allowing water to enter. Mason removed 2,000-gallons of petroleum-impacted water from the tank. Upon removal, petroleum impacted soil was found to extend to approximately 5 to 8 feet below ground surface (bgs) and 90 cubic yards (cy) of impacted soil were removed and stockpiled onsite on polyethylene sheeting and covered with the same. Contaminated soil was noted to extend toward the building in the area of a 35-foot chimney; due to structural concerns, this soil could not be removed and was left in place. Additionally, a portion of the UST concrete pad nearest the building was left in place and reportedly also likely had additional impacted soil beneath.

Confirmatory laboratory soil samples collected from the excavation were not analyzed due to expired holding times. A composite sample was collected from the stockpiled soil and indicated a total petroleum concentration (Maine DEP Oil in Soil field analysis) of 90.5 milligrams per kilogram (mg/kg). One sample was also collected from test pits excavated to represent the sidewall of the backfilled excavation where polyethylene sheeting had been placed to separate clean backfill from contaminated soil. Results of this sample indicated a total petroleum concentration (similarly by Maine DEP Oil in Soil field analysis) of 457 mg/kg.

On August 25, 1994, the area of the former 4,000-gallon UST was assessed by a test pit investigation. Mason removed 150 cy of petroleum impacted soil; however, left residual soil contamination in the excavation per discussions with Maine DEP and USACE. Confirmatory laboratory soil samples collected from the excavation were not analyzed due to expired holding times. Polybag headspace field screening results indicated 212 parts per million (ppm) by photoionization detector (PID) in the excavation. Additional samples were collected from stockpiled soil and contained petroleum concentrations (analyzed by the Maine DEP Oil in Soil field Analysis) between 511 to 1,500 mg/kg.

Stockpiled soil was removed from the Launch Site on October 3, 1994, and 290 tons of petroleum impacted soil were disposed offsite at the Tri-Community Landfill in Fort Fairfield, Maine (Maine Environmental Engineering Co. [MEE], 1997b).

Upon occupation of the apartments in the barracks building by new residents, USACE authorized Mason to collect indoor air and tap water samples. On January 17, 1995, one drinking water sample was collected, and one indoor air sample was collected from each of the three apartments. All samples were analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX). Drinking water results were below laboratory reporting limits. BTEX compounds were detected in indoor air within each of three apartments; however, no risk-based standards were available at the time to assess the detected BTEX concentrations. Additionally, benzene detections were likely attributed to cigarette smoking in the apartments.

Closure Report, MEE, November 1997 (MEE, 1997a)

Maine DEP identified several reporting deficiencies related to the Mason 1994 report (Maine DEP, 1999). In addition to the information reported above in Mason's Chapter 691 Site Investigation

report, this MEE Closure Report addressed DEP deficiencies by providing further details on the sampling and handling during the removals. The report also summarized the removal of three 10 kilo-volt-ampere (kVA) transformers from inside the generator building by Mason in 1994. The transformers were emptied into containers, contents were sampled for polychlorinated biphenyls (PCBs) and were removed from the Launch Site. The transformer oil contained 300,000 to 360,000 mg/kg of PCB Aroclor 1260. The transformers were disposed of by Transformer Services, Inc. of Concord, New Hampshire; however, the means of disposal of the PCB-containing transformer contents was not reported.

Site Investigation Report, R. Weston, October 31, 1997 (R. Weston, 1997)

Through 1996 and 1997, R. Weston completed investigation activities outlined in the SAP to meet the project objectives. The investigation focused on previously identified petroleum contamination areas adjacent to the barracks building, generator building, and the acid neutralization pits on the Launch Site.

Three (3) directionally drilled soil borings (LSSB-1 through LSSB-3), three (3) vertical soil borings (LSSB-4, LSSB-5, and LSMW-2), and two (2) monitoring wells (LSMW-1 and LSMW-7) were advanced/installed in the area of the former 2,000-gallon UST near the barracks building on September 17 and 25, 1996. Two wells (LSMW-3 and LSMW-8) and three (3) vertical soil borings (LSSB-6, LSSB-7, and LSMW-4) were installed/advanced surrounding the area of the former 4,000-gallon diesel UST near the generator building between September 17 and 24, 1996. On September 24 and 25, 1996, two (2) soil borings (LSANPB-1 and LSANPB-2) were advanced to 6 feet in the area of the acid neutralization pits. Additionally vertical boring LSMW-5 and monitoring well LSMW-6 were advanced to represent site-specific background conditions. Of the monitoring wells, LSMW-1 and LSMW-3 are overburden wells. LSMW-2, LSMW-4, and LSMW-5 were planned to be overburden wells, but no overburden groundwater was encountered; therefore, bedrock wells LSMW-7, LSMW-8, and LSMW-6 were installed in their place, respectively.

Soil samples were collected from each location and analyzed for volatile organic compounds (VOCs) by method 8260A and total petroleum hydrocarbons (TPH)-DRO by Maine DEP 4.1.25. Additionally, samples collected from the acid neutralization pits were analyzed for semi-volatile organic compounds (SVOCs) by method 8270B, pesticides/PCBs by method 8080A/3540B and/or Resource Conservation and Recovery Act (RCRA) 8 metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) by various metals analytical methods.

Two rounds of groundwater samples (rounds -1 and -2 on November 2 and 3, 1996, and May 28 and 29, 1997, respectively) were collected from the two overburden monitoring wells (LSMW-1 and LSMW-3), three bedrock wells (LSMW-6, LSMW-7, and LSMW-8), and one drinking water well collected from the barracks building apartment taps. Samples were collected from monitoring wells via low stress (low flow) purging and sampling procedures and analyzed for VOCs by method 8260A, TPH-GRO by Maine DEP method 4.2.17, and TPH-DRO by Maine DEP method 4.1.25. Drinking water samples were analyzed for VOCs by method 524.2, SVOCs by method 525, TPH-GRO by Maine DEP method 4.2.17, TPH-DRO by Maine DEP method 4.1.25, and pesticides/PCBs by method 8080A/8081.

To assess possible impacts to indoor air from the documented petroleum contamination adjacent to the barracks building, indoor air samples were again collected from the three barracks building apartments along with ambient air and blank samples. Samples were analyzed for EPA method TO-14.

Groundwater analytical results were compared to the Maine Department of Human Services (DHS) Maximum Exposure Guidelines (MEGs) dated 1992 (Maine DHS, 1992), and soil analytical results were compared to the *Maine DEP Procedural Guidelines for Establishing Standards for the Remediation of Oil Contaminated Soil and Groundwater in Maine* dated 1995 (Maine DEP, 1995), and to former Maine DEP's RAGs for direct contact residential scenario (Maine DEP, 1997).

Soil concentrations of TPH-DRO exceeded the 10 mg/kg guidelines at the time in samples collected from LSSB-3 at depths of 4 to 6 feet bgs (2,300 mg/kg) and 14 to 16 feet bgs (22 mg/kg). LSSB-3 was also the only boring advanced with evidence of petroleum contamination by PID and odor. VOCs, pesticides, and metals were also detected at the Launch Site in other borings; however, results were below their comparison criteria at the time.

Groundwater analytical results exceeded the TPH-DRO MEG of 50 micrograms per liter (µg/L) in wells LSMW-1 (210 µg/L), LSMW-3 (52 µg/L), LSMW-7 (150 µg/L), and LSMW-8 (173 µg/L) during the November 1996 sampling round; however, results only exceeded the MEG in LSMW-7 (70 µg/L) during the May 1997 sampling round. Additionally, trichloroethene (TCE) was detected (0.8 µg/L and 2 µg/L) in both sampling events in LSMW-6 and cis-1,2-dichloroethene (DCE) was detected (0.5 µg/L) during the May event, which were below the current EPA Maximum Contaminant Levels (MCLs) for drinking water; and below the current Maine DEP RAGs. VOC results for the drinking water samples were below the laboratory reporting limits.

BTEX compounds were detected in the indoor air of three apartments with the highest concentrations in Apartment 3. Potential sources of background VOCs were reported to include an oil heater and fuel tank in Apartment 1, cigarette smoking in Apartments 1 and 3, new flooring in Apartment 3, and recent painting in Apartment 2. Of the detected compounds, benzene was the only compound identified to exceed the soil gas target concentrations used in the risk assessment; however, the benzene was attributed to cigarette smoking in the apartment and not to vapor intrusion associated with the No. 2 fuel oil release.

Based on the upgradient position of the onsite drinking water well and "low risk of human contact" with the impacted soil zone, the report recommended continued biannual monitoring of petroleum concentrations in groundwater to assess natural attenuation for a period of five years.

Site Conceptual Model Letter Report, R. Weston, May 7, 1999 (R. Weston, 1999a)

Based on the previous Site investigations, a CSM was prepared for the Launch Site. It was reported (consistent with **Figure 1A**) that the Launch Site is located within the same surficial drainage basin as the Control Site. Topography suggests surface water likely flows from the topographic high in the northern portion of the Launch Site to the topographic lows and drainages located to the northeast and southeast of the Site, which ultimately flow toward Lavoie Brook. A site

reconnaissance was performed to observe the acid neutralization area, which was found to discharge runoff from the concrete pad and drainage system to an unlined swale outside the building in two locations. It was recommended that soil samples from each of the two discharge locations and sediment from within the drainage system catch basins be collected for analysis of VOCs, TPH, pesticides, and priority pollutant metals.

Addendum Site Investigation Report, R. Weston, November 6, 2000 (R. Weston, 2000b)

On June 25, 1999, two borings (LSANPB-3 and LSANPB-4) were advanced in the earthen drainage swale that received discharge from the acid neutralization area. Two soil samples were collected from each soil boring. One sample was also collected from the sediment at the bottom of a catch basin (LSCB-1) within the acid neutralization pit. The second catch basin proposed to be sampled did not contain measurable sediment. Samples were analyzed for VOCs by method 8260B, TPH by method 8015B, pesticides by method 8081, and priority pollutant metals (antimony, arsenic, beryllium, cadmium, chromium, copper, lead, nickel, selenium, silver, thallium, and zinc) by method 6010B and 7471A.

Two rounds of groundwater samples (rounds -3 and -4) were collected from monitoring well LSMW-7 on October 26, 1999 (R. Weston, 1999d), and May 17, 2000 (R. Weston 2000a). Both rounds of samples were submitted for analysis of TPH-DRO by Maine method 4.1.25.

TPH-DRO was detected in the soil sample collected from the catch basin (LSCB-1) at 289 mg/kg, which exceeded the Maine DEP petroleum RAG at the time (Maine DEP, 2000). Similar results were not reported in the soil samples collected from the discharge location/swale borings LSANPB-3 and LSANPB-4. The four acid neutralization pit soil boring samples showed detected concentrations of VOCs, TPH-DRO, pesticides and metals below the Maine DEP RAGs (Maine DEP, 1997) at the time.

TPH-DRO was detected in groundwater at concentrations exceeding the Maine DHS MEG (Maine DHS, 1998) of 50 µg/L in LSMW-7 (180 µg/L in October 1999); however, results were below the laboratory reporting limit in May 2000.

Based on the supplemental investigation results, the report concluded no additional soil sampling was required based on the lack of identified contamination in the drainage swales despite the elevated TPH-DRO concentrations in the catch basin sediment. Continued biannual monitoring of LSMW-7 and the drinking water well was also recommended for a period of two years.

Long Term Monitoring Reports, Weston, 2003-2004

The following table summarizes the long-term monitoring (LTM) reports prepared by Weston for groundwater samples collected between Fall 2002 and Spring 2004. The complete data set is summarized in **Table 3**.

LTM Report Date	Sampling Date	DRO Sample Results Results were compared to 50 µg/L Maine MEG (Maine DHS, 1998)	
		LSMW-7	LSDW-1
June 2003 (Weston, 2003a)	12/5/2002	50 U	NS
October 2003 (Weston, 2003b)	4/23/2003	50 U	NS
NR	9/18/2003	50 U	50 U
October 2004 (Weston, 2004a)	5/11/2004	50 U	NS

Results shown in µg/L
NR – not formally reported, result from subsequent report
NS – not sampled (building was unoccupied and no electricity to run the pump)
U – Results were below the laboratory reporting limits

Based on the groundwater monitoring results from 2002 through 2004 and revisions to the DoD FUDS guidance that recommend sampling groundwater only when in use, monitoring well LSMW-7 and drinking water well LSDW-1 were temporarily discontinued from the LTM program (Weston, 2005) since no one was actively using the drinking water well. Therefore, monitoring was discontinued at the Launch Site, except for groundwater level measurements.

Long Term Monitoring, The Johnson Company, Inc. (JCO), 2008-2010

In accordance with the October 2008 SAP (JCO, 2008), the onsite drinking water well was proposed to be sampled if the apartment building was occupied, and the Contractor would continue to collect groundwater elevation data. The building was occupied during each of the sampling rounds completed under this SAP, and the following table summarizes the results for groundwater samples collected in the Fall of 2008, Spring and Fall of 2009, and Spring of 2010. The results of each sampling event were, as before, below laboratory reporting limits for DRO. The complete data set is summarized in **Table 3**.

LTM Report Date	Sampling Date	DRO Sample Results Results were compared to 50 µg/L Maine DEP MEG (Maine DHS, 2010)
		LSDW-1
February 12, 2010 (JCO 2010a)	10/28/2008	50 U
February 2010 (JCO, 2010b)	4/30/2009	50 U
March 8, 2010 (JCO, 2010c))	10/31/2009	50 U
April 2011 (JCO, 2011)	5/25/2010	50 U

Results shown in µg/L
U – Results were below the laboratory reporting limits

Based on these results, the report recommended continued monitoring of the drinking water well using the new Massachusetts Department of Environmental Protection (MassDEP) extractable petroleum hydrocarbon (EPH) and volatile petroleum hydrocarbon (VPH) methods newly required in the Maine DEP 2009 *Remediation Guidelines for Petroleum Contaminated Sites in Maine* (Maine DEP, 2009).

Site Historical Report, Weston, January 2009 (Weston, 2009a)

Weston prepared a Site Historical Report to document the cumulative work completed at the Site and prepared a CSM to show the nature and extent of DRO impacts at the Launch Site. The report also included additional research on historical use of the Launch Site and surrounding area to assess for other contributing sources of DRO contamination upgradient of the Site.

Based on the historical data, Weston concluded the following:

- Soil and the bedrock aquifer had been impacted by a historical release of fuel oil and diesel from former onsite USTs.
- Due to the concentrations of petroleum in soil and groundwater, impacts at the Launch Site were not likely to represent a risk to environmental or human receptors.

Long Term Monitoring, Woods Hole Group, Inc. (WHG), 2010-2012

In accordance with the WHG 2011 SAP, LSDW-1 was planned to be sampled; however, since the apartment building was not occupied, samples were not collected during the November 2010, May 2011, November 2011, or May 2012 sampling rounds (WHG, 2012a; WHG, 2012b; WHG, 2012c; and WHG, 2013).

Final Trip Report, AECOM, September 29, 2015 (AECOM/Battelle, 2015)

On May 14, 2015, two soil samples (0-0.5 and 0.5-1 foot bgs) were collected from each of four locations (LO13SB-01 through LO13SB-04) around the location of the former generator building. Samples were analyzed for PCBs to assess for possible releases from the three former transformers removed by Mason in 1994. The transformers were located within the generator building that were documented to contain transformer oil with PCB concentrations over 300,000 mg/kg. PCB concentrations for the soil samples outside the generator building were below the laboratory reporting limits (**Table 1A**).

Additional Investigation Trip Report, April 21, 2017 (Credere, 2017b)

A SAP/Quality Assurance Project Plan (QAPP) (Credere, 2017a) was prepared that outlined work to be completed in specific areas at the LO-13 Launch Site where historical elevated DRO concentrations were detected in soil to obtain soil data using current MassDEP EPH (MassDEP, 2004a) and VPH (MassDEP, 2004b) analytical methods that were adopted by the Maine DEP[1]. This work was completed to assess if an additional investigation was needed at the Site or to support the completion of the Human Health Risk Assessment (HHRA). On November 1, 2016, two angled soil borings (LSSB-8 and LSSB-10) were advanced beneath the Site building and four (4) vertical soil borings (LSSB-9, and LSSB-11 through LSSB-13). Subsurface soil samples were collected based on greatest observed contamination, from historical intervals with detections of DRO, or below observed contamination for vertical delineation. Samples were analyzed for EPH

[1] MassDEP EPH and VPH analytical methods were adopted for use in Maine in 2016 and continue in accordance with the Maine DEP Remediation Guidelines for Petroleum Contaminated Sites in Maine, May 23, 2014 (Maine DEP, 2014), and Remediation Action Guidelines for Contaminated Sites, February 5, 2016 (Maine DEP, 2016).

and VPH by MassDEP methods. Refusal was encountered between 11 and 16 feet bgs, presumably due to bedrock, in all locations and no groundwater was encountered.

Only low level PID responses between non-detect and 3.0 ppm were observed in soil samples collected at the Launch Site. As no elevated PID readings were obtained, no oleophilic dye tests were warranted.

Soil samples collected from LSSB-8, LSSB-9, LSSB-10, LSSB-12, and LSSB-13 contained concentrations of polycyclic aromatic hydrocarbons (PAHs), with benzo(a)pyrene in LSSB-13 exceeding the EPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites (EPA, 2023b). Low levels of hydrocarbon fractions for the extractable and volatile ranges were also detected at concentrations below the current Maine DEP RAGs (Maine DEP, 2023). A summary of soil analytical results is provided in **Table 1B**.

1.2.3.2 Previous Environmental Investigations at the LO-13 Control Site

Nike Site LO-13 Trip Report, Caswell, ME, August 25, 1992 (CENAE, 1992)

On August 25, 1992, CENAE visited the Control Site to assess the presence of environmental concerns and need for possible remediation under DERP. The Control Site visit and associated interviews revealed a general Site history, which is incorporated into **Section 1.2.2**.

Several USTs were identified during the Control Site visit including a 3,000-gallon No. 2 fuel oil UST north of the barracks building (later discovered to be only 2,000-gallons), a 2,000-gallon No. 2 fuel oil tank southeast of the administration building, a 2,000-gallon No. 2 fuel oil UST east of the mess hall, two 500-gallon liquefied propane gas ASTs behind the mess hall to fuel the kitchen range, a 6,000-gallon diesel UST southwest of the main generator building, and a 500-gallon UST near the radar tracking equipment generator building (**Figure 3**). Of these USTs, the owner at the time indicated he had no beneficial use from the tanks other than the propane tanks, which he had re-piped to the barracks building where they resided.

Five out-of-service pole-mounted transformers, located outside the fenced area along the access road were also noted at the Control Site. These had not been used by the owner.

USACE recommended removal of the five USTs and transformers that the Control Site owner had received no beneficial use from.

Maine DEP Chapter 691 Initial Site Investigation, Mason Environmental Services, Inc. (Mason), March 1, 1995 (Mason, 1995)

The USTs were removed from the Control Site beginning on August 15, 1994. Mason removed 5,760 gallons of petroleum contaminated water from the 6,000-gallon diesel UST at the generator building prior to commencing excavation. Upon excavation, the UST was found to be within a concrete housing that was evidently impacted by petroleum. Petroleum contaminated soil and the concrete housing were removed and stockpiled onsite. Petroleum contamination was observed to extend beneath the generator building, and due to the poor structural integrity of the building at the time, the building was removed on September 9, 1994. At the completion of the excavation and removal of approximately 840 cubic yards of soil to depths of 11 to 14 inches bgs, it was noted

that additional "weathered" petroleum was still present in the excavation, and confirmatory soil samples indicated concentrations of 180 and 240 mg/kg TPH.

On August 17 and 18, 1994, the barracks building's 2,000-gallon UST (formerly thought to be a 3,000-gallons UST) was removed. Approximately 70 tons of No. 2 fuel oil contaminated soil were removed and stockpiled onsite. Confirmatory Oil in Soil analysis indicated no detections on the sidewall adjacent to the building. A composite confirmatory sample of the remaining three sidewalls indicated TPH concentrations at 170 ppm (or mg/kg). However, Mason was not confident the samples had been accurately labeled; therefore, this data is not considered reliable and may indicate contamination was present on the building side excavation wall.

Between August 15 and 17, 1994, the mess hall 2,000-gallon UST was removed. Mason removed and presumably carbon filtered 2,000-gallons of petroleum contaminated water from the UST. Approximately 150 cubic yards of petroleum impacted soil were removed from the excavation and stockpiled onsite. Soil samples were composited from the three sidewalls away from the building and from the observed residual contamination at the base of the building foundation. The sidewall samples detected concentrations of 27 ppm (or mg/kg) TPH while the sample from the residual contamination was 180 ppm (or mg/kg) TPH.

Between August 16 and 19, 1994, the administration building 2,000-gallon UST was removed and 150 tons of contaminated soil were removed from the excavation and stockpiled onsite. One soil sample collected from the residual soil observed adjacent to the building foundation indicated 320 ppm (or mg/kg) TPH.

On September 14, 1994, composite samples were collected from the stockpiled soil for waste characterization. Stockpiled soil was removed from the Control Site between October 1 and 4, 1994.

Additionally, five PCB-containing transformers including three 50 kVA, one 10 kVA, and one 5 kVA transformer were removed from the Site. Between August and October 1994, Mason collected samples from the 5 transformers' contents and from soil beneath the transformers. Confirmatory sample results indicated PCBs were not present beneath the transformers; however, TPH was detected between 54 and 57 ppm (or mg/kg).

The transformers were removed from the Site on November 4, 1994, by Transformer Service, Inc. On December 8, 1994, approximately 23 tons of soil were excavated from beneath the transformers' former locations to remove the identified TPH, and soil was disposed offsite at the Tri-Community Landfill in Fort Fairfield, Maine. Confirmatory soil sample TPH results for the excavated areas ranged from 2.2 to 7.2 ppm (or mg/kg).

Maine UST Site Assessment Report, MEE, November 1997 (MEE, 1997c)

MEE prepared a summary UST Site Assessment Report as required by the Maine DEP to satisfy Site Assessment reporting in accordance with Maine DEP Chapter 691. The report documents the removal of the following USTs and provides no additional detail beyond that provided in the Mason 1995 report above:

UST Location	UST Details	Date Removed
West of radar tower generator building	500-gallon No. 2 fuel oil	8/15/1994
West of main generator building in center of Site	6,000-gallons diesel	8/16/1994
Off eastern corner of mess hall	2,000-gallon No. 2 fuel oil	8/17/1994
Off northern corner of barracks	2,000-gallon No. 2 fuel oil	8/18/1994
Southern side of administration building	2,000-gallon No. 2 fuel oil	8/19/1994

Although not reported in the Mason Site Assessment report, the MEE report indicated the 500-gallon UST was removed with no evidence of a release. Composite sample results from the limits of the excavation were below the laboratory reporting limits.

Site Investigation Report, R. Weston, October 31, 1997 (R. Weston, 1997)

Through 1996 and 1997, R. Weston completed investigation activities outlined in the associated SAP (R. Weston, 1996) to meet the project objectives to horizontally and vertically delineate the extent of petroleum impacts and possible VOCs that may have been used during DoD operation of the Site and to assess impacts to the Site's drinking water well. Investigation focused on previously identified petroleum contamination in the vicinity of former USTs at the barracks building, administration building, generator building, and mess hall. Soil borings and monitoring wells were installed in each source area according to the following table and presented on **Figure 3**:

Source Area	Type	Associated Soil Borings/Monitoring Wells
Generator Building	Vertical soil borings	CSSB-1, CSSB-2
	Overburden monitoring well	CSMW-1, CSMW-2
Barracks Building	Vertical soil borings	CSSB-3, CSSB-7
	Angled soil borings	CSSB-4 through CSSB-6
	Overburden monitoring wells	CSMW-3, CSMW-4
Mess Hall	Vertical soil boring	CSSB-8
	Angled soil boring	CSSB-10 through CSSB-12
	Overburden monitoring well	CSMW-5
Administration Building	Vertical soil borings	CSSB-13, CSSB-15 through CSSB-17, CSMW-6
	Angled soil boring	CSSB-14
	Overburden monitoring well	CSMW-7
Radar towers	Vertical soil boring	CSSB-18
Background	Overburden monitoring well	CSMW-8

Soil samples were collected from each location and analyzed for VOCs by method 8260A and TPH-DRO by MEDEP 4.1.25.

Two rounds of groundwater samples (rounds -1 and -2) were also collected from select monitoring wells. Most of the wells were found to be dry during both sampling rounds; therefore, only CSMW-5 was sampled on November 4, 1996, and CSMW-3 and CSMW-5 were sampled on May 28, 1997. Samples were also collected from the residential drinking water well (CSTAP collected from CSDW-1) during both sampling rounds. Samples were collected from monitoring wells via low stress (low flow) procedures and both groundwater and drinking water samples were analyzed

for VOCs by method 8260A, TPH-GRO by Maine DEP method 4.2.17, and TPH-DRO by Maine DEP method 4.1.25.

Groundwater analytical results were compared to the Maine DHS MEGs dated 1992 (Maine DHS, 1992), and soil analytical results were compared to the *Maine DEP Procedural Guidelines for Establishing Standards for the Remediation of Oil Contaminated Soil and Groundwater in Maine* dated 1995 (Maine DEP, 1995), and to Maine DEP's RAGs at the time for direct contact residential scenario (Maine DEP, 1997).

Concentrations of TPH-DRO exceeded the 10 mg/kg guidelines at the time in soil samples collected from CSSB-1 from 6 to 8 feet bgs (94 mg/kg) and 18 to 20 feet bgs (35 mg/kg), CSSB-11 from 19 to 21 feet bgs (15 mg/kg), and from CSMW-2 from 19.5 to 20 feet bgs (200 mg/kg). VOCs were also detected, particularly TCE in CSSB-18 (0.018 mg/kg) and CSMW-8 (0.034 mg/kg; **Table 2A**). Slightly elevated PID screening results were also encountered near the top of till interval in borings CSMW-3 (30 ppm), CSMW-5 (25 ppm) and CSMW-8 (93 ppm at 6 feet bgs extending to 34 feet bgs where PID was 30 ppm), see boring logs in **Appendix B**.

Groundwater analytical results exceeded the TPH-DRO MEG of 50 µg/L in well CSMW-5 during both sampling rounds at 230 and 240 µg/L, respectively. Results for the CSMW-3 and drinking water samples from CSDW-1 were below the laboratory reporting limits (**Table 4A**).

Based on the upgradient position of the onsite drinking water well, low number of samples that indicate the presence of contaminants above remediation guidelines, and "low risk of human contact" with the impacted soil zone, the report recommended continued biannual monitoring of natural attenuation in groundwater for a period of five years.

Site Conceptual Model Letter Report, R. Weston, May 7, 1999 (R. Weston, 1999a)

Based on the recent Site investigation, a CSM was prepared for the Control Site. Data gaps to be filled during upcoming additional investigation included TCE assessment in the area of CSMW-8 and CSSB-18, the extent of TPH-DRO detected in CSMW-5, and the need for bedrock wells to better assess hydrologic conditions at the Control Site.

Addendum Site Investigation Report, R. Weston, November 6, 2000 (R. Weston, 2000b)

The Addendum to the Site Investigation was performed to further assess TCE in the area of the radar towers and assess bedrock groundwater conditions. Additionally, continued monitoring of DRO in monitoring well CSMW-5 and other wells if water was present, and the drinking water well, were also included in this investigation.

On June 22 to 25, 1999, soil borings CSSB-19 through CSSB-22 were advanced in the vicinity of previously advanced CSSB-18, and soil borings CSSB-23 through CSSB-26 were advanced in the vicinity of previously advanced CSMW-8, both where TCE was previously detected (**Figure 3**). Two soil samples were collected from each soil boring. Samples were analyzed for VOCs by method 8260B.

Three bedrock monitoring wells were also installed on June 23, 1999, near CSMW-8 (CSMW-9), CSMW-5 (CSMW-10), and CSSB-18 (CSMW-11; **Figure 3**). Two rounds of groundwater

samples (rounds -3 and -4) were collected on October 26, 1999, and May 17, 2000, from overburden monitoring well CSMW-5, and the newly installed bedrock wells CSMW-9, CSMW-10, and CSMW-11. Samples from CSMW-5 were submitted for TPH-DRO analysis by Maine DEP Method 4.1.25, and samples from CSMW-9, CSMW-10, and CSMW-11 were submitted for analysis of VOCs by method 8260B, TPH-DRO by Maine DEP method 4.1.25 and TPH-GRO by Maine DEP method 4.2.17. Sampling of the onsite drinking water well was not reported.

TCE was detected in soil samples from CSSB-19 (38-40 feet bgs, 0.170 mg/kg), CSSB-20 (38-40 feet bgs, 0.117 mg/kg), CSSB-22 (4 to 6 feet bgs, 0.505 mg/kg), CSSB-23 (38 to 40 feet bgs, 0.616 mg/kg), and CSSB-26 (38-40 feet bgs, 0.070 mg/kg; **Table 2A**). Concentrations did not exceed the direct contact Maine DEP Guidelines at the time but did exceed protection of groundwater guidelines. TCE concentrations in CSSB-22 and CSSB-23 exceeded the current RSLs.

TPH-DRO was detected in groundwater at concentrations exceeding the Maine DEP MEG of 50 µg/L during both rounds of sampling in overburden well CSMW-5 (220 and 120 µg/L, respectively) and during the October 1999 sampling round in CSMW-10 (120 µg/L). Additionally, TCE was detected in CSMW-9 and CSMW-11 during both sampling rounds at concentrations that were below the current MCLs/Maine DEP RAGs but exceeded the current Tapwater RSL (**Table 4A**).

Hydraulic conductivity testing was also performed on the three bedrock wells on October 25 and 26, 1999. Values ranged from 7.4 feet per day (ft/d) to 40.4 ft/d with an estimated bedrock seepage velocity of 1,500 feet per year (ft/yr).

Based on the supplemental investigation results, the report concluded no additional soil sampling was required based on the lack of newly identified soil impacts and lack of exposure to previously identified TPH-DRO soil exceedances. Continued biannual monitoring of CSMW-5, CSMW-9, CSMW-10, and CSMW-11, and the drinking water well was also recommended for a period of two years.

Long Term Monitoring Reports, Weston, 2003-2004

Weston prepared and executed the associated SAP (Weston, 2002) to perform a two-year biannual groundwater sampling program at the Control Site to include monitoring wells CSMW-5, CSMW-9, CSMW-10, and CSMW-11, and the drinking water well CSDW-1. Sampling was conducted for a period of two years, and samples were analyzed for DRO by Maine DEP method 4.1.25.

The following table summarizes the LTM reports prepared by Weston for groundwater samples collected between Fall 2002 and Spring 2004. The complete data set is summarized in **Table 4A**.

LTM Report Date	Sampling Date	DRO Sample Results Results were compared to 50 µg/L Maine MEG (Maine DHS, 1998)				
		CSMW-5	CSMW-9	CSMW-10	CSMW-11	CSDW-1
June 2003 (Weston, 2003a)	12/4/2002	NS	50 U	50 U	50 U	NS
October 2003 (Weston, 2003b)	4/23/2003	NS	50 U	50 U	50 U	NS
NR	9/18-19/2003	**88**	50 U	50 U	50 U	50 U
October 2004 (Weston, 2004b)	5/11/2004	50 U	50 U	50 U	50 U	50 U

Results shown in µg/L
NR – not formally reported
NS – not sampled
U – Results were below the laboratory reporting limits
Bold – results reported above the laboratory reporting limits
Bold – results exceed Maine MEG at the time

Long Term Monitoring Reports, Weston, 2004-2006

Based on the four rounds of non-detect groundwater monitoring results in monitoring wells CSMW-9, CSMW-10, and CSMW-11 from 2002 through 2004 and revisions to the DoD FUDS guidance these wells were temporarily discontinued from the LTM program (Weston, 2005). Therefore, continued monitoring of only CSMW-5 and the drinking water well CSDW-1 for DRO was continued.

The following table summarizes the LTM reports prepared by Weston for groundwater samples collected between Fall 2004 and Spring 2006. The complete data set is summarized in **Table 4A**.

LTM Report Date	Sampling Date	DRO Sample Results Results were compared to 50 µg/L Maine MEG (Maine DHS, 1998)	
		CSMW-5	CSDW-1
November 2005 (Weston, 2005)	9/30/2004	**250**	50 U
	4/25/2005	50 U	50 U
November 2006 (Weston, 2006)	9/15-22/2005	50 U	50 U
	5/23/2006	50 U	50 U

Results shown in µg/L
U – Results were below the laboratory reporting limits
Bold – Concentrations exceeded the laboratory reporting limits
Results exceed the MEG at the time

Long Term Monitoring Reports, Weston, 2006-2008

Weston prepared a SAP dated April 2007 (Weston, 2007a) to extend the groundwater monitoring program through the Spring of 2008. The SAP proposed sampling of CSMW-5 and CSDW-1 for TPH-DRO by Maine DEP Method 4.1.25. The following table summarizes the long-term monitoring reports prepared by Weston for groundwater samples collected in the Fall of 2006, Spring and Fall of 2007, and Spring of 2008. The complete data set is summarized in **Table 4A**.

LTM Report Date	Sampling Date	DRO Sample Results Results were compared to 50 µg/L Maine DEP MEG	
		CSMW-5	CSDW-1
November 2007 (Weston, 2007b)	10/24/2006	**260**	50 U
	5/24/2007	50 U	NS
February 2009 (Weston, 2009b)	10/24/2007	50 U	NS
	4/30/2008	50 U	NS

Results shown in µg/L
U – Results were below the laboratory reporting limits
NS – Not sampled
Bold – Concentrations exceeded the laboratory reporting limits
Results exceed the MEG at the time

The reason for not sampling the drinking water well between Spring of 2007 and Spring of 2008 was not indicated in the report.

Long Term Monitoring, JCO, 2008-2010

In accordance with JCO's October 2008 SAP (JCO, 2008), CSMW-5 and the onsite drinking water well, if in use for a potable water supply, were proposed for sampling. The drinking water well was not in use as a potable water supply between Fall 2008 and Spring 2010; therefore, the drinking water well was not sampled. The following table summarizes the long-term monitoring results prepared by JCO for groundwater samples collected from CSMW-5 in the Fall of 2008, Spring and Fall of 2009, and Spring of 2010. The complete data set is summarized in **Table 4A**.

LTM Report Date	Sampling Date	DRO Sample Results Results were compared to 50 µg/L Maine MEG (Maine DHS, 1998)
		CSMW-5
February 12, 2010 (JCO 2010a)	10/28/2008	50 U
February 2010 (JCO, 2010b)	4/30/2009	50 U
March 8, 2010 (JCO, 2010c))	10/30/2009	50 U
April 2011 (JCO, 2011)	5/25/2010	50 U

Results shown in µg/L
U – Results were below the laboratory reporting limits

Based on these results, JCO recommended continued monitoring of the well using the new Mass DEP EPH and VPH methods adopted in the Maine DEP 2009 *Remediation Guidelines for Petroleum Contaminated Sites in Maine* (Maine DEP, 2009).

Site Historical Report, Weston, January 2009 (Weston, 2009a)

Weston prepared a Site Historical Report to document the cumulative work completed at the LO-13 Site and prepared a CSM to assess the nature and extent of DRO impacts at the Control Site. The report also included additional research on historical use of the Control Site and surrounding area to assess for other contributing sources of DRO contamination upgradient of the Site.

Based on the historical data, Weston concluded the following:

- Soil and the bedrock aquifer had been impacted by a historical release of fuel oil and diesel from former onsite USTs
- Due to the current concentrations of petroleum in soil and groundwater, impacts at the Control Site are not likely to represent a risk to human receptors or the environment.

Long Term Monitoring, WHG, 2010-2012

In accordance with the WHG 2011 SAP, WHG monitored well CSMW-5. The SAP was consistent with the previous JCO SAP with the exception of the change to EPH (hydrocarbon fractions only) analysis by MassDEP method 04-1.1. The following table summarizes the long-term monitoring reports prepared by WHG for groundwater samples collected in the Fall of 2010, Spring and Fall of 2011, and Spring of 2012. The complete data set is summarized in **Table 4A**.

LTM Report Date	Sampling Date	Total EPH Carbon Ranges Results were compared to the individual Petroleum Guidelines for Respective Carbon Ranges (Maine DEP, 2009)
		CSMW-5
December 2012 (WHG, 2012a)	11/2/2010	100 U
February 2012 (WHG, 2012b)	5/25/2011	100 U
April 2012 (WHG, 2012c)	11/16/2011	100 U
January 2013 (WHG, 2013)	5/23/2012	100 U

Results shown in µg/L
U – Results were below the laboratory reporting limits

Based on these results, WHG recommended discontinuing sampling at the LO-13 Control Site and decommissioning of the Site wells.

Additional Investigation Trip Report, March 1, 2018 (Credere, 2018)

A SAP/QAPP (Credere, 2017c) was prepared that outlined work to be completed in specific areas at the Control Site where historical elevated DRO concentrations were detected to obtain soil data using current MassDEP EPH (MassDEP, 2004a) and VPH (MassDEP, 2004b) analytical methods that were adopted by the Maine DEP[2]. Additionally, two bedrock monitoring wells were installed downgradient of the former UST locations to fill a spatial data gap. This work was completed to assess if an additional investigation was needed at the Control Site or to support a no actionable risk conclusion in a HHRA. On July 19, 2017, five soil borings (CSSB-27 through CSSB-31) were advanced in the area of the generator building UST where historical DRO concentrations were identified and CSSB-32 was adjacent to the former UST near the mess hall (**Figure 3**). Between July 18 and 20, 2017, two bedrock monitoring wells (CSMW-100 and CSMW-101, both

[2] MassDEP EPH and VPH analytical methods were adopted for use in Maine in accordance with the Maine DEP Remediation Guidelines for Petroleum Contaminated Sites in Maine, May 23, 2014 (Maine DEP, 2014), and Remediation Action Guidelines for Sites Contaminated with Hazardous Substances, February 5, 2016 (Maine DEP, 2016a).

screened 57 to 77 feet bgs; see boring logs in **Appendix B**) were installed northwest of the generator building and northeast of the mess hall, respectively (**Figure 3**).

Evidence of residual petroleum was identified in boring CSSB-27 with maximum PID readings of 48.5 ppmv and a saturated oleophilic dye test result at a depth of 5 to 7 feet bgs. No evidence of contamination was observed in any other borings.

Soil analytical results for samples CSSB-27 from 5 to 7 feet bgs indicated EPH hydrocarbon fractions C_9-C_{18} aliphatics and unadjusted C_{11}-C_{22} aromatics (1,400 and 1,100 µg/L, respectively) exceeded the Maine DEP RAGs (Maine DEP, 2016b; no RSLs are published for the hydrocarbon fractions). PAHs were also detected in most samples collected at concentrations below the EPA RSLs and Maine DEP RAGs. Soil results are summarized in **Table 2B**.

Groundwater analytical results from the two bedrock monitoring wells CSMW-100 and CSMW-101 were below the laboratory reporting limits with the exception of C9-C10 aromatics that was detected at low concentrations of 13 and 12 µg/L, respectively, well below the current Maine DEP RAG of 71 µg/L (MCLs and Tapwater RSLs not established for EPH and VPH range petroleum fractions). Groundwater results are summarized in **Table 4B**.

2. PHYSICAL SETTING

2.1 TOPOGRAPHY

Based on Site observations and the United States Geological Survey (USGS) Topographic Map of the Van Buren Quadrangle, Maine (USGS, 2014), topography at the Sites is generally flat, and the local area slopes downward to the northeast and south from the Control Site and the north, east, and southeast from the Launch Site as shown on digital elevation model (DEM) **Figure 1C**. Topographic profiles from Google Earth are provided for reference as **Figures 6C and 6D** for the Control Site and **Figure 7B** for the Launch Site.

The Control Site has a ridge peak to the southeast but is otherwise located on top of a hilltop plateau as shown on the Control Site DEM **Figure 1D**. From the Control Site, topography slopes gradually to the north-northeast, but steeply just south of the Site. Ground surface at the Control Site ranges between approximately 852 and 860 feet above mean sea level (AMSL).

The Launch Site is located on a saddle between two hilltops, and ground surface slopes off to the north and southeast. Locally both sites ultimately drain to Lavoie Brook to the northeast. Ground surface at the Launch Site ranges between approximately 770 and 780 feet above mean sea level (AMSL).

An excerpt from the USGS map has been included as **Figure 1A**.

2.2 GEOLOGY

2.2.1 Surficial Geology

According to the Maine Geological Survey (MGS) Reconnaissance Surficial Geology map of the Van Buren Quadrangle, Maine (MGS, 1978), the Launch Site is underlain by glacial till consisting of a heterogeneous mixture of sand, silt, clay, and gravel; and the Control Site is the same with areas of swamp deposits. Generally, native soil observations at both Sites were consistent with mapped till with a possible overlying outwash layer at the Control Site. The following summarizes specific detailed descriptions of the surficial geology observed at each Site.

Launch Site Surficial Geology

At the Launch Site, approximately 2 to 8 feet of soil and sandy fill is present near the surface underlain by varying compositions of denser silt, clay, sand, and gravel to bedrock refusal. Till extended to refusal at approximately 14 to 19 feet bgs across the Site. During bedrock drilling, most locations encountered a 2 to 4-foot interval of weathered bedrock (see boring logs in **Appendix B**).

Control Site Surficial Geology

At the Control Site, surficial geology appears to be interlayered till and outwash deposits with fill and reworked till at the surface primarily in the top 2 feet, but as deep as 10 feet in some borings. The surface till may pinch out or become particularly thin in the northeastern portion of the Site in the vicinity of the generator building where this material was not specifically observed. The till

layers are described as a denser silt with sand and gravel, and the outwash is described as looser silt and sand. Most borings show a till-outwash-till sequence; however, the deeper borings (CSMW-1, CSMW-100, and CSMW-101) indicate this sequence continues as interlayered deposits becoming thicker with depth. Overburden thickness ranges from 45 to 53 feet in the southwest portion of the Site near the mess hall (CSMW-10 and CSMW-101) and the administration building (CSMW-9), 60 to 63 feet near the former generator building (CSMW-1 and CSMW-100) and 71 feet near the radar towers (CSMW-11). Well locations are shown on **Figure 3** and boring logs are included as **Appendix B**. Simplified cross sections showing overburden thickness and simplified soil descriptions are provided as **Figure 6A and 6B**. Generally, historical soil descriptions do not correlate well between boring or were not completed (as is the case for some bedrock well locations) so no correlation for overburden could be made in the cross sections.

2.2.2 Bedrock Geology

According to the MGS Bedrock Geologic Map of Maine (MGS, 1985), bedrock beneath both Sites consists of Silurian to Ordovician limestone, siltstone, and slate greywacke Carys Mills Formation. Bedrock observed in bedrock monitoring wells at the Launch Site was weakly metamorphosed quartzite. Limited bedrock descriptions were included in logs during prior investigations at the Control Site. The following summarizes specific detailed descriptions of the bedrock geology at each Site.

Bedrock structure is not well-characterized due to the lack of mapping in the area. No published geologic maps exist between Loring AFB and the Canadian border. There is no available published geologic mapping east of the published works of Roy, 1987 (Roy, D.C. 1987, "Geologic Map of the Caribou and Northern Presque Isle 15' Quadrangles, Maine"; Maine Geological Survey; Department of Conservation). The bedrock geology in the area has never been mapped, and Weston did not conduct borehole logging in the bedrock wells. There are no bedrock outcrops in the immediate vicinity of the Sites, and this part of Maine is notably sparse in having good geologic exposures. Regional fold structures are mapped by Roy in either the Ashland or Aroostook - Matapedia anticlinorium to the west, but these cannot be extrapolated reliably to the Sites.

Launch Site Bedrock Geology

At the Launch Site, the upper contact with bedrock is weathered to a thickness of approximately 4 feet. In the bedrock monitoring wells, competent bedrock was encountered between 18 and 23 feet bgs. Bedrock wells were advanced to 50 to 60 feet bgs, which was between 27 to 38 feet into competent bedrock. Descriptions were consistently quartzite with fracture zones where the wells were screened: 58 to 60 feet bgs in LSMW-6, 48 to 55 feet bgs in LSMW-7, and 39 to 43 and 47 to 49 feet bgs in LSMW-8 (R. Weston, 1997 and R. Weston, 2000b). A simplified cross section is provided as **Figure 7A**. The cross section indicates a slight slope in bedrock to the southeast approximately parallel with topography. Fracture zones indicated during historical drilling activities also consistently follow this slope, with the fracture zones corresponding to the bottom/screened portions of the wells shown on the cross section.

Control Site Bedrock Geology

Depth to bedrock ranges from 45 to 53 feet in the southwest portion of the Control Site near the mess hall (CSMW-10 and CSMW-101) and the administration building (CSMW-9), 60 to 63 feet near the former generator building (CSMW-1 and CSMW-100), and 71 feet near the radar towers (CSMW-11) indicating a slight (approximately 2%) slope in bedrock to the north (see cross section on **Figure 6A**), which is consistent with the regional geologic mapping of the Carys Mill formation (MGS, 1987). East to west, the bedrock slope is nearly flat within the investigated area as shown on **Figure 6B**. Approximately 3 feet of weathered bedrock is present in at least two borings from 2017 (CSMW-1 and CSMW-100) at the overburden/bedrock contact. Limited or no bedrock descriptions are provided in the older boring logs because they focused primarily on overburden petroleum release and relied upon the regional bedrock information as presented above. The Control Site is located on the top of a Topographic ridge with a slightly higher peak to the southeast (see DEM **Figure 1D**). From the Control Site, topography slopes downward to the northeast and east. Although bedrock appears relatively flat at the top of this ridge, the bedrock surface likely conforms to the ground surface sloping directions.

2.3 HYDROLOGY AND HYDROGEOLOGY

2.3.1 Surface Water

The Launch Site is located within a surficial drainage basin of Lavoie Brook located approximately 2,000 feet northeast of the Launch Site, which is the closest surface water body. The Launch Site drainage likely follows topography with the exception of an apparent drainage feature that extends from the berm downslope to the southeast, southerly prior to the adjoining residence, and then easterly across Route 1A.

The Control Site is located at the divide between the Lavoie Brook drainage basin to the east and Martin Brook drainage basin to the west (MGS, 2002). Martin Brook originates in a pond located 2,700 feet northwest of the Control Site. **Figure 1B** shows general surface water features and flow for the vicinity. Based on general radial groundwater flow direction to the north and east at the Control Site and southeast at the Launch Site, and local topography, the main areas of the Site appear more influenced by the Lavoie Brook basin. Lavoie Brook runs southeasterly into Canada toward the St. John River.

Precipitation at both Sites likely infiltrates the mostly permeable surfaces or flows overland across paved surfaces and infiltrates onto adjacent permeable surfaces. No stormwater management systems other than road culverts and drainage swales were noted at either Site. The acid neutralization area at the Launch Site was found to discharge runoff from the concrete pad and drainage system to an unlined swale in two locations (shown on **Figure 2**).

2.3.2 Groundwater

Review of the MGS Significant Sand and Gravel Aquifer map for the Hamlin Quadrangle, Maine, indicates the Site does not fall within a mapped significant sand and gravel aquifer (MGS, 2002).

Launch Site Groundwater

Groundwater flow direction was not initially assessed in 1996-2000; however, more recent gauging from 2011-2013 during the monitoring program indicated groundwater flow to the south-southeast toward discharge points along Lavoie Brook. Groundwater contours from the most recent groundwater monitoring event from May 2012 (JCO, 2013) are shown on **Figure 2**.

Based on a basic review of the groundwater levels in overburden compared to the bedrock well, vertical gradient at the Launch Site appears to be in a downward direction wherein overburden groundwater is recharging bedrock groundwater.

The drilling logs for the monitoring wells indicated a well yield in the screened fracture zones of 20 gallons per minute in LSMW-6 (58-60 feet bgs), 2-3 gpm in LSMW-7 (48 to 55 feet bgs), and in LSMW-8 was reported as 5-6 gpm in the shallower fracture zone at 39-43 feet bgs and 10-12 gpm in the deeper fracture zone 47-49 feet bgs. The well yield was reported by an experienced well driller. TCE was only detected in LSMW-6, the well with the highest yield.

Control Site Groundwater

Depth to groundwater was measured in 2017 to range from approximately 66 to 69 feet bgs in the gauged wells CSMW-9, CSMW-10, CSMW-100 and CSMW-101. Groundwater flow direction was historically interpreted during the groundwater monitoring program to be to the north (JCO, 2013) using monitoring wells CSMW-9, CSMW-10 and CSMW-11 but was inferred to be east-southeasterly in 2017 using wells CSMW-9, CSMW-10, CSMW-100 and CSMW-101 (Credere, 2018). A comprehensive groundwater gauging round has not been completed; however, review of historical gauging data indicates CSMW-11 to be a driving factor in the historical interpretation of groundwater flow to the north as there is a 0.02 foot/foot gradient between CSMW-9 and CSMW-11 in the 2011-2012 (similar between November and May sampling events; JCO, 2013) groundwater monitoring events and only a 0.002 gradient in the opposite direction between CSMW-100 and CSMW-9. The groundwater table may be relatively flat across most of the site, and then slope off steeply at the north and south sides. This may also be a factor of well construction as CSMW-10 is screened shallower (57-77 feet bgs) than CSMW-11 (screened 108-118 feet bgs) and CSMW-9 (screened 111-121 feet bgs). A consistent seasonal trend of spring water levels being typically 3 ft higher than summer/fall readings has been observed (JCO, 2013). Using this trend, it's possible to infer a summer/fall water level measurement at CSMW-11 that can be used for contouring water levels site-wide all within the summer/fall season. A summary table of this evaluation is provided as **Table 6**.

Considering local topography and drainage patterns and the proximity to Lavoie Brook, flow is considered most likely to the north-northeast on the northern portion of the site, but locally toward the south, southwest, and southeast along the southern edge of the site (see **Figure 1D**). The MGS Significant Sand and Gravel Aquifer map for the Hamlin Quadrangle, Maine (MGS, 2002), maps a surface water drainage basin divide across the Control Site.

Groundwater measurements from the 2017 groundwater sampling round are shown on **Figure 3** with an interpreted flow direction to the north across most of the site, and then locally to the south and southeast on the south side of the Site.

In October 1999, hydraulic conductivity testing using rising and falling head tests in three bedrock monitoring wells CSMW-9, CSMW-10, and CSMW-11 indicated conductivity ranged from 7.4 to 40.4 ft/d in the bedrock water bearing zones with a hydraulic gradient of 0.02 and conductivity of 21.2 ft/d. Using an estimated effective porosity of 10% based on observed number of fractures in the limestone during bedrock drilling of the monitoring wells, bedrock seepage was estimated at 1,500 ft/yr (R. Weston, 2000b).

2.4 CLIMATE

The average yearly temperature for the nearest climate station in Caribou, Maine (located 15 miles southwest of the Sites), is 49.2 degrees Fahrenheit (°F) with a peak monthly average of 76°F for July and a low monthly average of 20°F in January. Average rainfall (including snow equivalent) is 38.49 inches per year (U.S. Climate Data, 2024).

2.5 DEMOGRAPHICS AND LAND USE

The Town of Caswell has a total population of 293 people. Aroostook County, in which Caswell and the Sites are located, has a population density of 9.8 persons per square mile (US Census, 2020). There are no known residences within 1,000 feet of the Control Site; however, there is a single residence along Route 1A less than 450 feet southeast and several residences approximately 830 feet southeast of the Launch Site. **Figure 1B** shows the general area layout and proximity to occupied nearby properties.

There are multiple buildings at each Site. At the Launch Site, there are no occupied buildings. At the Control Site, the administration building is occupied seasonally for residential use. The remaining buildings are used for storage and are in varying states of deterioration. The surrounding area is undeveloped with the exception of logging and/or recreational use. While there are no current commercial uses of the property, commercial use is a possible future use and construction/utility work is also a potential future use. Due to limited occupancy of the Sites, trespassing is also possible.

Both properties as well as the surrounding region utilize groundwater, typically from bedrock, for potable water supply given the lack of a public water supply in this area. Locations of water supply wells LSDW-1 and CSDW-1 are shown on **Figures 2** and **3,** respectively. According to the Maine Department of Agriculture, Conservation & Forestry Water Well Database (MGS, 2023), the only mapped drinking water well is the Launch Site DW-1 and no construction details are recorded with the listing. No well construction information for the onsite drinking water wells was identified in prior reports. The drinking water well at the Launch Site is known to be plumbed to the barracks building where it was historically sampled via the tap/faucet in these apartments. The well at the Control Site was historically sampled directly from the well via a discharge hose. There are no residences in the immediate vicinity of the Control Site that would have drinking water wells; however, the adjoining residence to the south of the Launch Site uses a private drinking water well.

3. NATURE AND EXTENT OF CONTAMINATION

3.1 ENVIRONMENTAL SUMMARY

Environmental Summary of the Launch Site

During a USACE Site reconnaissance of the Launch Site in 1992, two USTs and the acid neutralization and refueling area were identified as items to assess. In 1994, a 2,000-gallon fuel oil UST was removed from southwest of the barracks building and a 4,000-gallon diesel UST was removed from southeast of the generator building (**Figure 2**). A total of 240 cubic yards of petroleum impacted soil and impacted groundwater were removed from both excavations, and residual petroleum contamination was known to be left in both excavations. Additionally, three PCB-containing transformers were removed from inside the generator building and disposed offsite.

In 1996 and 1997, the two UST areas and the acid neutralization and refueling area were assessed. Evidence of the residual soil contamination noted above was confirmed by PID, odor, and elevated DRO analytical concentrations in LSSB-3, which was an angle boring drilled beneath the barracks building. Soil samples from the generator building UST area (LSSB-6, LSSB-7, LSMW-3, and LSMW-4) indicated no evidence of the residual contamination. However, evidence of residual contamination was identified in both UST areas in groundwater samples collected from overburden wells LSMW-1 and LSMW-3 and bedrock wells LSMW-7 and LSMW-8 (**Figure 2**). Indoor air was also assessed in apartments within the barracks building; however, elevated benzene was attributed to cigarette smoking and was not correlated to the subsurface residual petroleum, though the highest concentrations in indoor air in Apartment 3 did correspond to the highest soil concentration in LSSB-3.

In 1999, additional investigation of the acid neutralization and refueling area indicated elevated DRO was present in a catch basin; however, similar concentrations were not identified in the swales that received the discharge (LSANPB-3 and LSANPB-4). Therefore, it appears the DRO was confined to the catch basins within the building. Arsenic was also consistently detected in samples from the catch basin, trench, and swale, with concentrations ranging from 5.21 to 9.97 mg/kg. The maximum arsenic concentration exceeds the lowest Maine RAG based on leaching to groundwater but is well below both the direct contact commercial soil RAG of 41 mg/kg and the Maine DEP “rural developed” background concentration of 28 mg/kg.

Based on the groundwater concentrations identified in 1996 and 1997, groundwater monitoring was conducted for DRO only in monitoring well LSMW-7 and the Site drinking water well (via the apartment taps) from 1999 through 2004 and again from October 2008 through May 2010 for only the drinking water well. Initial results indicated elevated DRO in LSMW-7 in 1999 with concentrations below the reporting limit thereafter for five rounds. No detections of DRO were obtained from the drinking water well during any sampling event. These wells were removed from the monitoring program and only water levels were measured through 2011.

To fill the data gap associated with the transformers that were removed from the Site in 1994, four soil samples were collected in 2015 from around the generator building prior to demolition. No PCBs were detected in the soil samples.

In 2016, a risk screening evaluation was completed using historical data (primarily DRO) from the Launch Site, which indicated direct contact exceedances when converting DRO results for comparison to EPH/VPH comparison criteria (MACTEC, 2010). Modeling for the vapor pathway was not included in the screening.

Considering the time elapsed since the DRO data were collected and the incompatibility of the DRO data with current risk screening criteria based on hydrocarbon fractions, additional soil sampling was completed in 2016, using current MassDEP EPH and VPH analytical methods for use in the risk assessment. Samples were collected to target historical elevated DRO concentrations (e.g., LSSB-3 near the barracks) and to fill any spatial data gaps. Results indicated EPH (specifically PAHs, mainly benzo(a)pyrene) remained in soil boring locations LSSB-8, LSSB-9, LSSB-10, LSSB-12, and LSSB-13 with only trace levels of hydrocarbon fractions in LSSB-10. Additionally, a downgradient residential drinking water well was sampled in August 2025 to dismiss the presence of VOCs in the water supply and to ensure there is no ongoing offsite transport of VOCs in groundwater from the Site (**Figure 1B**). These samples were analyzed for chlorinated VOCs only (PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride).

These results were used in the risk assessment, which is summarized in **Section 5**. Petroleum fraction results are presented in this RI to support the CSM; however, they are not regulated under CERCLA, so those petroleum hydrocarbon fraction results are not evaluated in the HHRA. Rather, the petroleum hydrocarbon fraction data are used to evaluate petroleum under the Maine DEP RAGs (Maine DEP, 2023) in a Petroleum Assessment Report (**Appendix D**).

Environmental Summary of the Control Site

During a USACE Site reconnaissance of the Control Site in 1992, five USTs and transformers were identified as items to assess. In 1994, the five USTs were removed, including a 6,000-gallon diesel UST from southwest of the former generator building, a 2,000-gallon No. 2 fuel oil UST from north of the barracks building, a 2,000-gallon No. 2 fuel oil UST from southeast of the mess hall, a 2,000-gallon No. 2 fuel oil UST from southeast of the administration building, and a 500-gallon diesel UST from west of the radar tower generator building (**Figure 3**). Petroleum impacted soil was removed from each excavation except the 500-gallon UST location, and residual petroleum contamination was known to be left in the four larger UST excavations, primarily along the building sidewalls of the excavations. Additionally, five transformers were removed for offsite disposal along with underlying soil that contained TPH.

In 1996 and 1997, each UST area was assessed. Evidence of the residual soil contamination noted above was confirmed by elevated DRO analytical concentrations in CSSB-1 at the former generator building and CSSB-11 at the mess hall. Soil samples from the barracks building, administration building, and radar tower building UST areas indicated no evidence of residual contamination. Overburden groundwater presence was limited to wells CSMW-3 and CSMW-5 during this initial assessment (i.e., CSMW-1, CSMW-2, and CSMW-4 were dry) and indicated DRO in groundwater at CSMW-5. No BTEX compounds were identified in the VOC analysis for these samples. TCE in soil was also detected at trace concentrations in soil in CSSB-18, CSMW-1, and CSMW-8 (all below the current RSL) (**Table 2A**).

In 1999, due to limited presence of overburden groundwater at the Control Site, three bedrock monitoring wells were installed. DRO was identified in the bedrock well CSMW-10 adjacent to overburden well CSMW-5. Additional investigation of the extent of TCE marginally in soil indicated TCE exceeded the current RSL for residential soil (May 2024) (0.41 mg/kg, based on a target hazard quotient of 0.1) in CSSB-22 from 4 to 6 feet bgs (0.44 mg/kg and 0.505 mg/kg in the field duplicate) and CSSB-23 from 38 to 40 feet bgs (0.616 mg/kg). TCE in all other samples was not detected or detected below the RSL of 0.41 mg/kg. Based on the depth of the TCE identified and results relative to the regulatory criteria at the time, no additional investigation was considered warranted at the time of the 1999 report.

Based on the groundwater concentrations identified in 1996 through 1999, groundwater monitoring was conducted on well CSMW-5 and the Control Site drinking water well CSDW-1 (via direct purge from the well pump) from 2003 through 2012. Initial results indicated elevated DRO in CSMW-5 through May 2000 and in the Fall of 2003, 2004, and 2006 with concentrations below the reporting limit thereafter for seven rounds of DRO and four subsequent rounds of EPH fractions and target compounds (**Table 4A and 4B**). No concentrations of DRO were detected from the drinking water well during any sampling event.

In 2016, a risk screening evaluation was completed using historical data (primarily DRO) from the Control Site, which indicated potential unacceptable risk was present for the residual soil petroleum concentrations. However, this risk conclusion was highly uncertain because the DRO results were compared to EPH/VPH comparison criteria (MACTEC, 2010). Modeling for the vapor pathway was not included in the screening assessment. TCE was not identified as a direct contact risk during the screening; therefore, no further investigation for TCE was considered warranted at the time.

Considering the time elapsed since the DRO data was collected and incompatibility of the DRO data with current risk screening criteria based on hydrocarbon fractions, additional soil sampling was conducted in 2017, using current MassDEP EPH and VPH analytical methods and PAHs by selected ion mode (SIM) for use in the risk assessment. Samples were collected to target historical elevated DRO concentrations (e.g., CSSB-1 and CSSB-11) and to fill any spatial data gaps. Results indicated EPH and VPH hydrocarbon fractions remained relatively higher (but below RSLs/RAGs) in soil boring location CSSB-27 in the area of the former generator building with only trace levels of hydrocarbon fractions and PAHs in other borings (**Table 2B**). Additionally, assessment of groundwater conditions in the downgradient direction from the two former USTs where there was evidence of contamination was identified as a spatial data gap. Two additional bedrock monitoring wells downgradient of these USTs were installed and sampled; results were predominantly below the laboratory reporting limits with only trace detection of C9-C10 aromatics (**Table 4B**).

These results were used in the risk assessment, which is summarized in **Section 5**. Petroleum fraction results are presented in this RI to support the CSM; however, they are not addressed under CERCLA and therefore not evaluated in the HHRA. Rather, the petroleum hydrocarbon fraction data is used to evaluate petroleum under the Maine DEP RAGs (Maine DEP, 2023) in a Petroleum Assessment Report (**Appendix D**).

Uncertainties Associated with Site Data Applied to CSM

Historical analytical laboratory reports (dating back to the mid-1990s) were not available for some sampling events, so, in some cases, data were obtained from summary tables presented in previous Site documents. In addition, in some cases, the detection limits for historical data were not available. Much of the oldest data from the 1990s was collected as DRO, which cannot be compared directly to current PALs that are parsed out by petroleum fractions and target PAHs and VOCs. Higher concentrations of DRO were confirmed using current EPH and VPH analytical methods in 2016 and 2017. Additional uncertainties associated with the data are presented below by medium:

- Soil: Surface and subsurface soil samples applied to the HHRA for the Launch Site were collected in 1994, 1996, 2015 or 2016. The older samples may not be representative of current Site conditions as organic contaminants are expected to have degraded, in some cases likely to concentrations below detection limits. Some of the more recent samples were collected in similar areas as older samples and represent updated conditions at these locations.

- Groundwater: For the Launch Site, the most recent onsite groundwater sample was collected in 2010 (in a drinking water well only); no monitoring wells have been sampled since 2004. While TCE, a COPC, was detected above screening levels in one well (LSMW-6) in 1996 and 1997, in some cases, no follow-up groundwater sampling for TCE was conducted as previous investigations concluded there were no major TCE DoD-related sources. The absence of current onsite groundwater data for TCE and chlorinated hydrocarbons in groundwater adds uncertainty to the assessment of the Launch Site groundwater; however, concentrations are expected to have decreased to below detection limits since 2004 due to both the historically low detected concentrations and the likely degradation of organic contaminants over time. Furthermore, the drinking water well at the downgradient residence, which is approximately 450 feet southeast of LSMW-6 and 350 feet southeast from the border of the Launch Site, was sampled in August 2025 and the results confirmed that no VOCs are present in this downgradient well. The drinking water sample was taken from the faucet in the residence, and there was no filtration system present. These samples were analyzed for chlorinated VOCs only (PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride).

  Similarly, groundwater data from the Control Site are limited. Of the six monitoring wells sampled, more recent data (2017) were collected from only two wells, CSMW-100 and CSMW-101, and were analyzed for VPH fractions and target analytes (none detected), EPH fractions (none detected), and PAHs by low detection limit methods (8270-SIM). All other groundwater data were collected between 1996 and 2012 (one well). TCE was detected above screening levels in 1999 and 2000, but these wells have not been sampled since as previous investigations concluded that there were no major DoD-related sources of TCE. The absence of current groundwater data for TCE and chlorinated hydrocarbons in groundwater adds uncertainty to the assessment of the Control Site; however, concentrations are expected to have decreased to below detection limits since 2004 due to both the historically low detected concentrations and the likely degradation of organic contaminants over time.

- Air: At the Launch Site, air measurements for the barracks/apartment building were last collected in 1995 and 1996. In addition, analysis was done only for BTEX compounds, and there was probable interference by cigarette smoke during the indoor air sampling event. As these apartments have since been renovated, and due to the age of the data, these results are not likely representative of current indoor conditions.

3.2 SOURCE AREAS

Launch Site Source Areas

Based on previous investigation data at the Launch Site, the former 2,000-gallon fuel oil UST southwest of the barracks building was a source that resulted in a release of petroleum to soil. Soil was excavated during the UST removal and disposed offsite, but residual contamination was also known to extend beneath the barracks building in the vicinity of the chimney (see **Appendix A** Launch Site Photo Log photo 6). Current analytical results indicate petroleum fraction detections (below the RAGs) persist at LSSB-10 (former LSSB-3) and lesser so at LSSB-13.

Data suggests the acid neutralization and fueling area can be dismissed as a source area because no release to soil or groundwater was documented through sampling. The acid neutralization pit area of the Launch Site was reportedly used for the fueling and de-fueling of missiles prior to warhead maintenance and/or transportation to the launcher area. A concrete platform in the area was designed to collect discharged or spilled fuel mixtures, likely consisting of a blend of jet petroleum fuel #4 (JP-4), inhibited red fuming nitric acid, and unsymmetrical dimethylhydrazine. Runoff from the concrete pad was directed into catch basins and a nearby unlined drainage swale.

TCE was detected in groundwater below the MCL in LSMW-6, located in a downgradient position on the Launch Site near the acid neutralization and fueling area. As upgradient wells did not contain TCE, particularly LSMW-8, migration to LSMW-6 does not appear to be occurring, indicating there is a potential source of the TCE nearer LSMW-6. This could have been derived from a minor source of TCE near the warhead building or shop, which could, for example, be related to the past use of TCE for cleaning and sporadic discharge to surface soil. No VOCs were detected in the downgradient residential drinking water well in August 2025.

In addition, the former 4,000-gallon diesel UST was a possible source of petroleum in groundwater but can be dismissed based on no evidence of residual soil contamination and apparent attenuated groundwater DRO concentrations from groundwater samples collected from LSMW-3 and LSMW-8 from 1996 and 1997 after source removal in 1994.

Control Site Source Areas

Based on previous investigation data at the Control Site, the three former No. 2 fuel oil USTs and the diesel generator building UST were source areas that resulted in releases of petroleum to soil and groundwater. Petroleum contaminated soil was removed from each of the four UST excavations where a release had occurred. Subsequent investigations, as recently as 2017, indicated residual petroleum contamination remains only around the former generator building (CSSB-27), albeit below current RAGs/RSLs. Based on these results, the generator building former UST area remains a current source area at the Site, and the three No. 2 fuel oil USTs are dismissed as current source areas.

Additionally, two areas of TCE contamination were present, one in the vicinity of the radar towers (CSSB-18, -19, -20, and -22 in soil and CSMW-11 in groundwater) and the other northeast of the administration building (CSSB-23, CSSB-26 and CSMW-8 in soil and CSMW-9 in groundwater). Concentrations of TCE detected at the Site are believed to be from small volume sporadic discharges by personnel cleaning equipment. This is consistent with the detection near the radar towers and generator building where it is known that equipment was cleaned with TCE (USACE, 2003). Control equipment was often housed in mobile trailers/vans (USACE, 2003) that were likely been parked or stored in the parking area northeast of the administration building. Cleaning of the mobile trailer equipment would also have utilized TCE that may have been similarly discharged sporadically in small volumes to the ground surface off the edges of the parking area.

3.3 CONTAMINANTS OF POTENTIAL CONCERN

3.3.1 Regulatory Criteria

Analytical results were compared to the following criteria for identification of COPCs:

Soil

- EPA RSLs protective of residential soil exposures, May 2023 (EPA, 2023b); RSLs associated with a $1x10^{-6}$ target incremental cancer risk level (TR) and a non-cancer target hazard quotient (THQ) of 0.1 were applied as human health screening values. These RSLs are based on direct soil contact scenarios.
- Soil background concentrations in Maine (Maine DEP, 2023).

Additionally, the following benchmarks for screening soil relative to ecological COPCs included the following:

- EPA Ecological Soil Screening Levels (EPA EcoSSLs) (various dates);
- EPA Region 4 Ecological Soil Screening Values (EPA, 2018); and,
- Soil background concentrations in Maine (Maine DEP, 2023).

Groundwater

- EPA MCLs, which are the enforceable drinking water standards (EPA, 2009, accessed on-line 2023)
- EPA RSLs ($1x10^{-6}$ TR and THQ of 0.1) for tap water exposures (May 2023; EPA, 2023b).
- To evaluate the potential vapor intrusion exposure pathway, vapor intrusion screening levels (VISLs) calculated using the EPA's on-line VISL calculator were applied to groundwater (EPA, 2015a; EPA 2015b; EPA, 2023a). These values were based on a $1x10^{-6}$ TR and THQ of 0.1, default attenuation factors and chemical properties, and a default residential exposure scenario. VISLs are calculated by the EPA VISL Calculator only when a chemical is of sufficient volatility and has inhalation toxicity data. The VISL calculator assumes an attenuation factor for vapors to indoor air through a foundation, based on parameters including the chemical's Henry's Law Constant, soil type, and depth to

groundwater (EPA, 2015a; EPA 2015b; EPA, 2023a). Note that some of the groundwater sampling depths are unknown. Default parameters such as temperature (25 degrees Celsius) are consistent with those employed by Maine DEP for the State of Maine and were not adjusted.

Air

- EPA RSLs ($1x10^{-6}$ TR and THQ of 0.1) for residential indoor air exposures (May 2023; EPA, 2023b).

3.3.2 COPCs

Launch Site COPCs

Throughout the history of the Launch Site, COPCs associated with the potential source areas described above have included petroleum (primarily analyzed as DRO), VOCs, pesticides, and metals. Based on the lack of detection above the laboratory reporting limits and/or results below applicable screening criteria or background levels, metals, PCBs, most petroleum target compounds, and pesticides were dismissed as COPCs. Evaluation of the cumulative data set (see **Table 3)** indicates TCE was the only identified COPC for the Launch Site groundwater based on groundwater concentrations (maximum of 2 µg/L) above the tapwater RSL (0.28 µg/L) but below the MCL (5 µg/L) in LSMW-6 only. The most recent Launch Site groundwater data for TCE is May 1997; however, more recent groundwater data was collected downgradient of the Site in August 2025.

There were no COPCs in Launch Site soils. Benzo(a)pyrene was detected in 6 of 9 samples with a maximum detected concentration of 0.3 mg/kg (LSSB-13-1), exceeding the residential soil RSL of 0.11 mg/kg (see **Table 1B**). However, this concentration is less than the Maine "rural developed" background value of 5.4 mg/kg and thus was not considered a COPC.

There are no petroleum COPCs for the Site, as all EPH and VPH petroleum fraction results for the samples from 2016 (see **Table 1B**), which were intended to replace the historical DRO data with newer EPH/VPH data, were below the Maine DEP RAGs (Maine DEP, 2023). Detected petroleum compounds are further evaluated in **Appendix D**.

Air concentrations of BTEX exceeded screening criteria (see **Table 5**) in some of the sampling locations but were not considered COPCs as they were likely attributable to cigarette smoking in the apartments at the time (1995-1996). As these apartments have since been renovated, and due to the age of the data, these results are not likely representative of current indoor conditions.

Additional historical lab reports are provided as **Appendix E** for data quality reference. Per and polyfluoroalkyl substances (PFAS) were reviewed as potential contaminants of interest for the Launch Site; however, it was concluded there were no sources of PFAS used or anticipated to be present at the Site. See memorandum included as **Appendix F**.

Control Site COPCs

Throughout the history of the Control Site, COPCs associated with the suspected below ground source areas have included petroleum (primarily analyzed as DRO) and VOCs. Based on the

minor detections above the laboratory reporting limits and/or results below applicable screening criteria or background levels, there were limited COPCs. TCE is the only identified COPC in groundwater based on detections (maximum of 1.6 µg/L) above the tapwater RSL (0.28 µg/L) but below the MCL (5 µg/L) in CSMW-9 and CSMW-11 only (see **Table 4A**). The most recent groundwater data for TCE is May 2000. TCE was also identified as an ecological COPC in soil.

In Control Site soils, naphthalene was detected in one sample (reported as CSSB-27-1 and its duplicate; see **Table 2B**). The detected concentration of 2.7 mg/kg from the 5 to 7 feet bgs sample is greater than the residential soil RSL of 2 mg/kg, but less than the Maine "rural developed" background value of 5 mg/kg. Additionally, the duplicate concentration was 1.3 mg/kg, which is below the RSL. Therefore, naphthalene was not identified as a COPC.

There are no petroleum COPCs for the Site, as all results for the recent EPH and VPH petroleum fraction samples from 2017 (see **Table 2B**), which were intended to replace the historical DRO data with newer EPH/VPH data, were below the Maine DEP RAGs (Maine DEP, 2023). Detected petroleum compounds are further evaluated in **Appendix D**.

No sampling of air was conducted during prior investigations at the Control Site.

Additional historical lab reports are provided as **Appendix E** for data quality reference. PFAS were also reviewed as potential contaminants of interest for the Control Site; however, it was concluded there were no sources of PFAS used or anticipated to be present at the Site. See memorandum included as **Appendix F**.

3.4 EXTENT OF CONTAMINATION

3.4.1 Soil and Vadose Zone

Launch Site Soil Extent of Contamination

In Launch Site soils, benzo(a)pyrene above the RSL but below the Maine DEP "rural developed" background value (Maine DEP, 2023) was limited to LSSB-13 with only trace EPH fractions detected compared to the adjoining LSSB-10 location. However, lower levels of benzo(a)pyrene were detected in most of the 2016 soil sample locations near the barracks building. Although not further delineated to the east, this exceedance of the RSL (0.3 mg/kg compared to the RSL of 0.11 mg/kg) is considered limited to the LSSB-13 vicinity.

Based on the review of the cumulative soil analytical data and field screening results, residual petroleum impacted soil appears to be limited to beneath the barracks building in the vicinity of LSSB-10 at a depth of 8 to 10 feet bgs where residual petroleum was formerly documented as DRO in LSSB-3. Surrounding locations contained no field evidence of petroleum and analytical results were below the reporting limits or below the RSL. Therefore, horizontally, petroleum is presumed to extend north to LSSB-4, northeast to LSSB-11, southeast to LSSB-1, south to LSSB-12, west to LSSB-9, and northwest to LSSB-2. This horizontal extent is shown on the inset on **Figure 4**.

These detections are likely associated with the residual petroleum previously detected in this location as DRO. Based on odor, PID observations starting at 2 feet, and analytical results at 7-9

feet (depths corrected for angled boring) in LSSB-10 and 14-16 feet (angle of 1996 boring not known for correction) in LSSB-3, petroleum contamination beneath the barracks building is estimated to begin at approximately 2 feet below the foundation (boring depth corrected for angle) and extends to refusal at approximately 11.2 feet (as measured in 2017) below the foundation. These corrected depths in the angled borings are not consistent with surrounding refusal and known bedrock depths; therefore, may not represent precise bedrock refusal. Contamination is conservatively considered to extend to 16 feet due to this inconsistency.

Based on a horizontal delineated area of 1,692 square feet (ft^2) and conservative vertical extent of 16 feet bgs, a total of approximately 900 to 1,100 cy of soil is present in the delineated area. Based on a thickness of 2 feet in the delineated area, the unimpacted soil zone overlying the impacted soil is calculated to be approximately 100 to 150 cy. Therefore, 750 to 1,000 cy of impacted soil are estimated to be present at the Site[3] (total volume minus the unimpacted surface volume).

Control Site Soil Extent of Contamination

Based on the review of the cumulative soil analytical data and field screening results, petroleum impacted soil was limited to near the former generator building (now demolished) in the vicinity of CSSB-27 where relatively high EPH and VPH fraction concentrations and naphthalene were identified, albeit below the current Maine DEP RAGs and "rural developed" background values. The surrounding locations contained no field evidence of petroleum and analytical results were below the reporting limits or risk screening criteria. Therefore, horizontally, residual petroleum contamination is presumed to conservatively extend to the next closest location with no evidence of petroleum contamination: northwest to CSSB-30, west to CSSB-29, southwest to CSSB-28, and south to CSSB-31. The extent to the north and east as shown on **Figure 5** is approximate and conservative using the observation of limited evidence of residual petroleum and laboratory detections below the screening criteria. Based on field screening results, vertically at this location, petroleum contamination begins at approximately 5 feet bgs and extends vertically to approximately 10 feet bgs. This interval is consistent with an observed gray silt and clay layer.

Based on this extent, a horizontal delineated area of 3,330 ft^2 and vertical extent of 10 feet bgs, a total of approximately 1,200 to 1,300 cy of soil is present in the delineated area. Based on a thickness of 5 feet in the delineated area, the unimpacted soil zone overlying the impacted soil is calculated to be approximately 600 to 700 cy. Therefore, 500 to 700 cy of petroleum impacted soil are estimated to be present at the Site[4] (total volume minus the unimpacted surface volume). Risks potentially associated with petroleum contamination are evaluated in **Appendix D**.

Two areas of TCE contamination in soil were present with unknown sources in the vicinity of the radar towers (CSSB-18, -19, -20, and -22 in soil and CSMW-11 in groundwater) and east of the administration building (CSSB-23, CSSB-26 and CSMW-8 in soil and CSMW-9 in groundwater). Based on the likely sporadic small volume cleaning supply releases as a potential source, and the limited available TCE data for soil, the full extent of TCE contamination in these two areas is not known. The extents shown on **Figure 5** are approximate and based only on available data.

[3] Actual calculations based on assumptions include a total of 1,002 cy of soil within area, 125 cy of unimpacted fill near the surface, and 877 cy of impacted soil.
[4] Actual calculations based on assumptions include a total of 1,233 cy of soil within the areas, 616 cy of unimpacted soil near the surface and 617 cy of impacted soil.

However, considering the known nearby groundwater concentration, review of partitioning coefficients suggests the detected soil concentrations are consistent with those that would contribute to the detected groundwater concentrations in the vicinity.

In the following New Jersey dilution attenuation factor (DAF) model, the average soil concentrations in the vicinity of CSMW-11 were used to predict the corresponding groundwater concentration. As shown, the DAF predicted a concentration of 1.44 µg/L, which is similarly below the MCL consistent with the maximum concentration detected in CSMW-11. Groundwater concentrations may have been slightly higher nearby, but would still be predicted to be well below the MCL and consistent with low level concentrations discussed for CSMW-9.

NJ Dilution Attenuation Factor (DAF) Model
Predicted well concentration = Pore water concetration / DAF
Soil Pore Water Partitioning
Kd= Cs/Cw
foc*Koc = Kd

Cw=Cs/(foc*Koc)

Data	
CSMW-11	**0.8 ug/L**
CSSB-20	0.117 mg/kg
CSSB-19	0.17 mg/kg
CSSB-18	0.018 mg/kg
CSSB-22	0.505 mg/kg
Average (CSSB-18-20)	**0.1017** mg/kg

Log Koc	2.220	
Koc	166.00	L/kg
foc	0.05	%
foc	0.0005	kg/kg
foc	500.00	mg/kg
Kd	0.082998454	L/Kg
Cs	**0.1017**	mg/kg
Cw	**1.22**	mg/L
	1224.9	ug/L

Predicted Pore Water Concentration

Calculate Mixing Zone Dilution
NJ DAF Model

$$DAF = 1 + \frac{Kid}{IL}$$

		Enter SI		Metric	
DAF		20	ft/d		
K=	aquifer hydraulic conductivity (m/yr)	7300	ft/year	2225.04	m/yr
i=	gradient (m/m)	0.03	ft/ft	0.03	m/m
d=	mixing zone depth (m) in bedrock	50	ft	15.24	m
I=	infiltration rate (m/yr)	2.58	in/yr	0.065532	m/yr
L	length of area of concern parallel to ground water flow (m)	**60**	ft/ft	18.288	m
		DAF=		**849.837**	

Predicted Groundwater Concentratrion at Well **0.0014** mg/L
1.44 ug/L

In the following DAF model, the soil concentrations in the vicinity of CSMW-9 were used to predict the corresponding groundwater concentration. As shown, the DAF predicted a concentration of 1.44 µg/L, which is consistent with the maximum concentration detected in CSMW-9. (Note, that it was a confirmed coincidence that both predicted groundwater concentrations were the same between CSMW-9 and CSMW-11).

NJ Dilution Attenuation Factor (DAF) Model
Predicted well concentration = Pore water concetration / DAF
Soil Pore Water Partitioning
Kd= Cs/Cw
foc*Koc = Kd

Cw=Cs/(foc*Koc)

Data	
CSMW-9	**1.6 ug/L**
CSSB-23	0.616 mg/kg
CSMW-8	0.034 mg/kg
CSSB-26	0.07 mg/kg
Average (23,8)	**0.3250 mg/kg**

Log Koc	2.220	
Koc	166.00	L/kg
foc	0.08	%
foc	0.0008	kg/kg
foc	800.00	mg/kg
Kd	0.132797527	L/Kg
Cs	**0.3250**	mg/kg
Cw	**2.45**	mg/L
	2447.3	ug/L

Predicted Pore Water Concentration

Calculate Mixing Zone Dilution
NJ DAF Model

		Enter SI		Metric	
DAF	$DAF = 1 + \frac{Kid}{IL}$	20	ft/d		
K=	aquifer hydraulic conductivity (m/yr)	7300	ft/year	2225.04	m/yr
i=	gradient (m/m)	0.03	ft/ft	0.03	m/m
d=	mixing zone depth (m) in bedrock	50	ft	15.24	m
I=	infiltration rate (m/yr) as Recharge to Bedrock	2.58	in/yr	0.06553	m/yr
L	length of area of concern parallel to ground water flow (m)	30	ft/ft	9.144	m
			DAF=	**1698.7**	

Predicted Groundwater Concentratrion at Well **0.0014 mg/L**
1.44 ug/L

3.4.2 Groundwater

Launch Site Groundwater Extent of Contamination

In 1996, DRO was historically detected in monitoring wells LSMW-1, LSMW-3, LSMW-7, and LSMW-8. Results for a subsequent round (in 1997) in LSMW-1, LSMW-3, and LSMW-8 were below the reporting limits. After UST and soil source removal, LSMW-7 was monitored with concentrations above comparison criteria at the time through 1999, but concentrations then dropped below the reporting limits through 2004 with five "clean" rounds (i.e., 2000 to 2004). Based on these results, both overburden and bedrock groundwater may have been impacted by releases from the UST(s); however, after source removal, concentrations appear to have attenuated to below detectable concentrations.

TCE was detected in groundwater in LSMW-6, located in a downgradient position of the Launch Site in 1996 and 1997 near the maintenance warhead building/acid neutralization trench above the tapwater RSL but below both its MCL and Maine DEP RAG. As concentrations were below the MCL, no delineation of these concentrations was completed during prior investigations. There is no known source of TCE in this vicinity as there have been no detections of TCE in soil at the Site other than trace concentrations near the barracks building. As upgradient wells did not contain TCE, particularly LSMW-8, migration to LSMW-6 does not appear to be occurring indicating there is no potential source of the TCE nearer LSMW-8 and the source likely resides closer to LSMW-6. There are no downgradient receptors to the south and southwest; however, there is a single residence with a drinking water well offsite approximately 450 feet southeast of LSMW-6. VOCs were not detected in this downgradient residential drinking water well in August 2025. A potential minor source in the vicinity of the warhead building could have been related to sporadic releases of cleaning chemicals. As these types of concentrations in limited extent would not likely represent a risk to human health or the environment, it was determined that further delineation is not warranted.

Although not a COPC, cis-1,2-dichloroethane was also present in groundwater at LSMW-6. This indicates biological degradation of parent TCE even at low concentrations was occurring historically, which suggest the presence of petroleum hydrocarbons has provided adequate levels of electron donors to allow continued biological attenuation of the TCE. It is expected these concentrations have continued to attenuate to below detectable concentrations over the past 28 years.

No COPCs have been detected in the onsite drinking water well throughout all the prior investigations and VOCs were not detected in the downgradient residential drinking water well in August 2025.

Control Site Groundwater Extent of Contamination

DRO was historically detected in overburden monitoring well CSMW-5 and bedrock monitoring well CSMW-10 located in the same vicinity southeast of the mess hall. Both wells were monitored and results for CSMW-10 were below the reporting limit in the subsequent five rounds of samples. CSMW-5 continued to be monitoring through 2012 and did not detect DRO and EPH hydrocarbon fractions in the last seven and fourth sampling round rounds, respectively. Based on these results, overburden and bedrock groundwater was impacted by the release from the mess hall 2,000-gallon No. 2 fuel oil UST; however, after source soil removal in 1994, concentrations attenuated to below detectable concentration. No concentrations of petroleum compounds that would represent a risk to human health were detected in groundwater samples collected in 2017.

TCE was detected in groundwater in bedrock monitoring wells CSMW-9 (1.2-1.6 µg/L) and CSMW-11 (0.8 µg/L) above the tapwater RSL but below both its MCL and Maine DEP RAG. TCE was also detected in soil in both areas at concentrations only marginally above the RSLs (i.e., all less than 1 mg/kg). While there is no known specified source (though believed to be sporadic small volume releases during cleaning), TCE concentrations were present at both shallow depths (4-6 feet bgs) and deeper depths (38-40 feet bgs) indicating evident vertical migration. In addition, based on the inferred groundwater flowing radially north and northeast toward CSMW-11 and eastern toward CSMW-9, these two areas are inferred to be downgradient of the central portion of

the Site between the barracks, mess hall and administration building. TCE was not detected in overburden well CSMW-3 between these two locations nor in bedrock well CSMW-10 (CSMW-1, CSMW-2, CAMW-101, and CSMW-100 were not analyzed for TCE). Therefore, it may be inferred that bedrock groundwater (depths of at least 66 feet bgs) may contain TCE consistently at deeper depths within bedrock across the Site (see Cross section **Figure 7A**. It is also possible there a smaller localized sources near each of the well locations as TCE was also detected in soil in the vicinity (shallow detection from 4-6 feet in CSSB-22 nearest CSMW-11, and a deeper detection in CSSB-23 nearest CSMW-9). Regardless, it is likely that degradation of these organic compounds has occurred since these detections almost 25 years ago.

Although not a COPC, cis-1,2-Dichloroethane was also present in groundwater at LSMW-9. This indicates biological degradation of parent TCE even at low concentrations was occurring historically, which suggest the presence of petroleum hydrocarbons has provided adequate levels of electron donors to allow continued biological attenuation of the TCE.

No COPCs have been detected in the onsite drinking water well throughout all the prior investigations.

3.4.3 Air

Launch Site Indoor Air

Based on the petroleum concentrations within 2 feet of the surface, the current Launch Site barracks building and future Launch Site buildings in the area of the COPC extent could have impacts to indoor air by vapor intrusion. Historical analysis of indoor air in the barracks building indicated that for VOCs, BTEX compounds (potentially related to petroleum), were present. However, BTEX was not detected or detected at low levels (ethylbenzene and xylene detected in LSSB3-1 and toluene detected in LSMW-7) in a small number of the soil samples (LSSB-1 to LSSB-4) and groundwater samples (LSMW-1, LSMW-2, and LSMW-7) collected around the same time near the building. In addition, background sources of contamination (e.g., painting, cigarette smoke) inhibited correlation of the indoor air results with subsurface conditions. Since subsequent soil and groundwater samples have shown no trace of BTEX, any potential vapor intrusion contributions due to VOCs are not anticipated.

The primary SVOC selected as a COPC in the Launch Site barracks area soil was benzo(a)pyrene, which is not considered a volatile contaminant based on its vapor pressure less than 1 mmHg and its Henry's Law constant greater than 10^{-5} atm-cu m/mole at 25 °C (EPA, 2015a). Therefore, this COPC is not expected to be associated with vapor intrusion or indoor air concerns.

Additionally, these apartments have since been renovated and prior indoor air sampling results are not likely representative of current indoor air conditions. Based on the factors outlined above, indoor air exposure is not a risk concern.

Control Site Indoor Air

No sampling of indoor air at the Control Site occurred during prior investigations.

4. CONTAMINANT FATE AND TRANSPORT

4.1 MIGRATION PATHWAYS

Launch Site Migration Pathways

Given the age of the release and removal of the primary source area of impacted soil and groundwater surrounding the former UST, migration of petroleum is limited. At the time of the release, petroleum likely leaked from the UST to the interstitial fill and due to lack of overburden groundwater, spread out into the surrounding fine-grained till slowly migrating downward being driven by periodic infiltration of precipitation. Expansion and migration of the contaminated area was likely limited by the fine grained till soil, presence of the overlying barracks building, and limited nature of the source area. Although benzo(a)pyrene was the only petroleum related contaminant in soil above a screening level, benzo(a)pyrene is not a concern for volatilization (EPA, 2015a) and the detected concentration in soil is below background. Therefore, migration of petroleum related contaminants in soil to indoor air is not likely. Further evaluation of risk related to petroleum is provided in **Appendix D**.

TCE was only detected in groundwater from LSMW-6 in 1996-1997 (the only two years it was sampled), located in a downgradient position on the Launch Site. As upgradient wells did not contain TCE, particularly LSMW-8, migration to LSMW-6 does not appear to be occurring, indicating a potential source of the TCE nearer LSMW-6. There are no downgradient receptors to the south and southwest; however, there is a single residence approximately 450 feet southeast of LSMW-6. LSMW-6 is screened from 50-60 feet bgs. Concentrations are below the MCL indicating migration to downgradient drinking water would not be a concern and since depth to groundwater is prohibitive of vapor migration, there does not appear to be a migration pathway to any receptors to the TCE detected in LSMW-6. The downgradient residential drinking water well was sampled in August 2025 and no VOCs were detected. Further, given the trace concentrations historically detected and degradation over time since those concentrations were detected, any pumping stress caused by a single residence private well would only further dilute any remaining TCE.

Control Site Migration Pathways

The migration of contaminants from each UST at the Control Site appears dependent on the type of soil deposit (e.g., till or outwash) present where the tanks were installed.

The migration of petroleum from the UST at the administration building was limited due to the mostly dense glacial till deposits (see CSSB-15, CSSB-16, and CSSB-17). Additionally, after source removal, there was no additional evidence of contamination identified during the subsequent investigations.

The mess hall UST was surrounded by more granular soil consisting of construction fill and outwash sand and silt that permitted further migration vertically to the groundwater interface at approximately 30 feet bgs. Installation of the deeper CSMW-10 bedrock well may have served as a preferential migration pathway into bedrock during the initial sampling round in October 1999 or declining overburden groundwater concentrations after source removal may have stopped contributing to the bedrock concentrations; but subsequent sampling rounds from CSMW-10

suggest only the overburden groundwater in CSMW-5 was impacted by the residual petroleum, which also decreased to below detectable limits in 2007. Further, no evidence of significant petroleum contamination was identified in the downgradient bedrock well CSMW-101 in 2017.

Similarly at the barracks building UST, the more granular outwash soils beneath the UST may have permitted vertical migration as evidenced by the 30 ppm field screening result at 22-24 feet bgs. Analytical results indicate residual concentrations at this depth were below laboratory reporting limits except for a low detection of benzene. However, due to lack of overburden groundwater in CSMW-3, impacts to the bedrock aquifer and in the drinking water well (CSDW-1) would require large mass flux by infiltration alone, which is unlikely given the majority of the mass would partition to fine grained soil once encountered at depth and be retained by matrix diffusion and sorption. Therefore, migration of petroleum appears to have been slowed vertically and limited when the till was encountered below the outwash (below 17.5 feet bgs). After source removal, no residual contamination that would represent a risk to human health persisted.

Coarser outwash deposits are also present surrounding the former generator building UST and vault; however, limited evidence of residual contamination was present immediately surrounding the UST (CSMW-1 and CSSB-2). A piping conduit was present between the UST and generator building that permitted migration of releases due to overfilling from the UST to the east as evidenced by the contamination identified in CSSB-1 and CSSB-27 (**Figure 3**). A release from the tank may have percolated downward through outwash and then preferentially to the east along the lower till slope as indicated by the thicker outwash/deeper till in CSMW-2, which would indicate how contamination reached CSMW-2. Despite the observed soil contamination, due to lack of overburden groundwater in CSMW-1 and CSMW-2, no impacted groundwater could have transmitted contamination to the bedrock aquifer (CSMW-100). Therefore, migration appears vertically limited to the lower till between 17 feet bgs in CSMW-1, 25.4 feet bgs in CSMW-2, and 16 feet bgs in CSSB-27. Some contamination likely continued downward migrating into or through this till but at much lower concentrations. Based on the time elapsed since the release and partial soil removal, continued migration is not expected to be occurring at this time.

Soil data associated with the source and extent of TCE in the area east of the administration building (CSMW-8 and CSSB-23) and in the vicinity of the radar towers (CSSB-22) is limited. Therefore, the migrations pathways cannot be well inferred though apparent vertical migration is noted based on detections in soil at both 4-6 feet bgs and 38-40 feet bgs. Characteristically, TCE would migrate vertically to a confining surface (e.g., any denser soil, bedrock), but the till at the Control Site does not appear to have served to confine TCE. Elevated PID readings in CSMW-8 near the surface may suggest a release occurred in this vicinity that migrated vertically. Bedrock groundwater in CSMW-9 historically contained low concentrations (1.2 to 1.6 µg/L) of TCE. Therefore, it appears concentrations of TCE in this eastern area of the Site are vertically dispersed (i.e., evidence of TCE from the surface soil down into the bedrock aquifer). There is insufficient data to make similar inferences for the radar tower area, although TCE was detected near the surface (4 to 6 feet bgs) in CSSB-22 and at depth (38-40 feet bgs) in the surrounding borings and in groundwater in bedrock well CSMW-11 (0.8 µg/L). As there are no bedrock wells that reach a similar depth as CSMW-9 and CSMW-11 between these locations, it is not possible to infer if they are related to a common source or if they are independent sources associated with the nearby soil detections. Not only are the wells not aligned along the inferred direction of groundwater flow,

which is believed to be radial toward each of these wells, but the distance between the wells (approximately 380 feet) is long enough to expect substantial attenuation of concentrations along that path, which is not observed in the available data. It is reasonable to assume each well indicates the historical existence of more than one and possibly multiple points of release.

Based on the lack of detections in the onsite drinking water well indicating no drinking water exposure and lack of other nearby offsite receptors, lack of detections of TCE in overburden groundwater, and the depth to detections in these bedrock wells indicating unlikely conditions for vapor encroachment, there is no migration pathway to any anticipated receptors for TCE.

4.2 CONTAMINANT PERSISTENCE

Due to the age of all the contamination at the LO-13 Site, the remaining COPCs are all considered persistent for the Site. Ongoing aerobic degradation of fuel compounds may be occurring but would be expected to exhibit low reaction rates and long half-lives. The same would be true for degradation involving facultative anaerobes. Given its age and contaminants, the LO-13 Site is considered stable and any remaining impacts would continue to attenuate.

Launch Site

Petroleum compounds, notably the aliphatic and low molecular weight aromatic compounds degrade rapidly under aerobic conditions. The heavier molecular weight PAHs degrade more slowly, have lower solubility and are less mobile. The detected petroleum compounds in groundwater from 1996 through 1999 appear to have degraded to below laboratory detection limits following the removal of the source areas (i.e., the USTs and surrounding source area soils). The presence of dissolved oxygen (DO) indicated aerobic conditions were present during the groundwater sampling, which is a line of evidence that degradation may still be occurring, but at very low rates that do not depress or completely consume available oxygen. The most recent five rounds of undetected DRO results suggest groundwater contamination has not persisted.

Remaining petroleum concentrations in soil persists primarily in LSSB-3/LSSB-10 based on benzo(a)pyrene persisting in most of the area surrounding the barracks building UST, but only above the RSL in one location (LSSB-13). The benzo(a)pyrene, which is essentially insoluble, is at concentrations that do not present risk of exposure given their depth. Similar and higher hydrocarbon fraction concentrations were likely formerly present throughout most of this area, particularly outside the building foundation, but have degraded and/or were removed in 1994. Remaining soil contamination is confined under the building likely because it does not receive frequent precipitation to drive percolation relative to the unprotected area outside the building footprint. It is possible the concentrations beneath the building would attenuate similarly if the building was removed in the future through added precipitation infiltration and aeration and increased fluctuation of the subsurface environment. No soil vapor data has been collected as part of prior investigations, so it is unknown whether petroleum vapor persists with the potential for vapor intrusion.

The current concentration of TCE in LSMW-6 is not known as the most current sample was collected over 25 years ago in 1997. TCE was detected at low concentrations above the tapwater RSL but below the MCL. Cis-1,2-DCE was also detected at low concentrations below the RSL

indicating reductive dechlorination was occurring. Based on the low concentrations and time since these most recent detections (over 25 years), these low concentrations are likely to have attenuated at least partially by now. This is further evidenced by the lack of detections of COPCs in the downgradient residential drinking water well in August 2025.

Control Site

Persistent contaminants are currently limited to residual low levels of petroleum compounds below the RAGs in soil adjacent to the former generator building and TCE in soil in the eastern corner (northeast of the administration building) and radar tower areas. Historical groundwater contamination monitored in CAMW-5 persisted (near the mess hall) after source removal in 1994 through 2006; however, concentrations attenuated to below the comparison criteria thereafter for seven non-detect rounds (including four rounds of non-detect EPH analysis).

Petroleum impacted soil persists at CSSB-1/CSSB-27 with PAHs persisting throughout most of the former generator building area. However, the PAHs are at concentrations below the RSLs and do not pose a risk to potential receptors. The identified concentrations may persist or, if left under current conditions, will likely continue to degrade, albeit very slowly, with time.

The current concentrations of TCE in soil in the vicinity of the radar towers and east of the administration building are unknown as the most current sample was collected 25 years ago in 1999. Due to the tendency of TCE to degrade in unsaturated soil, the soil concentration can be presumed to be at least somewhat lower than the concentrations detected in 1996 through 1999.

TCE in groundwater data is from 1999-2000. Cis-1,2-DCE was also detected indicating reductive dechlorination was occurring. Based on the low concentrations and time since these most recent detections (nearly 25 years), these low concentrations are expected to have attenuated, if not completely, at least partially by now.

4.3 CSM SUMMARY

The CSM considers previously summarized information including current Site conditions and Site history related to historical sources and mode of release of contamination (**Section 1.2**), Site physical characteristics and land uses (**Section 2**) and the nature and extent of contamination (**Section 3**). These aspects of the Site coupled with consideration of contaminant fate and transport as discussed in **Sections 4.1** and **4.2** above constitute the CSM.

In summary, there were releases of petroleum and TCE at both sites. Petroleum releases were primarily via USTs that were removed from the Sites with associated soil contamination in 1994. In several locations, limited residual petroleum contaminated soil was left in place near building foundations due to structural concerns. Groundwater monitoring wells and/or drinking water wells were monitored at the two Sites, generally between 2000 and 2010 at the Launch Site and 2012 at the Control Site. At both Sites, petroleum concentrations in groundwater had dropped below detectable concentrations. TCE was also released presumably related to small volume sporadic releases during cleaning activities. TCE was detected at both Sites in groundwater at concentrations below the MCL and in soil at depths of 4-6 feet and 38-40 feet bgs at the Control Site. TCE was detected in one monitoring well at the Launch Site in the downgradient portion of

the Site. At the Control Site, TCE was detected in two bedrock monitoring wells. Results for TCE at both Sites are from 1996-2000 (over 25 years old) and concentrations have likely attenuated since that time.

Indoor air was not assessed at the Control Site but was sampled in 1995 and 1996 at the Launch Site. BTEX compounds were detected in indoor air but were likely attributed to background sources of contamination (smoking, painting, fuel storage). Furthermore, given renovations of these apartments and the age of the indoor data, these results are not likely representative of current indoor conditions. No soil vapor sampling was completed; therefore, the complete pathway from the subsurface petroleum contaminated soil left in place to indoor air was not documented.

5. RISK ASSESSMENT

A HHRA and Screening Level Ecological Risk Assessment (SLERA) were performed using the historical and more recent analytical data collected from the Sites. Petroleum fraction results are not regulated under CERCLA, so those petroleum hydrocarbon fraction results were evaluated under the Maine DEP RAGs (Maine DEP, 2023) as described in subsection 5.3 and in a Petroleum Assessment Report (Appendix D).

The HHRA evaluated the potential risk of adverse cancer and non-cancer human health effects to humans at the Sites in accordance with *Environmental Quality - Risk Assessment Handbook Volume I: Human Health Evaluations* (USACE, 1999) and *Risk Assessment Guidance for Superfund – Part A: Human Health Evaluations* (EPA, 1989).

The SLERA evaluated the potential risks to ecological receptors at the Site in accordance with the ecological guidance, *Ecological Risk Assessment Guidance for Superfund* (EPA, 1997) and *Standard Scopes of Work for Environmental Risk Assessments* (USACE, 2016).

The following presents a summary of the HHRA and SLERA completed for the Sites based on available data. The complete RA is included as **Appendix C**.

5.1 HHRA CONCLUSIONS

The HHRA assessed potential health risks posed to four receptor groups based on current and reasonably anticipated future uses of the Sites: residents, commercial workers, construction/utility workers, and trespassers. Recreator and landscape workers were considered but were concluded to be conservatively covered under one of the other receptor group categories based on conditions at these sites.

Each receptor group was assessed for exposure to COPCs through soil ingestion, soil dermal contact, and outdoor inhalation of entrained soil particles (dust). Residents and commercial workers were additionally assessed for inhalation of indoor air potentially impacted by volatile COPCs in groundwater via household water use and vapor intrusion. At the Control Site, soil results were divided into the following five subareas for the risk assessments based on the identified USTs areas and differences in the presence and concentrations of COPCs. Given the spatial differences between the five subareas, this approach was taken both to avoid "diluting" exposure point concentrations (EPCs) by including samples between these subareas where no constituents were detected and to allow evaluation of separate areas for risk in case remediation is necessary:

- Subarea 1 – Former Radar Tower Generator Building – an area surrounding the location of a former 500-gallon UST that was removed.
- Subarea 2 – Former Generator Building – an area near the locations where former 6,000-gallon and 2,000-gallon USTs were removed.
- Subarea 3 – Former Mess Hall – an area where a former 2,000-gallon UST was removed.
- Subarea 4 –Former Administration Building – an area surrounding the location of a former 2,000-gallon UST that was removed.

- Subarea 5 – Northeast of Administration Building – an area northeast of the administrative building where TCE was detected in soil and groundwater.

While all available soil were considered, data collected at depths greater than 15 ft bgs, where exposures are not anticipated, were excluded from the analysis. Uncertain data (i.e., sample IDs that do not following naming conventions of other samples collected at the same time, samples with missing information), and samples collected from stockpiles that have presumably been removed, were also excluded from the analysis. The remaining soil samples, including older samples that may not represent current conditions, and all available groundwater data, were used to identify COPCs.

COPCs were selected as constituents detected above applicable screening criteria or background (Section 3.3.1). Risk assessment equations, exposure factors, and toxicity values were obtained from EPA or other generally recognized sources. To summarize, the following constituents were selected as COPCs for quantitative assessment in the HHRA, based on the data available:

- Soil
  - Launch Site soil – none
  - Control Site soil – TCE (Subarea 1 only); no COPCs in Subareas 2, 3, 4 and 5)
- Groundwater
  - Launch Site groundwater – TCE
  - Control Site groundwater – TCE
- Air
  - Launch Site air – none
  - Control Site air – no data available

The quantitative results of the human health risk assessment are summarized in the following table:

HUMAN HEALTH RISK ASSESSMENT SUMMARY		
Receptor Group	**Non-carcinogenic Hazard Index (HI)**	**Excess Lifetime Cancer Risk**
Launch Site[2]		
Residents – Child	1	-
Residents – Adult	1	-
Residents – Combined ages	-	6×10^{-6}
Control Site – Subarea 1 Radar Tower Area		
Residents – Child	1	-
Residents – Adult	0.8	-
Residents – Combined ages	-	5×10^{-06}
Commercial Workers	0.0006	6×10^{-9}
Construction/Utility Workers	0.003	1×10^{-9}
Trespassers	0.0004	2×10^{-9}
Control Site – Subarea 2[1] Generator Building Area		
No COPCs	-	-

HUMAN HEALTH RISK ASSESSMENT SUMMARY		
Receptor Group	**Non-carcinogenic Hazard Index (HI)**	**Excess Lifetime Cancer Risk**
Control Site – Subarea 3[1] Former Mess Hall Area		
No COPCs	-	-
Control Site – Subarea 4[1] Northeast of Former Administration Building Area		
No COPCs	-	-
Control Site – Subarea 5[1] – Northeast of Administration Building		
No COPCs	-	-
Maximum Acceptable Level	**1**	**1×10^{-4}**

[1] This Site or subarea has no carcinogenic COCs, so cancer risks were not assessed
[2] Combined ages assessed for cancer risk only, cancer risks for individual age groups are intermediate values and are not presented.
Bold – HI or Excess Lifetime Cancer Risk (ELCR) exceeds maximum acceptable level
Subareas shown on Figure in **Appendix C**.

The conclusions based on the results shown above are:

- The Launch Site poses no unacceptable human health risk to residents.
- The Control Site Subarea 1 poses no unacceptable risk to human health for any receptors evaluated.
- There are no COPCs for the Control Site Subareas 2, 3, 4, and 5.

A moderate degree of uncertainty is associated with the conclusions of the HHRA, as follows. These uncertainties are further detailed in the HHRA in **Appendix C**:

- Surface and subsurface soil samples for the Launch Site were collected in 1994, 1996, 2015 or 2016, and for the Control Site from 1996, 1999 or 2017. Only some of these samples were taken at depths relevant for the risk assessments. Therefore, these soil data may not be representative of current Site conditions. However, given that concentrations in more recent sampling events (2016 and 2017) are lower than earlier samples, using older data to assess risks to human receptors is conservative and likely overestimates the quantified risks.
- Groundwater data were collected from 1996 to 2010 at the Launch Site, and between 1996 and 2017 at the Control Site, but in some cases, wells in which TCE was detected above screening levels have not been analyzed since the initial finding dating back to 1997 at the Launch Site and 2000 at the Control Site. The absence of current groundwater data for chlorinated VOCs in groundwater adds uncertainty to the risk assessments for groundwater. However, given the anticipated attenuation that has occurred since the most recent detections (in 2000), using older data to assess risks to human receptors is conservative and likely overestimates the quantified risks. Additionally, the drinking water well at the downgradient residence was sampled in August 2025 and no VOCs were detected.
- In the absence of surface soil data for the Control Site, subsurface soil results were used to assess the surface soil exposure pathway, and conservatively assumed to be representative

of all soil exposures. Given that the likely contaminants due to USTs would primarily be found in the subsurface soils and fill was placed where the USTs were removed, using subsurface soil results to represent all soil exposure likely overestimates the quantified risks.

Despite the uncertainties associated with the risk assessment, the conservative assumptions used to assess risks indicate no unacceptable risks for the Launch and Control Sites.

5.2 SLERA CONCLUSIONS

According to the EPA's Ecological Risk Assessment Guidance (1997), an ecological risk assessment (ERA) refers to a qualitative and/or quantitative appraisal of the actual or potential impacts of contaminants from a hazardous waste site on plants and animals other than humans and domesticated species. A risk does not exist unless: (1) the stressor has the ability to cause one or more adverse effects, and (2) it co-occurs with or contacts an ecological component long enough and at a sufficient intensity to elicit the identified adverse effects.

The SLERA addressed the first two steps of the eight-step scheme presented in the guidance, which include the following:

- Step 1: Screening Level – Problem Formulation and Ecological Effects Evaluation
- Step 2: Screening Level – Preliminary Exposure Estimates and Risk Calculations

The only medium that ecological receptors are potentially exposed under current LO-13 Site uses is surface soil. Constituents that were detected above ecological screening criteria and background were from samples taken below the biologically relevant zone at depths of 4 to 6 feet bgs. However, due to lack of surface soil data, and since future construction activities could mix the soil and bring these concentrations to the surface, ecological risk hazard quotients (HQs) were calculated for the selected contaminants of potential ecological concern (high molecular weight TPH in Launch Site soils and TCE in Control Site soils). An HQ less than or equal to 1 indicates that the constituent in soil is unlikely to cause adverse ecological effects.

For Launch Site soils, the calculated ecological HQ was less than 1 (HQ=0.23). For Control Site soils, the average TCE concentration, based on a single detected concentration of 0.505 mg/kg, resulted in an HQ greater than 1 (HQ=1.8). However, given the depth of the sample, the limited detections, and the large area of the Site, the single detected concentration of TCE in soil is not considered a significant ecological risk.

Thus, the SLERA concluded that the Site does not pose an unacceptable risk to ecological receptors, and a full baseline ecological risk assessment is not required. Additionally, the lack of significant habitat within the footprint of the Launch and Control Sites, the disturbance of the areas by the current human activity, and the presence of more significant habitat in the surrounding forested land indicate that ecological risks, if they did exist, would be minimal.

5.3 PETROLEUM ASSESSMENT

Petroleum is not a hazardous substance under CERCLA. Petroleum results evaluated historically as GRO and DRO grouped analyses and more recently as EPH and VPH petroleum fractions were assessed under State guidelines, and the Petroleum Assessment Report is included as **Appendix D**.

The Petroleum Assessment concludes there are sufficient grouped petroleum data for the Site to adequately evaluate the location, extent of soil contamination and scenarios where exposure may occur, which provide an adequate evaluation of potential exposures and risks. The Petroleum Assessment concludes there is no unacceptable risk of human exposure to petroleum posed by the Site.

6. SUMMARY AND CONCLUSIONS

6.1 SUMMARY

6.1.1 Nature and Extent of Contamination Summary

Launch Site Extent

Benzo(a)pyrene is the only petroleum-related CERCLA eligible contaminant detected above an applicable screening benchmark at the Launch Site. Benzo(a)pyrene above the RSL, but below the Maine DEP "rural developed" background level, was limited to LSSB-13 with only trace EPH fractions detected compared to the adjoining LSSB-10 location. However, lower levels of benzo(a)pyrene were detected in most of the 2016 soil sample locations near the barracks building. Although not further delineated to the east, this exceedance of the RSL (0.3 mg/kg compared to the RSL of 0.11 mg/kg) is considered limited to the LSSB-13 vicinity.

Based on a horizontal delineated area surrounding LSSB-10 and LSSB-13 extending north to LSSB-4, northeast to LSSB-11, southeast to LSSB-1, south to LSSB-12, west to LSSB-9, and northwest to LSSB-2 of 1,692 ft^2 and conservative vertical extent of 16 feet bgs, a total of approximately 900 to 1,100 cy of petroleum and or benzo(a)pyrene impacted soil is present in the delineated area. Based on a thickness of 2 feet in the delineated area, the unimpacted soil zone overlying the impacted soil is calculated to be approximately 100 to 150 cy. Therefore, 750 to 1,000 cy of impacted soil are estimated to be present at the Site[5] (total volume minus the unimpacted surface volume). This horizontal extent is shown on the inset on **Figure 4**.

The extent of TCE in groundwater is limited to the LSMW-6 detections below the MCL in 1996 and 1997. Sampling of the downgradient residential water supply well in August 2025 confirmed there are no VOCs migrating offsite and no offsite exposures.

BTEX were historically detected in indoor air of the barracks apartments in 1995-1996, but were likely attributed to background sources of contamination within the apartments. No complete pathway between the subsurface and indoor air was documented, and current indoor air conditions after renovations are not known.

Control Site Extent

Based on a horizontal delineation surrounding CSSB-27 (where relatively high petroleum impacted soil at concentration below the Maine DEP RAGs) north to CSSB-30, west to CSSB-29, southwest to CSSB-28, and south to CSSB-31, an area of 3,330 ft^2, and vertical extent of 10 feet bgs, a total of approximately 1,200 to 1,300 cy of soil is present in the delineated area. Based on a thickness of 5 feet in the delineated area, the unimpacted soil zone overlying the impacted soil is calculated to be approximately 600 to 700 cy. Therefore, 500 to 700 cy of petroleum impacted soil are estimated to be present at the Site[6] (total volume minus the unimpacted surface volume). Risk associated with this petroleum is evaluated in **Appendix D**.

[5] Actual calculations based on assumptions include a total of 1,002 cy of soil within area, 125 cy of unimpacted fill near the surface, and 877 cy of impacted soil.

[6] Actual calculations based on assumptions include a total of 1,233 cy of soil within the areas, 616 cy of unimpacted soil near the surface and 617 cy of impacted soil.

Two areas of TCE contamination in soil were present with unknown sources in the vicinity of the radar towers (CSSB-18, -19, -20, and -22 in soil and CSMW-11) and east of the administration building (CSSB-26 and CSMW-8 in soil and CSMW-9). Based on the lack of an identified source area and limited available TCE data for soil, the full extent of TCE contamination in soil in these two areas is not known but are most likely to be localized sources of sporadic surface releases that migrated vertically. The extents shown on **Figure 5** are approximate and based only on available data. Based on the spatial distribution in groundwater, it may be inferred worst-case that bedrock groundwater (depths of at least 66 feet bgs) may contain TCE consistently across the Site. It is likely that degradation of these organic compounds has occurred since these detections over 20 years ago.

6.1.2 Fate and Transport Summary

Launch Site Fate and Transport

Given the age of the release and removal of the primary source area of impacted soil and groundwater surrounding the former UST, migration of contamination is limited. At the time of the release, petroleum likely leaked from the UST to the interstitial fill and due to lack of overburden groundwater, spread out into the surrounding fine-grained soil slowly migrating downward being driven by periodic infiltration of precipitation. Expansion and migration of the contaminated area was likely limited by the fine grained till soils, presence of the overlying barracks building, and limited nature of the source area. Vapors from contaminated soil remaining beneath the barracks apartments has likely attenuated to some degree since the prior indoor sampling in the 1990s by biological degradation of organics.

TCE was only detected in groundwater from LSMW-6, located in a downgradient position on the Launch Site. As upgradient wells did not contain TCE, particularly LSMW-8, migration to LSMW-6 does not appear to be occurring indicating a potential source of the TCE nearer LSMW-6. There are no downgradient receptors to the south and southwest; however, there is a single residence approximately 450 feet southeast of LSMW-6. LSMW-6 is screened from 50-60 feet bgs. Concentrations are below the MCL indicating migration to downgradient drinking water would not be a concern; in addition, since depth to groundwater is prohibitive of vapor migration, there does not appear to be a migration pathway to any receptors to the TCE detected in LSMW-6. The downgradient residential well was sampled in August 2025 and no VOCs were detected. Further, given the low concentrations initially detected and the likely attenuation over time, any pumping stress caused by a single residential private water supply well would result in dilution to the extent that detectable TCE would be unlikely.

Control Site Fate and Transport

The migration of contaminants from each UST at the Control Site appears dependent on the type of soil deposit (e.g., till or outwash) present where the tanks were installed. The migration of petroleum from the UST at the administration building was limited due to the mostly dense till geology. Additionally, after source removal, there was no additional evidence of contamination identified during the subsequent investigations.

The mess hall, barracks building, and generator building USTs were surrounded by more granular soil consisting of fill and outwash sand and silt that permitted further migration vertically to deeper soil or the groundwater interface. Groundwater in these vicinities was monitored until contaminant concentrations declined below detectable limits. Based on the time elapsed since the releases and partial soil removal, continued migration is not expected to be occurring at this time and any residual soil mass has likely degraded.

Soil data associated with the source and extent of TCE in the area east of the administration building (CSMW-8 and CSSB-23) and in the vicinity of the radar towers (CSSB-22) is limited; therefore, the lateral migration pathways cannot be inferred though vertical migration was apparent. Characteristically, TCE would migrate vertically to a lower permeability or confining layer (e.g., any denser soil, bedrock), but the till at the Control Site does not appear to have completely arrested vertical migration of TCE. Bedrock groundwater in CSMW-9 historically contained low concentrations (1.2 to 1.6 µg/L) of TCE. Therefore, it appears concentrations of TCE in this eastern area of the Control Site are vertically distributed (i.e., evidence from the surface soil down through the bedrock aquifer). There is insufficient data to make similar inferences for the radar tower area, although TCE was detected near the surface (4 to 6 feet bgs) in CSSB-22 and at depth (38-40 feet bgs) in the surrounding borings and in groundwater in bedrock well CSMW-11 (0.8 µg/L). As there are no bedrock wells that reach a similar depth as CSMW-9 and CSMW-11 between these locations, it is not possible to infer if they are related to a common source or if they are independent sources associated with the nearby soil detections. Not only are the wells not aligned along the inferred direction of groundwater flow, which is believed to be radial toward each of these wells, but the distance between the wells (approximately 380 feet) is long enough to expect substantial attenuation of concentrations along that path, which is not observed in the available data. It is reasonable to assume each well indicates the historical existence of more than one and possibly multiple points of release.

Because of the following factors, vapor intrusion of TCE into on-site buildings is considered unlikely: 1) the lack of detections in the onsite drinking water well, 2) the lack of detections of TCE in overburden groundwater, and 3) the depth of detections in the bedrock groundwater wells.

6.1.3 CERCLA Risk Assessment Summary

A HHRA and SLERA were conducted using site-specific data and USACE and EPA risk assessment guidance documents.

The HHRA assessed potential health risks posed to residents, commercial workers, construction/utility workers, and tresspassers based on current and reasonably anticipated future uses of the two Sites. Given the identified USTs areas and differences in the presence and concentrations of COPCs, the Control Site was divided into five subareas. The receptor groups were assessed for exposure to COPCs through soil ingestion, soil dermal contact, and outdoor inhalation of entrained soil particles (dust). Residents and commercial workers were additionally assessed for inhalation of indoor air impacted by volatile COPCs in groundwater via household water use and vapor intrusion. The only COPC was TCE in Control Site Subarea 1 subsurface soil and groundwater at both the Launch and Control Sites.

The HHRA calculated HIs for receptors is at or below the maximum acceptable HI of 1 and calculated cancer risks are below the maximum acceptable CERCLA incremental cancer risk of $1x10^{-4}$. Despite the uncertainties associated with the risk assessment, the conservative assumptions used to assess risks indicate the LO-13 Sites (Launch Site and Control Site) do not pose an unacceptable risk to human health for the identified receptors.

The SLERA concluded that soil at the LO-13 Site does not pose unacceptable risks to ecological receptors, as the contaminants that exceeded ecological screening levels are at a depth that would not be accessible to these receptors and concluded that a full baseline ecological risk assessment is not required. Additionally, the lack of significant habitat within the footprint of the Launch and Control Sites, the disturbance of the areas by the current human activity, and the presence of more significant habitat in the surrounding forested land indicate ecological risks, if they did exist, would be minimal.

6.1.4 Petroleum Assessment

Petroleum results evaluated historically as GRO and DRO grouped analyses and more recently as EPH and VPH petroleum fractions were assessed as part of a separate Petroleum Assessment Report included as **Appendix D**. Conclusions and recommendations made in the Petroleum Assessment Report are outside the scope and authority of CERCLA and are assessed in accordance with State guidelines.

The Petroleum Assessment concludes that there are sufficient grouped petroleum data for the LO-13 Site to adequately evaluate the location, extent of soil contamination and scenarios where exposure may occur, which provide an adequate evaluation of potential exposures and risks. The Petroleum Assessment concludes there are no unacceptable risks related to human exposure to petroleum constituents at the LO-13 Site.

6.2 CONCLUSIONS

6.2.1 Achievement of Objective

The primary objectives of this RI included:

1. Prepare a CSM.
2. Assess the adequacy of LO-13 Site data for determining nature and extent of contamination and risks.
3. Determine if the COPCs at the Sites pose unacceptable risks to human health and the environment (i.e., risks above EPA's acceptable risk levels or, for petroleum constituents, above the Maine RAGs).
4. Document data are sufficient to decide if remedial action is warranted under CERCLA.

A HHRA/SLERA was performed using the available LO-13 Site data set to assess exposures for current and reasonably anticipated future land uses for CERCLA contaminants. The Sites are currently occupied for residential (Launch Site) or periodic residential (Control Site) use, or storage. Therefore, these Sites were assessed for unrestricted residential use, as the residential scenario is typically the most conservative, along with commercial workers, construction/utility

workers, and trespassers. The HHRA results demonstrate there are no unacceptable risks for current and reasonably anticipated future use human exposures.

The SLERA indicated the Site does not pose unacceptable risks to ecological receptors, as the contaminants that exceeded ecological screening levels are at a depth that would not be accessible to these receptors and concluded that a full baseline ecological risk assessment is not required.

Therefore, no actionable risks were identified for the LO-13 Launch and Control Sites.

The remaining petroleum contamination was evaluated in the Petroleum Assessment Report (**Appendix D**). The Assessment concludes there are no unacceptable risks related to human exposure to petroleum hydrocarbons as there are no detected concentrations above the Maine DEP RAGs.

Therefore, USACE recommends a Proposed Plan is developed proposing No Further Action (NFA) under CERCLA as appropriate for this Formerly Used Defense Site.

6.2.2 Recommendations

The HHRA and SLERA conclude there is no actionable risk to human health or the environment for the Site under CERCLA. Therefore, NFA is recommended, and a NFA Proposed Plan will be completed. A Record of Decision will be prepared to close out the Site in the FUDS Program if no further credible information to contradict this report presents itself during the public comment period.

The Petroleum Assessment Report also concludes NFA is recommended for the petroleum releases.

7. REFERENCES

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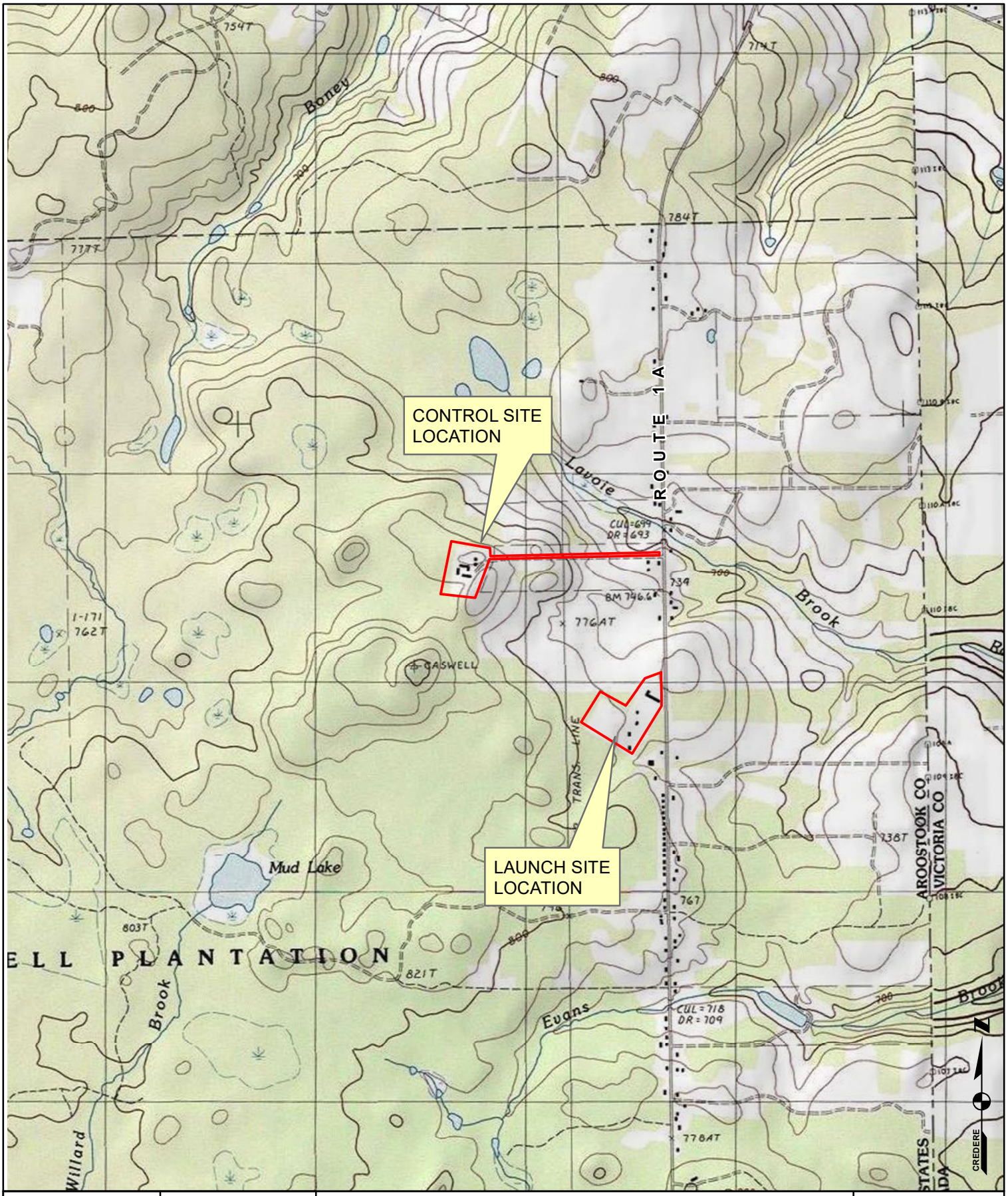
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FIGURES



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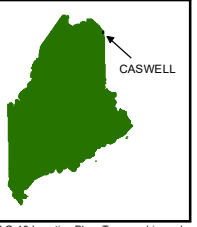
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FIGURE 1A
LO-13 LAUNCH AND CONTROL SITES
LOCATION PLAN - TOPOGRAPHIC

FORMER LORING AFB
LO-13 LAUNCH AND CONTROL SITES
ROUTE 1A
CASWELL, MAINE

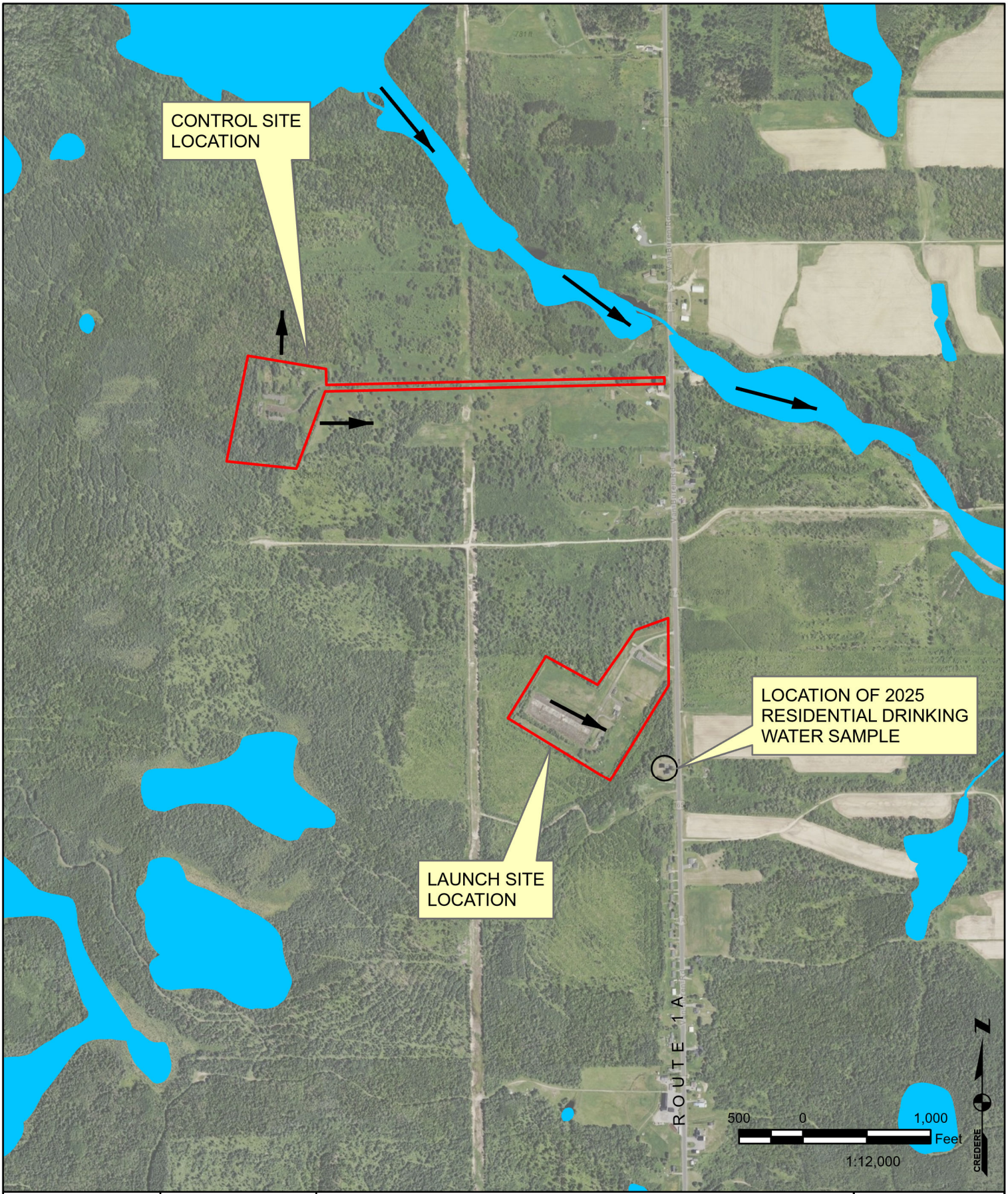
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1 inch = 2,000 feet



Topographic Map Data Copyright© 2013 National Geographic Society, i-cubed

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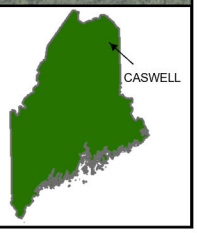
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FIGURE 1B
LO-13 LAUNCH AND CONTROL SITES LOCATION PLAN

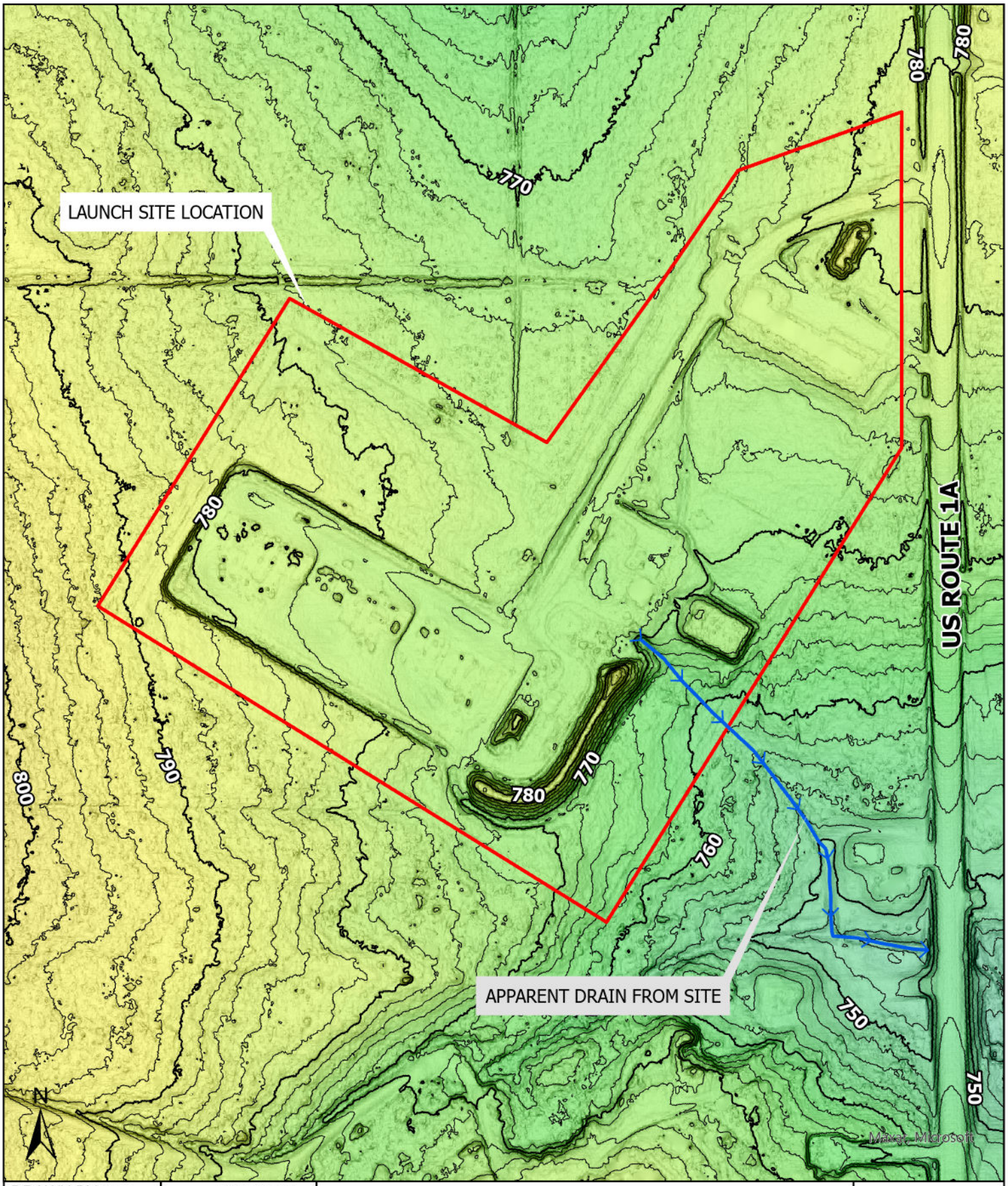
FORMER LORING AFB
LO-13 LAUNCH AND CONTROL SITES
ROUTE 1A
CASWELL, MAINE

- FLOW DIRECTION
- WETLAND/SURFACE WATER BODY
- SITE BOUNDARY



Topographic Map Data wide-area (wide-area):
World_Topo_Map: Province of New Brunswick, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA, AAFC, NRCan
World Topographic Map: Province of New Brunswick, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA, AAFC, NRCan
US_StateBoundaries selection:

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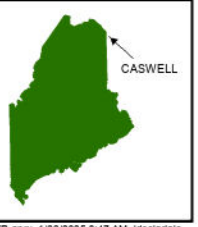
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FIGURE 1C
LO-13 LAUNCH SITE
DIGITAL ELEVATION MODEL TOPOGRAPHY

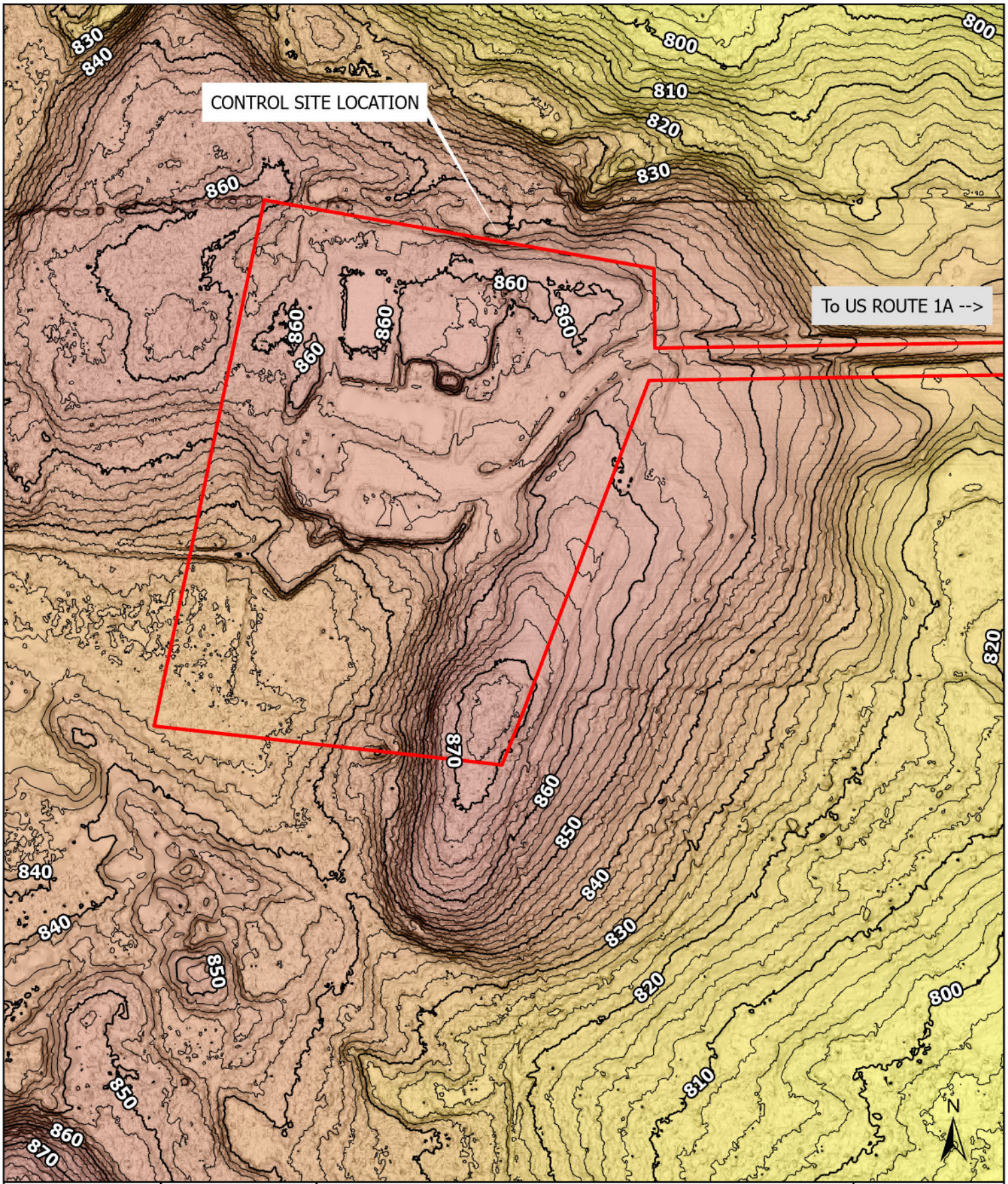
FORMER LORING AFB
LO-13 LAUNCH AND CONTROL SITES
ROUTE 1A
CASWELL, MAINE

0 50 100 200
Feet
1 inch equals 200 feet



LIDAR SOURCE: EASTERN CENTRAL MAINE 2017 QL2 LIDAR PROJECT

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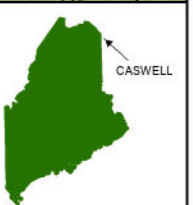
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FIGURE 1D
LO-13 CONTROL SITE
DIGITAL ELEVATION MODEL TOPOGRAPHY

FORMER LORING AFB
LO-13 LAUNCH AND CONTROL SITES
ROUTE 1A
CASWELL, MAINE

0 50 100 200
Feet
1 inch equals 200 feet



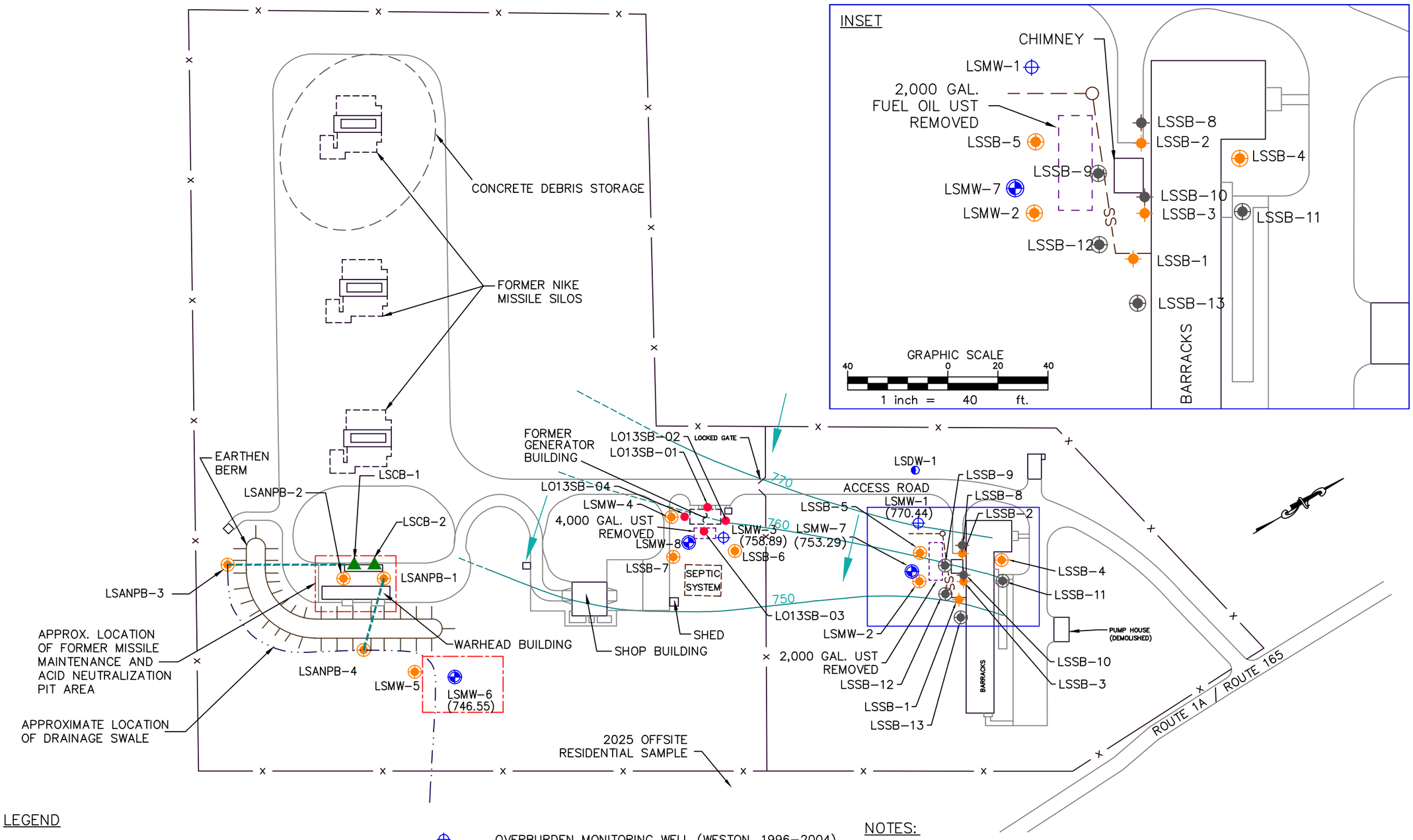
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FIGURE 2
DETAILED SITE PLAN – LO-13 LAUNCH SITE

FORMER LORING AFB LO-13 LAUNCH SITE
ROUTE 1A
CASWELL, MAINE

GRAPHIC SCALE
100 50 0 100 ft.
1 inch = 100 ft.



LEGEND

- ANGLED SOIL BORING (CREDERE, 2016)
- STRAIGHT SOIL BORING (CREDERE, 2016)
- SURFACE SOIL (AECOM, 2015)
- ANGLED SOIL BORING (WESTON, 1996)
- STRAIGHT SOIL BORING (WESTON, 1996–1999)
- BEDROCK MONITORING WELL (WESTON, 1996–2004)
- OVERBURDEN MONITORING WELL (WESTON, 1996–2004)
- RESIDENTIAL WATER SUPPLY WELL
- SEDIMENT SAMPLE FROM CATCH BASIN
- ACID NEUTRALIZATION PIT DRAINAGE PIPE
- CHAIN LINK FENCE WITH BARB WIRE
- SANITARY SEWER
- GROUNDWATER CONTOURS (FT) (MAY 2012)
- GROUNDWATER FLOW DIRECTION

NOTES:

1. ALL FEATURES ON THIS PLAN ARE APPROXIMATE.
2. FIGURE MODIFIED FROM EXISTING PLAN CONTAINED IN LONG-TERM MONITORING PROGRAM REPORT PREPARED BY WESTON SOLUTIONS, INC., DATED NOVEMBER 2007.
3. BLUE OUTLINE REPRESENTS INSET AREA.
4. MONITORING WELLS NOT INSTALLED AT LSMW-2, LSMW-4, OR LSMW-5, DESPITE MONITORING WELL DESIGNATION DUE TO LACK OF OVERBURDEN SATURATION, AND WERE REPLACED WITH LSMW-7, LSMW-8, AND LSMW-6 BEDROCK WELLS, RESPECTIVELY.
5. GROUNDWATER CONTOURS FROM THE MAY 2012 MONITORING EVENT. GROUNDWATER ELEVATIONS USED FOR THE CONTOURS ARE SHOW AS FEET ABOVE MEAN SEA LEVEL IN PARENTHESES.

DRAWN BY: SAF/CMD DATE: 12/10/25
CHECKED BY: ASD PROJECT: 15001301

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Economy Community Environment

J:\1. Credere Projects\15001301 USACE Loring FUDS RI-RA\Figure 2 and 4 – LO-13 Launch Site_recover.dwg plot date: 12/10/2025 1:39 PM

FIGURE 3
DETAILED SITE PLAN - LO-13 CONTROL SITE

LO-13 CONTROL SITE
ROUTE 1A
CASWELL, MAINE

GRAPHIC SCALE
60 30 0 60
1 inch = 60 ft.

FORMER RADAR TOWERS
CSMW-11 (774.44)
CSSB-19
CSSB-18
CSSB-20
CSSB-21
CSSB-22
776
777
778
779
780
781
782
783
784
785
786
787
GENERATOR BUILDING (2)
FORMER 500 GAL. UST
PAVED AREA
FORMER 6,000 GAL. DIESEL UST IN CONCRETE VAULT REMOVED
FORMER 2,000 GAL. NO. 2 FUEL OIL UST EXCAVATION
CSMW-100 (786.40)
CSSB-30
CSMW-1
FORMER GENERATOR BUILDING
CSSB-29
CSSB-2
CSSB-1
CSSB-27
CSSB-28
CSMW-2
BURIED WATER STORAGE TANK
APPROX. LOCATION OF RESIDENTIAL WATER SUPPLY WELL (CSDW-1)
CSMW-3
CSSB-3
CSMW-4
CSSB-6
CSSB-5
CSSB-4
GARAGE
RESIDENCE
CSSB-7
CSSB-31
PARKING
ACCESS ROAD TO ROUTE 165
GATE
PAINT SHED
FORMER BARRACKS BUILDING AND OFFICER QUARTERS
GROUNDWATER FLOW DIRECTION
CSMW-101 (786.97)
FORMER MESS HALL
CSSB-10
CSSB-8
CSSB-11
CSSB-32
CSSB-12
POSSIBLE UNDERGROUND PROPANE TANKS
FORMER 2,000 GAL. UST REMOVED
CSMW-10 (787.05)
CSMW-5
CSSB-13
FORMER ADMINISTRATION BUILDING
CSSB-14
CSSB-15
CSSB-16
CSSB-17
2,000 GAL. UST REMOVED
CSMW-6
BERMED AREA
CSMW-7
CSSB-24
CSMW-9 (785.53)
CSSB-25
CSMW-8
CSSB-26
CSSB-23

LEGEND

- BEDROCK MONITORING WELL (CREDERE, 2017)
- STRAIGHT SOIL BORING (CREDERE, 2017) JULY 2017
- BEDROCK MONITORING WELL (WESTON, 1996–2004)
- OVERBURDEN MONITORING WELL (WESTON, 1996–2004)
- ANGLED SOIL BORING (WESTON, 1996)
- STRAIGHT SOIL BORING (WESTON, 1996)
- RESIDENTIAL WATER SUPPLY WELL
- CHAIN LINK FENCE W/ BARBED WIRE
- GUARD RAIL
- AREAS OF EXCAVATED SOIL BY MASON ENVIRONMENTAL (1994)
- SLOPE
- GROUNDWATER FLOW DIRECTION
- TREE LINE
- GROUNDWATER CONTOURS (FT) (JULY 2017)
- INFERRED GROUNDWATER CONTOURS

NOTES:

1. ALL FEATURES ON THIS PLAN ARE APPROXIMATE.
2. FIGURE MODIFIED FROM EXISTING PLAN CONTAINED IN LONG–TERM MONITORING PROGRAM REPORT PREPARED BY WESTON SOLUTIONS, INC., DATED NOVEMBER 2007.
3. NO CSSB–9 LOCATION.
4. CSMW–6 IS ONLY A BORING DESPITE MONITORING WELL DESIGNATION (I.E., MW)
5. GROUNDWATER CONTOURS FROM THE JULY 2017 REMEDIAL INVESTIGATION WORK. GROUNDWATER ELEVATIONS USED FOR THE CONTOURS ARE SHOWN AS FEET ABOVE MEAN SEA LEVEL IN PARENTHESES NEXT TO WELL ID.

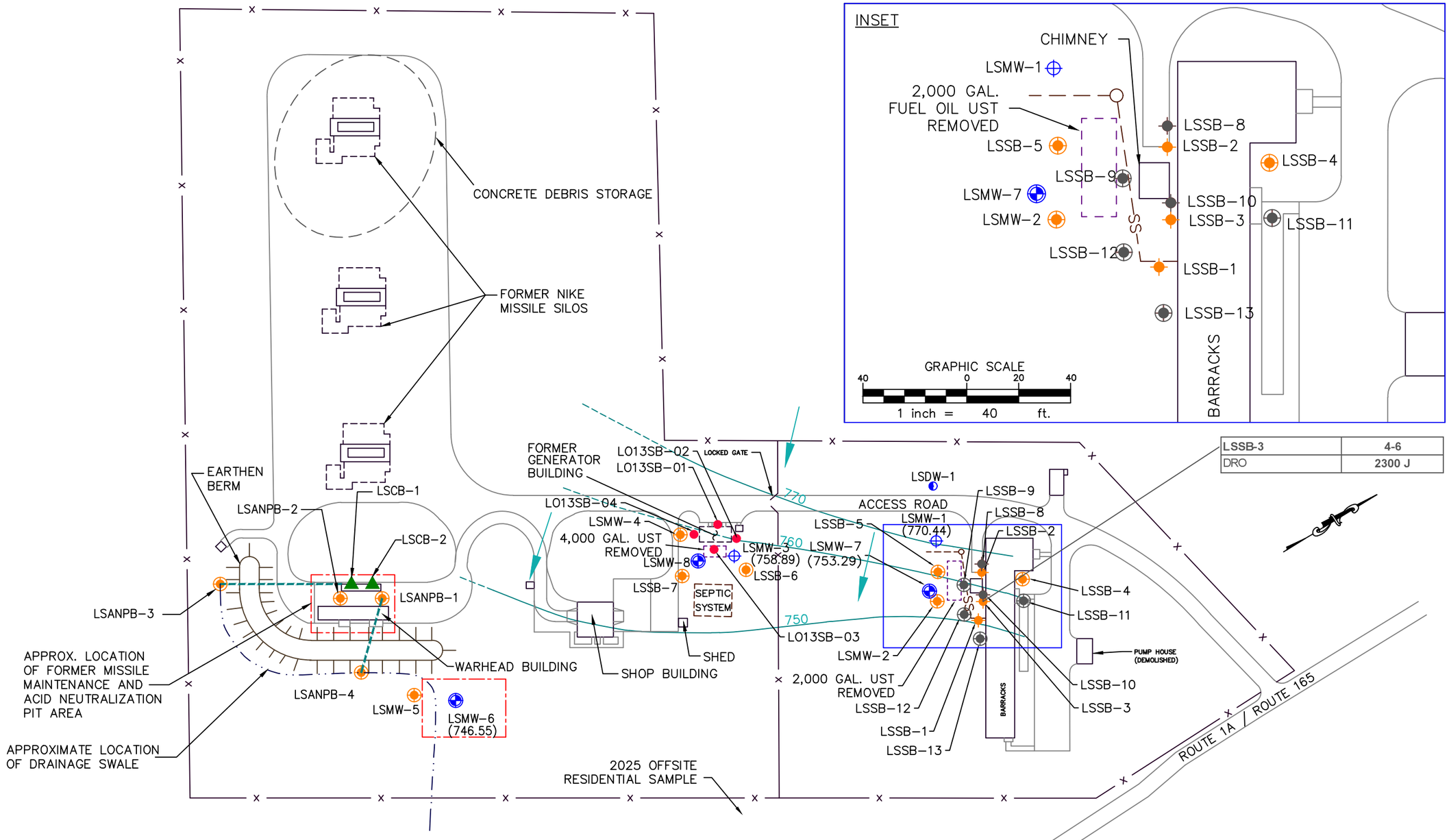
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CHECKED BY: ASD
DATE: 01/25/2025
PROJECT: 15001301

CREDERE ASSOCIATES, LLC
776 MAIN STREET
WESTBROOK, MAINE 04092
TEL: 207.828.1272
FAX: 207.887.1051
WWW.CREDERELLC.COM

Economy Community Environment

J:\1. Credere Projects\15001301 USACE Loring FUDS RI–RA\Figure 3 and 5 – LO–13 Control Site.dwg plot date: 1/21/2025 8:11 AM

FIGURE 4
LO-13 LAUNCH SITE – EXTENT OF COCs IN SOIL



LSSB-3	4-6
DRO	2300 J

GRAPHIC SCALE
100 50 0 100
1 inch = 100 ft.

LEGEND

- ANGLED SOIL BORING (CREDERE, 2016)
- STRAIGHT SOIL BORING (CREDERE, 2016)
- SURFACE SOIL (AECOM, 2015)
- ANGLED SOIL BORING (WESTON, 1996)
- STRAIGHT SOIL BORING (WESTON, 1996–1999)
- BEDROCK MONITORING WELL (WESTON, 1996–2004)
- OVERBURDEN MONITORING WELL (WESTON, 1996–2004)
- RESIDENTIAL WATER SUPPLY WELL
- SEDIMENT SAMPLE FROM CATCH BASIN
- ACID NEUTRALIZATION PIT DRAINAGE PIPE
- CHAIN LINK FENCE WITH BARB WIRE
- SANITARY SEWER
- EXTENT OF CONTAMINATION

Sample ID	(Depth Interval in ft)
Result detection on Table 1 that represents risk	71.00
Value is estimated	J
Result units	mg/kg
Depth adjusted based on boring angle	^

NOTES:

1. ALL FEATURES ON THIS PLAN ARE APPROXIMATE.
2. FIGURE MODIFIED FROM EXISTING PLAN CONTAINED IN LONG-TERM MONITORING PROGRAM REPORT PREPARED BY WESTON SOLUTIONS, INC., DATED NOVEMBER 2007.
3. BLUE OUTLINE REPRESENTS INSET AREA.
4. MONITORING WELLS NOT INSTALLED AT LSMW-2, LSMW-4, OR LSMW-5, DESPITE MONITORING WELL DESIGNATION DUE TO LACK OF OVERBURDEN SATURATION, AND WERE REPLACED WITH LSMW-7, LSMW-8, AND LSMW-6 BEDROCK WELLS, RESPECTIVELY.
5. GROUNDWATER CONTOURS FROM THE MAY 2012 MONITORING EVENT. GROUNDWATER ELEVATIONS USED FOR THE CONTOURS ARE SHOW AS FEET ABOVE MEAN SEA LEVEL IN PARENTHESES.

FORMER LORING AFB LO-13 LAUNCH SITE
ROUTE 1A
CASWELL, MAINE

DRAWN BY: MAK/CMD DATE: 12/10/2025
CHECKED BY: ASD PROJECT: 15001301

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J:\1. Credere Projects\15001301 USACE Loring FUDS RI-RA\Figure 2 and 4 - LO-13 Launch Site_recover.dwg plot date: 12/10/2025 1:37 PM

FIGURE 5
LO-13 CONTROL SITE - EXTENT OF COPC IN SOIL

LO-13 CONTROL SITE
ROUTE 1A
CASWELL, MAINE

GRAPHIC SCALE
60 30 0 60
1 inch = 60 ft.

CSSB-22	4-6
TCE	0.505

CSSB-23	38-40
TCE	0.616

Sample ID	(Depth Interval in ft)
Result exceeds or is equal to comparison criteria listed in Table 2	1100
Value is estimated	J
Result units	mg/kg

LEGEND

- BEDROCK MONITORING WELL (CREDERE, 2017)
- STRAIGHT SOIL BORING (CREDERE, 2017) JULY 2017
- BEDROCK MONITORING WELL (WESTON, 1996–2004)
- OVERBURDEN MONITORING WELL (WESTON, 1996–2004)
- ANGLED SOIL BORING (WESTON, 1996)
- STRAIGHT SOIL BORING (WESTON, 1996)
- RESIDENTIAL WATER SUPPLY WELL
- CHAIN LINK FENCE W/ BARBED WIRE
- GUARD RAIL
- APPROXIMATE EXTENT OF CONTAMINATION (DASHED LINE INDICATES UNKNOWN EXTENT
- AREAS OF EXCAVATED SOIL BY MASON ENVIRONMENTAL (1994)
- SLOPE
- TREE LINE
- GROUNDWATER FLOW DIRECTION

NOTES:

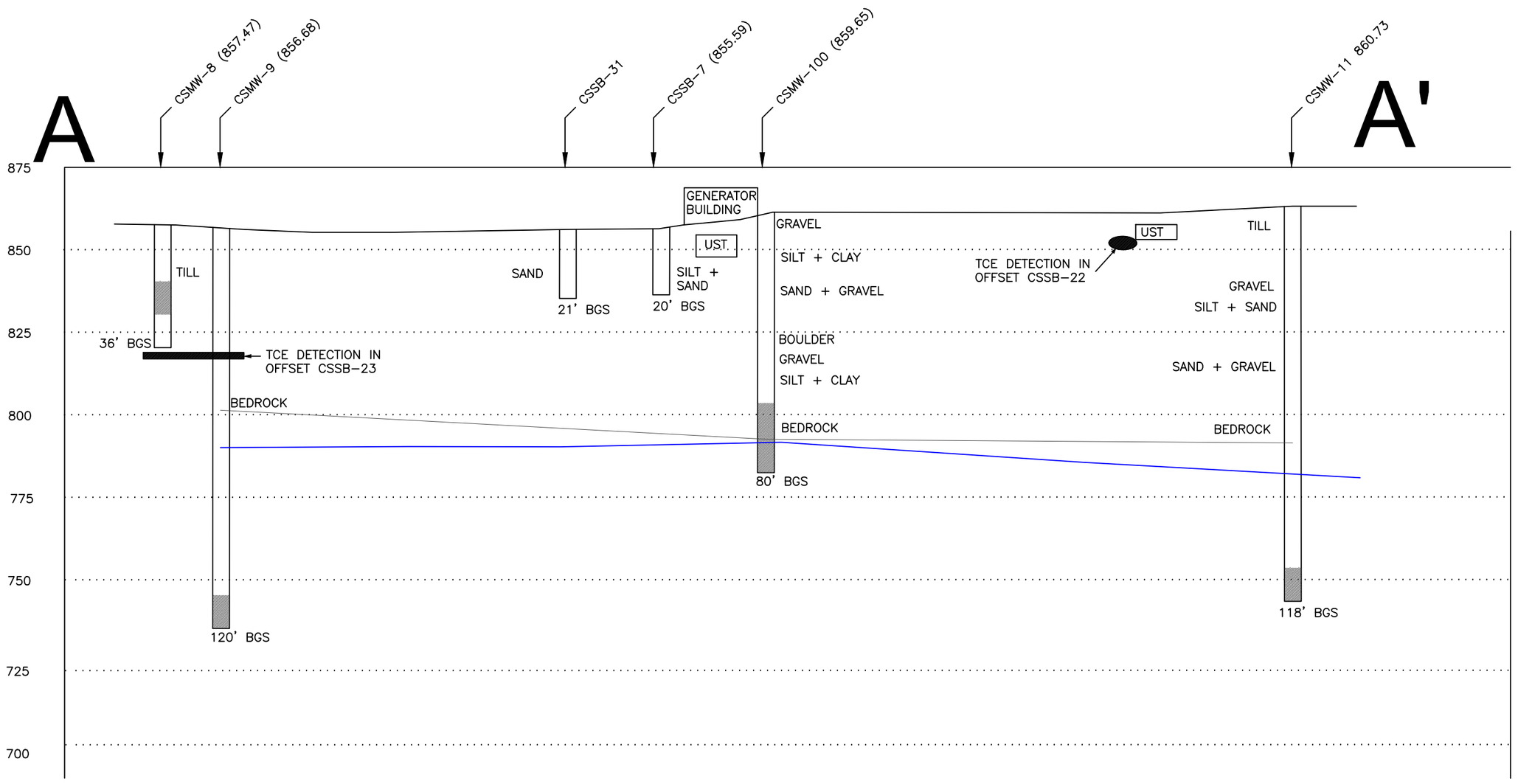
1. ALL FEATURES ON THIS PLAN ARE APPROXIMATE.
2. FIGURE MODIFIED FROM EXISTING PLAN CONTAINED IN LONG–TERM MONITORING PROGRAM REPORT PREPARED BY WESTON SOLUTIONS, INC., DATED NOVEMBER 2007.
3. NO CSSB–9 LOCATION.
4. CSMW–6 IS ONLY A BORING DESPITE MONITORING WELL DESIGNATION (I.E.,MW)

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NOTES

1. SOIL BORINGS LSMW-1 THROUGH LSMW-8, LSSB-1 THROUGH LSSB-7, AND LSANPB-1 THROUGH LSANPB-4 COMPLETED BY WESTON SOLUTIONS SEPTEMBER 17, 1996 THROUGH JUNE 25, 1999
2. SOIL BORINGS LSSB-8 THROUGH LSSB-13 COMPLETED ON NOVEMBER 1, 2016 BY CREDERE ASSOCIATES, LLC.
3. ELEVATIONS OBTAINED FROM BORING LOGS IN WESTON, 2000 ADDENDUM SITE INVESTIGATION REPORT. ELEVATIONS IN PARENTHESIS ARE FEET AMSL.

LEGEND

- SCREEN INTERVAL
- GROUNDWATER TABLE
- BEDROCK INTERFACE (2012 OR 2017)

FIGURE 6A – LO-13 CONTROL SITE CROSS SECTION A-A'

GRAPHIC SCALE
10 5 0 10
1 inch = 10 ft.

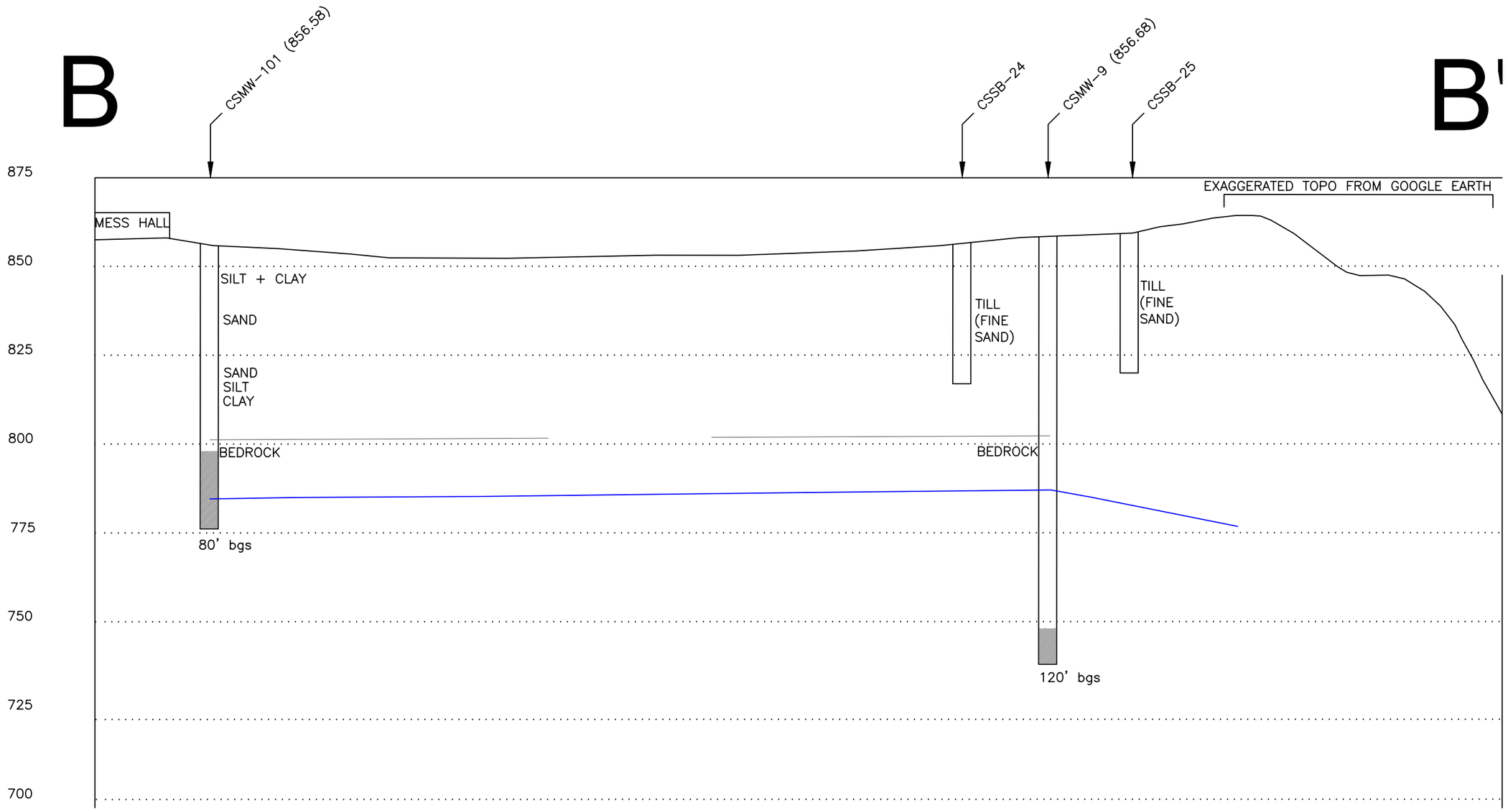
LORING AFB
LO-13 CONTROL SITE
CASWELL, MAINE

DRAWN BY: PCH
CHECKED BY: ASD
DATE: 09/05/2024
PROJECT: 15001301

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J:\1. Credere Projects\15001301 USACE Loring FUDS RI-RA\Sections.dwg plot date: 9/6/2024 11:50 AM



NOTES

1. SOIL BORINGS LSMW-1 THROUGH LSMW-8, LSSB-1 THROUGH LSSB-7, AND LSANPB-1 THROUGH LSANPB-4 COMPLETED BY WESTON SOLUTIONS SEPTEMBER 17, 1996 THROUGH JUNE 25, 1999
2. SOIL BORINGS LSSB-8 THROUGH LSSB-13 COMPLETED ON NOVEMBER 1, 2016 BY CREDERE ASSOCIATES, LLC.
3. ELEVATIONS OBTAINED FROM BORING LOGS IN WESTON, 2000 ADDENDUM SITE INVESTIGATION REPORT. ELEVATIONS IN PARENTHESIS ARE FEET AMSL.

LEGEND

- SCREEN INTERVAL
- GROUNDWATER TABLE
- BEDROCK INTERFACE (2012 OR 2017)

FIGURE 6B LO-13 CONTROL SITE CROSS SECTION B-B'

GRAPHIC SCALE
10 5 0 10
1 inch = 10 ft.

LORING AFB
LO-13 CONTROL SITE
CASWELL, MAINE

DRAWN BY: PCH
CHECKED BY: ASD
DATE: 09/05/2024
PROJECT: 15001301

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Figure 6C
LO-13 Control Site Topographic Profile from Google Earth – East to West

Notes

1. Data sources from Google Earth, August 2024.

Not to scale, for relative depiction only

Community Economy Environment
CREDERE ASSOCIATES, LLC



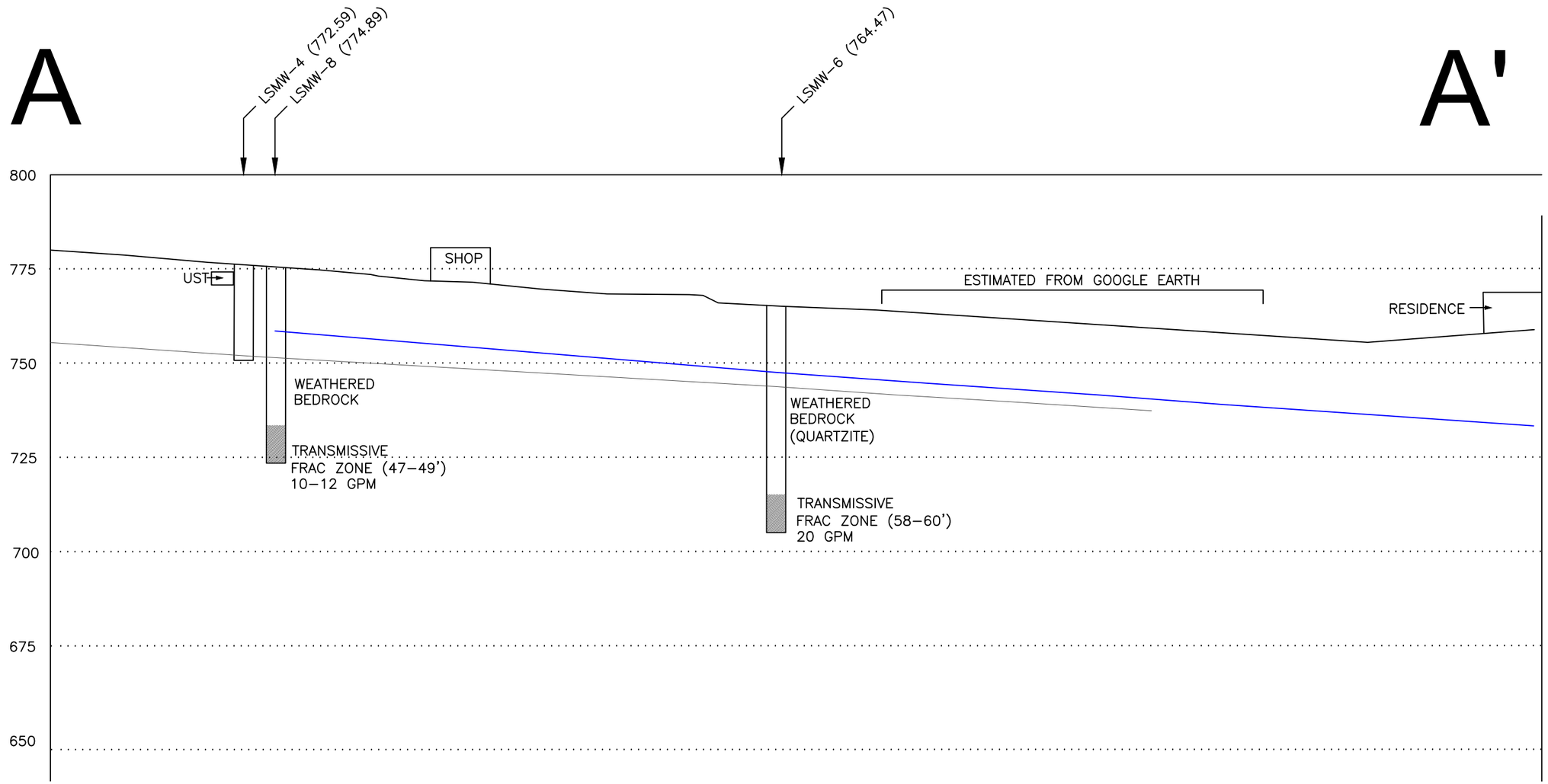
Figure 6D
LO-13 Control Site Topographic Profile from Google Earth – North to South

Notes

1. Data sources from Google Earth, August 2024.

Not to scale, for relative depiction only

CREDERE ASSOCIATES, LLC



NOTES

1. SOIL BORINGS LSMW-1 THROUGH LSMW-8, LSSB-1 THROUGH LSSB-7, AND LSANPB-1 THROUGH LSANPB-4 COMPLETED BY WESTON SOLUTIONS SEPTEMBER 17, 1996 THROUGH JUNE 25, 1999
2. SOIL BORINGS LSSB-8 THROUGH LSSB-13 COMPLETED ON NOVEMBER 1, 2016 BY CREDERE ASSOCIATES, LLC.
3. ELEVATIONS OBTAINED FROM BORING LOGS IN WESTON, 2000 ADDENDUM SITE INVESTIGATION REPORT. ELEVATIONS IN PARENTHESIS ARE FEET AMSL.

LEGEND

- SCREEN INTERVAL
- GROUNDWATER TABLE
- BEDROCK INTERFACE (2012 OR 2017)

FIGURE 7A – LO-13 LAUNCH SITE CROSS SECTION A-A'

GRAPHIC SCALE 10 5 0 10
1 inch = 10 ft.

LORING AFB
LO-13 LAUNCH SITE
CASWELL, MAINE

DRAWN BY: PCH
CHECKED BY: ASD
DATE: 09/05/2024
PROJECT: 15001301

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J:\1. Credere Projects\15001301 USACE Loring FUDS RI-RA\Sections.dwg plot date: 12/18/2024 1:33 PM



Figure 7B

LO-13 Launch Site Topographic Profile from Google Earth – Northwest to Southeast

Notes

1. Data sources from Google Earth, August 2024.

Not to scale, for relative depiction only

CREDERE ASSOCIATES, LLC

TABLES

Table 1A
Summary of Historical Soil Analytical Results - LO-13 Launch Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

Parameter*	EPA RSL[1]	Maine DEP RAG[2]	Former DEP Guideline[3]	Boring Location:	LSSB-1		LSSB-2		LSSB-3		LSSB-4		LSSB-5		LSSB-6	
				Sample ID:	LSSB1-1	LSSB1-2	LSSB2-1	LSSB2-2	LSSB3-1	LSSB3-2	LSSB4-1	LSSB4-2	LSSB5-1	LSSB5-2	LSSB6-1	LSSB6-2
				Sample Depth:	6-8	16-18	9-11	14-15.5	4-6	14-16	12-14	17	7-8	10-12	6-8	16-17.5
				Sample Date:	9/24/1996	9/24/1996	9/24/1996	9/24/1996	9/24/1996	9/24/1996	9/17/1996	9/17/1996	9/17/1996	9/17/1996	9/24/1996	9/24/1996
				Field QC:	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
					Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method 8260B (mg/kg)																						
Acetone	7,000	96,000	NA		0.005	U	0.006	U	**0.029**		0.006	U	0.74	U	0.006	U	0.006	U	0.005	U	0.006	U	**0.010**		0.006	U	0.005	U
2-Butanone	2,700	20,000	NA		0.005	U	0.006	U	0.006	U	0.006	U	**3.1**		0.006	U	0.006	U	0.005	U	0.006	U	0.006	U	0.006	U	0.005	U
1,1,1-Trichlorothane	810	640	NA		0.005	U	0.006	U	0.006	U	0.006	U	0.74	U	0.006	U	0.006	U	0.005	U	0.006	U	**0.005**	**J**	0.006	U	0.005	U
Trichloroethene	0.41	6.1	NA		0.005	U	0.006	U	0.006	U	0.006	U	0.74	U	0.006	U	0.006	U	**0.003**	**J**	0.006	U	0.006	U	0.006	U	0.005	U
Ethylbenzene	5.8	86	NA		0.005	U	0.006	U	0.006	U	0.006	U	**0.085**	**J**	0.006	U	0.006	U	0.005	U	0.006	U	0.006	U	0.006	U	0.005	U
Xylene	58	260	NA		0.005	U	0.006	U	0.006	U	0.006	U	**0.16**	**J**	0.006	U	0.006	U	0.005	U	0.006	U	0.006	U	0.006	U	0.005	U
Semi-Volatile Organic Compounds by EPA Method 8270 (mg/kg)																						
All Compounds	NA	NA	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Diesel Range Organics (DRO) (mg/kg)																						
DRO	NE	NE	10		5.4	U	5.4	U	5.8	U	5.7	U	**2300**	**J**	**22**	**J**	5.7	U	5.4	U	5.6	U	5.8	U	5.6	U	5.2	U
Polychlorinated biphenyls (PCBs) by EPA Method 8082A (mg/kg)																						
PCBs	0.12	3.1	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Pesticides (mg/kg)																						
delta-BHC	NE	NE	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
4,4'-DDE	2.0	28	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
4,4-DDD	2.3	31	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
4,4-DDT	1.9	26	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Metals by EPA Method 6010 (mg/kg)																						
Arsenic	0.68	9.3	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Barium	1,500	21,000	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Beryllium	16	210	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Cadmium	0.71	9.8	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Total chromium	0.3/12,000	4.2/100,000	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Copper	310	4,300	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Lead	400	200	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Mercury	1.1	3.1	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Nickel	150	2100	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Selenium	39	540	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Silver	39	540	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Zinc	2,300	32,000	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	

Table 1A
Summary of Historical Soil Analytical Results - LO-13 Launch Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

Parameter*	EPA RSL[1]	Maine DEP RAG[2]	Former DEP Guideline[3]	Boring Location:	LSSB-7		LSSB-7		LSMW-1		LSMW-1		LSMW-2		LSMW-2		LSMW-3		LSMW-3		LSMW-3		LSMW-4		LSMW-4	
				Sample ID:	LSSB7-1		LSSB7-2		LSMW1-1		LSMW1-2		LSMW2-1		LSMW2-2		LSMW3-1		LSMW3-2				LSMW4-1		LSMW4-2	
				Sample Depth:	7-9		16-18		8-10		18-18.3		6-8		12-14		6-8		14-16				6-8		18-19.6	
				Sample Date:	9/17/1996		9/17/2016		9/17/1996		9/17/1996		9/25/1996		9/25/1996		9/24/1996		9/24/1996				9/24/1996		9/24/1996	
				Field QC:	FS		FS		FS		FS		FS		FS		FS		FS		FD		FS		FS	
					Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method 8260B (mg/kg)																										
Acetone	7,000	96,000	NA		0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U
2-Butanone	2,700	20,000	NA		0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U
1,1,1-Trichlorothane	810	640	NA		0.006	U	**0.004**	**J**	**0.004**	**J**	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U
Trichloroethene	0.41	6.1	NA		0.006	U	**0.003**	**J**	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U
Ethylbenzene	5.8	86	NA		0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U
Xylene	58	260	NA		0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U
Semi-Volatile Organic Compounds by EPA Method 8270 (mg/kg)																										
All Compounds	NA	NA	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Diesel Range Organics (DRO) (mg/kg)																										
DRO	NE	NE	10		5.5	U	5.6	U	5.8	U	5.7	U	5.5	U	5.5	U	5.5	U	5.7	U	5.8	U	5.5	U	5.1	U
Polychlorinated biphenyls (PCBs) by EPA Method 8082A (mg/kg)																										
PCBs	0.12	3.1	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Pesticides (mg/kg)																										
delta-BHC	NE	NE	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
4,4'-DDE	2.0	28	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
4,4-DDD	2.3	31	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
4,4-DDT	1.9	26	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Metals by EPA Method 6010 (mg/kg)																										
Arsenic	0.68	9.3	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Barium	1,500	21,000	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Beryllium	16	210	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Cadmium	0.71	9.8	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Total chromium	0.3/12,000	4.2/100,000	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Copper	310	4,300	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Lead	400	200	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Mercury	1.1	3.1	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Nickel	150	2100	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Selenium	39	540	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Silver	39	540	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Zinc	2,300	32,000	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	

Table 1A
Summary of Historical Soil Analytical Results - LO-13 Launch Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

Parameter*	EPA RSL[1]	Maine DEP RAG[2]	Former DEP Guideline[3]	Boring Location:	LSMW-5		LSANPB-1		LSANPB-2		LSANPB-3		LSANPB-4				LSCB-1	
				Sample ID:	LSMW5-1	LSMW5-2	LSANPB1-1	LSANPB1-2	LSANPB2-1	LSANPB2-2	LSANPB3-1	LSANPB3-2	LSANPB4-1		LSANPB4-2		LSCB-1	
				Sample Depth:	8-10	18-18.8	0.9-2.9	6.9-8.9	0.9-2.9	4.9-6.9	4-6	18-20	2-4		18-19		NA	
				Sample Date:	9/24/1996	9/24/1996	9/25/1996	9/25/1996	9/25/1996	9/25/1996	6/25/1999	6/25/1999	6/25/1999	DUP	6/25/1999		6/25/1999	
				Field QC:	FS	FS	FS	FS	FS	FS	FS	FS	FS	FD	FS		FS	
					Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method 8260B (mg/kg)																		
Acetone	7,000	96,000	NA		0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.006	U	ND		ND		ND		ND		ND		ND		ND	
2-Butanone	2,700	20,000	NA		0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.006	U	ND		ND		ND		ND		ND		ND		ND	
1,1,1-Trichlorothane	810	640	NA		0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.006	U	ND		ND		ND		ND		ND		ND		ND	
Trichloroethene	0.41	6.1	NA		0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.006	U	ND		ND		ND		ND		ND		ND		ND	
Ethylbenzene	5.8	86	NA		0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.006	U	ND		ND		ND		ND		ND		ND		ND	
Xylene	58	260	NA		0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.006	U	ND		ND		ND		ND		ND		ND		ND	
Semi-Volatile Organic Compounds by EPA Method 8270 (mg/kg)																		
All Compounds	NA	NA	NA		NS		NS		ND		ND		ND		ND		NS		NS		NS		NS		NS		NS		NS	
Diesel Range Organics (DRO) (mg/kg)																		
DRO	NE	NE	10		6.4	U	5.9	U	NS		NS		NS		NS		7	U	7	U	7	U	7	U	7	U	**289**			
Polychlorinated biphenyls (PCBs) by EPA Method 8082A (mg/kg)																		
PCBs	0.12	3.1	NA		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Pesticides (mg/kg)																		
delta-BHC	NE	NE	NA		NS		NS		**0.0018**		0.0044	U	0.0042	U	0.0045	U	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U	0.017	U		
4,4'-DDE	2.0	28	NA		NS		NS		**0.011**	**J**	0.0088	U	0.0085	U	0.0090	U	0.0031	U	0.0031	U	0.003	U	0.003	U	0.0031	U	0.034	U		
4,4-DDD	2.3	31	NA		NS		NS		**0.058**	**J**	0.0088	U	**0.0014**	**J**	0.0090	U	0.0031	U	0.0031	U	0.003	U	0.003	U	0.0031	U	**0.004**			
4,4-DDT	1.9	26	NA		NS		NS		**0.0092**	**J**	0.0088	U	**0.00070**	**J**	0.0090	U	0.0031	U	0.0031	U	**0.003**		**0.004**		0.0031	U	**0.039**			
Metals by EPA Method 6010 (mg/kg)																		
Arsenic	0.68	9.3	NA		NS		NS		**7.5**		**4.0**		**6.9**		**8.4**		**9.97**		**6.03**		**6.15**		**5.21**		**5.5**		**5.28**			
Barium	1,500	21,000	NA		NS		NS		**30.7**		**39.8 J**		**32.1**		**39.6**		NS		NS		NS		NS		NS		NS			
Beryllium	16	210	NA		NS		NS		NS		NS		NS		NS		**0.399**		**0.421**		**0.410**		**0.363**		**0.343**		**0.302**			
Cadmium	0.71	9.8	NA		NS		NS		0.072	U	0.91	U	0.87	U	0.89	U	0.75	U	0.77	U	**0.74**		0.73	U	0.71	U	**2.77**			
Total chromium	0.3/12,000	4.2/100,000	NA		NS		NS		**31.2**		**33**		**30.9**		**41.8**		**22**		**27.3**		**29**		**24.3**		**17.7**		**22.6**			
Copper	310	4,300	NA		NS		NS		NS		NS		NS		NS		**14.5**		**17**		**15.2**		**14.9**		**13.7**		**36.2**			
Lead	400	200	NA		NS		NS		**11.4**		**11.8**		**11.6**		**15**		**7.8**		7.7	U	**8.0**		**7.6**		7.1	U	**80.5**			
Mercury	1.1	3.1	NA		NS		NS		**0.06**		0.05	U	0.05	U	0.05	U	0.0659	U	0.069	U	0.0684	U	0.0654	U	0.0657	U	0.0745	U		
Nickel	150	2100	NA		NS		NS		NS		NS		NS		NS		**31.3**		**40.9**		**36.6**		**29.8**		**25.8**		**23**			
Selenium	39	540	NA		NS		NS		0.019	U	**0.38**		**0.35**		**0.55**		1.88	U	1.91	U	1.77	U	1.82	U	1.78	U	2.1	U		
Silver	39	540	NA		NS		NS		0.072	U	0.091	U	0.87	U	0.89	U	0.75	U	0.77	U	0.71	U	0.73	U	0.71	U	0.84	U		
Zinc	2,300	32,000	NA		NS		NS		NS		NS		NS		NS		**46.3**		**53.6**		**52.8**		**44.6**		**47.3**		**237**			

Table 1A
Summary of Historical Soil Analytical Results - LO-13 Launch Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

Parameter*	EPA RSL[1]	Maine DEP RAG[2]	Former DEP Guideline[3]	Boring Location:	LO13SB-01				LO13SB-02				LO13SB-03				LO13SB-04			
				Sample ID:	LO13SB-01A-051415		LO13SB-01B-051415		LO13SB-02A-051415		LO13SB-02B-051415		LO13SB-03A-051415		LO13SB-03B-051415		LO13SB-04A-051415		LO13SB-04B-051415	
				Sample Depth:	0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1	
				Sample Date:	5/14/2015		5/14/2015		5/14/2015		5/14/2015		5/14/2015		5/14/2015		5/14/2015		5/14/2015	
				Field QC:	FS	FD	FS		FS		FS		FS		FS		FS		FS	
					Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method 8260B (mg/kg)																				
Acetone	7,000	96,000	NA		NS		NS		NS		NS		NS		NS		NS		NS	
2-Butanone	2,700	20,000	NA		NS		NS		NS		NS		NS		NS		NS		NS	
1,1,1-Trichlorothane	810	640	NA		NS		NS		NS		NS		NS		NS		NS		NS	
Trichloroethene	0.41	6.1	NA		NS		NS		NS		NS		NS		NS		NS		NS	
Ethylbenzene	5.8	86	NA		NS		NS		NS		NS		NS		NS		NS		NS	
Xylene	58	260	NA		NS		NS		NS		NS		NS		NS		NS		NS	
Semi-Volatile Organic Compounds by EPA Method 8270 (mg/kg)																				
All Compounds	NA	NA	NA		NS		NS		NS		NS		NS		NS		NS		NS	
Diesel Range Organics (DRO) (mg/kg)																				
DRO	NE	NE	10		NS		NS		NS		NS		NS		NS		NS		NS	
Polychlorinated biphenyls (PCBs) by EPA Method 8082A (mg/kg)																				
PCBs	0.12	3.1	NA		0.012	U	0.011	U	0.011	U	0.012	U	0.010	U	0.012	U	0.012	U	0.014	U	0.012	U
Pesticides (mg/kg)																				
delta-BHC	NE	NE	NA		NS		NS		NS		NS		NS		NS		NS		NS	
4,4'-DDE	2.0	28	NA		NS		NS		NS		NS		NS		NS		NS		NS	
4,4-DDD	2.3	31	NA		NS		NS		NS		NS		NS		NS		NS		NS	
4,4-DDT	1.9	26	NA		NS		NS		NS		NS		NS		NS		NS		NS	
Metals by EPA Method 6010 (mg/kg)																				
Arsenic	0.68	9.3	NA		NS		NS		NS		NS		NS		NS		NS		NS	
Barium	1,500	21,000	NA		NS		NS		NS		NS		NS		NS		NS		NS	
Beryllium	16	210	NA		NS		NS		NS		NS		NS		NS		NS		NS	
Cadmium	0.71	9.8	NA		NS		NS		NS		NS		NS		NS		NS		NS	
Total chromium	0.3/12,000	4.2/100,000	NA		NS		NS		NS		NS		NS		NS		NS		NS	
Copper	310	4,300	NA		NS		NS		NS		NS		NS		NS		NS		NS	
Lead	400	200	NA		NS		NS		NS		NS		NS		NS		NS		NS	
Mercury	1.1	3.1	NA		NS		NS		NS		NS		NS		NS		NS		NS	
Nickel	150	2100	NA		NS		NS		NS		NS		NS		NS		NS		NS	
Selenium	39	540	NA		NS		NS		NS		NS		NS		NS		NS		NS	
Silver	39	540	NA		NS		NS		NS		NS		NS		NS		NS		NS	
Zinc	2,300	32,000	NA		NS		NS		NS		NS		NS		NS		NS		NS	

Table 1A
Summary of Historical Soil Analytical Results - LO-13 Launch Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

NOTES:

mg/kg - milligrams per kilogram

*Only samples and analytes with detections above the limit of detection (LOD) or estimated below the LOD are shown, all other sample results were below the laboratory LOD and were qualified as non-detect (U). All SVOCs were non-detect.

1 - US EPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites, May 2023 (THQ 0.1 or 1x10-6)

2 - Maine Department of Environmental Protection Remedial Action Guidelines (RAGs), November 15, 2023, Table 1: Maine RAGs for the Soil Exposure Pathway, by Exposure Scenario - Residential

3 - Former guideline provided for reference since current criteria are not available.

J - Results are considered estimated due to non-conformances in the data quality assurance/quality check (QA/QC)

U - Result was below the laboratory reporting limit or is considered non-detect based on blank contamination

0.3/120,000 - Cr+6/Cr+3

FS - field sample

FD - field duplicate

NE - Not established

NS - Not sampled

THQ - target hazard quotient

bgs - below ground surface

NA - Not applicable, current criteria available or criteria vary by compound with all results below the reporting limit.

Bold Exceeds laboratory reporting limit or is an estimated concentration

Exceeds applicable comparison criteria

Table 1B
Summary of 2016 Soil Analytical Results - LO-13 Launch Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

Parameter*	EPA RSL[1]	Maine DEP RAG[2]	Boring Location:		LSSB-8		LSSB-9						LSSB-10				LSSB-11		LSSB-12		LSSB-13	
			Sample ID:		LSSB-8-1		LSSB-8-2		LSSB-9-1		LSSB-9-1-D		LSSB-9-2		LSSB-10-1		LSSB-10-2		LSSB-11-1		LSSB-12-1		LSSB-13-1	
			Sample Depth:		4-8		12-13		6-8				14-16		8-10 (6.9-8.7)^		12-13 (10.4-11.4)^^		4-6		4-6		4-6	
			Sample Date:		11/1/2016		11/1/2016		11/1/2016		11/1/2016		11/1/2016		11/1/2016		11/1/2016		11/1/2016		11/1/2016		11/1/2016	
			Field QC:		FS		FS		FS		FD		FS		FS		FS		FS		FS		FS	
				Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Extractable Petroleum Hydrocarbons (EPH) by MassDEP Method EPH-04-1.1 (mg/kg)																						
phenanthrene	NE	2,500	0.12	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.10	U	0.11	U	0.11	U	**0.5**	
acenaphthene	360	4,900	0.12	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.10	U	0.11	U	0.11	U	**0.050**	J
fluorene	240	3,300	0.12	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.10	U	0.11	U	0.11	U	**0.043**	J
anthracene	1,800	25,000	0.12	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.10	U	0.11	U	0.11	U	**0.11**	J
fluoranthene	240	3,300	0.12	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.10	U	0.11	U	0.11	U	**0.7**	
pyrene	180	2,500	0.12	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.10	U	0.11	U	0.11	U	**0.6**	
benzo(a)anthracene	1.1	16	0.12	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.10	U	0.11	U	0.11	U	**0.3**	
chrysene	110	1,600	0.12	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.10	U	0.11	U	0.11	U	**0.4**	
benzo(b)fluoranthene	1.1	16	0.12	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.10	U	0.11	U	0.11	U	**0.3**	
benzo(k)fluoranthene	11	160	0.12	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.10	U	0.11	U	0.11	U	**0.2**	
benzo(a)pyrene	0.11	1.6	0.12	U	**0.036**	J	**0.040**	J	**0.037**	J	**0.034**	J	0.11	U	**0.035**	J	0.11	U	**0.034**	J	**0.3**	
indeno(1,2,3-cd)pyrene	1.1	16	0.12	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.10	U	0.11	U	0.11	U	**0.18**	J
dibenzo(a,h)anthracene	0.11	1.6	0.12	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.10	U	0.11	U	0.11	U	**0.10**	J
benzo(g,h,i)perylene	NE	2,500	0.12	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.10	U	0.11	U	0.11	U	**0.19**	J
C9-C18 aliphatics	NE	2,500	7.3	U	6.5	U	6.3	U	6.4	U	6.5	U	**71**	J	6.2	U	6.5	U	6.5	U	6.9	U
C19-C36 aliphatics	NE	100,000	12	U	11	U	11	U	11	U	11	U	11	UJ	10	U	11	U	11	U	**11**	J
C11-C22 aromatics	NE	2,600	**11**	J	6.5	U	6.3	U	6.4	U	6.5	U	**28**		6.2	U	**6.7**	J	6.5	U	**26**	
Volatile Petroleum Hydrocarbons (VPH) by MassDEP Method VPH-04-1.1 (mg/kg)																						
C9-C12 aliphatics	NE	2,500	3.2	U	2.3	U	2.2	U	2.2	U	3.7	U	**41**		2.4	U	2.2	UJ	2.5	U	2.5	U
C9-C10 aromatics	NE	660	0.40	U	0.29	U	0.27	U	0.28	U	0.46	U	**17**		**1.0**	J	0.28	UJ	0.31	U	0.31	U
naphthalene	2.0	29	0.050	U	0.037	U	0.034	U	0.034	U	0.058	U	**0.15**	J	0.038	U	0.034	U	0.038	U	0.039	U

NOTES:

mg/kg - milligrams per kilogram

*Only samples and analytes with detections above the limit of detection (LOD) or estimated below the LOD are shown, all other sample results were below the laboratory LOD and were qualified as non-detect (U).

^- Directionally drilled at a 20° angle beneath the building. Approximate adjusted depths indicated in parenthesis.

^^ - Directionally drilled at a 30° angle beneath the building. Approximate adjusted depths indicated in parenthesis.

1 - US EPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites, May 2023 (THQ 0.1 or 1x10-6)

2 - Maine Department of Environmental Protection Remedial Action Guidelines (RAGs), November 15, 2023, Table 1: Maine RAGs for the Soil Exposure Pathway, by Exposure Scenario - Residential

J - Results are considered estimated

UJ - The compound or analyte was reported as not detected by the laboratory; however, the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

U - Result was below the laboratory reporting limit or is considered non-detect based on blank contamination

NE - Not established

FS - field sample

FD - field duplicate

bgs - below ground surface

Bold Exceeds laboratory LOD or is an estimated concentration (J) below the LOD

LOD exceeds comparison criteria

Exceeds applicable comparison criteria

Table 2A
Summary of Historical Soil Analytical Results - LO-13 Control Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

Boring Location:				**CSSB-1**						**CSSB-2**				**CSSB-3**				**CSSB-4**						**CSSB-5**				**CSSB-6**			
Sample ID:				**CSSB1-1**				**CSSB1-2**		**CSSB2-1**		**CSSB2-2**		**CSSB3-1**		**CSSB3-2**		**CSSB4-1**		**CSSB4-2**				**CSSB5-1**		**CSSB5-2**		**CSSB6-1**		**CSSB6-2**	
Sample Depth (ft bgs):				**6-8**				**18-20**		**6-8**		**18-20**		**8-10**		**18-20**		**14-16**		**19-21**				**14-16**		**19-21**		**14-16**		**19-21**	
Sample Date				**9/11/1996**				**9/11/1996**		**9/11/1996**		**9/11/1996**		**9/12/1996**		**9/12/1996**		**9/12/1996**		**9/12/1996**				**9/13/1996**		**9/13/1996**		**10/9/1996**		**10/9/1996**	
Field QC:				**FS**		**FD**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FD**		**FS**		**FS**		**FS**		**FS**	
Parameter*	**EPA RSL [1]**	**Maine DEP RAG[2]**	**Former DEP Guideline[3]**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method 8260B (mg/kg)																															
2-Butanone	2,700	20,000	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Methylene Chloride	35	490	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
1,2,4-Trichlorobenzene	5.8	86	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
1,2-Dichloroethene	NE	NE	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
cis-1,2-Dichloroethene	6	90	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
1,1,1-Trichloroethane	810	640	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Benzene	1.2	17	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Ethylbenzene	5.8	86	NA	**0.005**	**J**	**0.004**	**J**	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Naphthalene	2.0	29	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Toluene	490	750	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Trichloroethene	0.41	6	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Xylenes	58	260	NA	**0.002**	**J**	**0.002**	**J**	0.006	U	**0.002**	**J**	0.006	U	**0.001**	**J**	0.006	U	0.006	U	1.006	U	1.006	U	2.006	U	2.006	U	3.006	U	3.006	U
Diesel Range Organics (DRO) (mg/kg)																															
DRO	NE	NE	10	**94**	**J**	**22**	**J**	**35**		6.2	U	5.2	U	5.5	U	5.6	U	5.6	U	6.0	U	6.1	U	11	U	5.9	U	5.3	U	6.2	U

Table 2A
Summary of Historical Soil Analytical Results - LO-13 Control Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

Boring Location:				CSSB-7				CSSB-8				CSSB-10						CSSB-11				CSSB-12				CSSB-13			
Sample ID:				CSSB7-1		CSSB7-2		CSSB8-1		CSSB8-2		CSSB10-1				CSSB10-2		CSSB11-1		CSSB11-2		CSSB12-1		CSSB12-2		CSSB13-1		CSSB13-2	
Sample Depth (ft bgs):				6-8		18-20		6-8		18-20		11-13				19-21		14-16		19-21		14-16		19-21		8-10		18-20	
Sample Date				10/8/1996		10/8/1996		9/15/1996		9/15/1996		9/14/1996				9/14/1996		9/13/1996		9/13/1996		9/13/1996		9/13/1996		9/16/1996		9/16/1996	
Field QC:				FS		FS		FS		FS		FS		FD		FS		FS		FS		FS		FS		FS		FS	
Parameter*	**EPA RSL [1]**	**Maine DEP RAG[2]**	**Former DEP Guideline[3]**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method 8260B (mg/kg)																													
2-Butanone	2,700	20,000	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.005	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Methylene Chloride	35	490	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.005	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
1,2,4-Trichlorobenzene	5.8	86	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.005	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
1,2-Dichloroethene	NE	NE	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.005	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
cis-1,2-Dichloroethene	6	90	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.005	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
1,1,1-Trichloroethane	810	640	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.005	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Benzene	1.2	17	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.005	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Ethylbenzene	5.8	86	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.005	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Naphthalene	2.0	29	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.005	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Toluene	490	750	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.005	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Trichloroethene	0.41	6	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.005	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Xylenes	58	260	NA	4.006	U	4.006	U	5.006	U	5.006	U	0.005	U	0.005	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Diesel Range Organics (DRO) (mg/kg)																													
DRO	NE	NE	10	5.5	U	**8.5**		5.7	U	6.1	U	ND<5.2		ND<5.2		ND<6.0		**8.6**		**15**		**5.6**		**8.3**		ND<5.5		ND<5.5	

Table 2A
Summary of Historical Soil Analytical Results - LO-13 Control Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

Boring Location:				**CSSB-14**						**CSSB-15**				**CSSB-16**				**CSSB-17**				**CSSB-18**			
Sample ID:				**CSSB14-1**		**CSSB14-2**				**CSSB15-1**		**CSSB15-2**		**CSSB16-1**		**CSSB6-2**		**CSSB17-1**		**CSSB17-2**		**CSSB18-2**		**CSSB18-2**	
Sample Depth (ft bgs):				**8-10**		**18-20**				**8-10**		**18-20**		**10-12**		**18-20**		**6-8**		**18-20**		**8-10**		**18-20**	
Sample Date				**9/15/1996**		**9/15/1996**				**10/8/1996**		**10/8/1996**		**10/8/1996**		**10/8/1996**		**10/9/1996**		**10/9/1996**		**10/8/1996**		**10/8/1996**	
Field QC:				**FS**		**FS**		**FD**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**	
Parameter*	**EPA RSL [1]**	**Maine DEP RAG[2]**	**Former DEP Guideline[3]**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method 8260B (mg/kg)																									
2-Butanone	2,700	20,000	NA	**0.011**		0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Methylene Chloride	35	490	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	ND<0.006	
1,2,4-Trichlorobenzene	5.8	86	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	ND<0.006	
1,2-Dichloroethene	NE	NE	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	ND<0.006	
cis-1,2-Dichloroethene	6	90	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	ND<0.006	
1,1,1-Trichloroethane	810	640	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	ND<0.006	
Benzene	1.2	17	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	ND<0.006	
Ethylbenzene	5.8	86	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	ND<0.006	
Naphthalene	2.0	29	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	ND<0.006	
Toluene	490	750	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	**0.001**	**J**
Trichloroethene	0.41	6	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	**0.018**	
Xylenes	58	260	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Diesel Range Organics (DRO) (mg/kg)																									
DRO	NE	NE	10	ND<8.0		ND<6.2		ND<5.5		ND<5.4		ND<5.4		ND<5.8		ND<5.9		ND<5.6		ND<6.0		ND<6.1		ND<5.5	

Table 2A
Summary of Historical Soil Analytical Results - LO-13 Control Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

Boring Location:				CSSB-19				CSSB-20				CSSB-21				CSSB-22						CSSB-23				CSSB-24			
Sample ID:				CSSB19-1		CSSB19-2		CSSB20-1		CSSB20-2		CSSB21-1		CSSB21-2		CSSB22-1				CSSB22-2		CSSB23-1		CSSB23-2		CSSB24-1		CSSB24-2	
Sample Depth (ft bgs):				4-6		38-40		4-6		38-40		4-6		38-40		4-6				38-40		4-6		38-40		4-6		38-40	
Sample Date				6/24/1999		6/24/1999		6/23/1999		6/24/1999		6/23/1999		6/24/1999		6/24/1999				6/25/1999		6/22/1999		6/22/1999		6/22/1999		6/22/1999	
Field QC:				FS		FS		FS		FS		FS		FS		FS		FD		FS		FS		FS		FS		FS	
Parameter*	**EPA RSL [1]**	**Maine DEP RAG[2]**	**Former DEP Guideline[3]**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method 8260B (mg/kg)																													
2-Butanone	2,700	20,000	NA	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
Methylene Chloride	35	490	NA	ND		ND		ND		**0.026**	**J**	ND		ND		ND		ND		**0.031**		ND		ND		ND		ND	
1,2,4-Trichlorobenzene	5.8	86	NA	ND		ND		ND		ND		ND		ND		ND		ND		ND		**0.030**	**J**	ND		ND		ND	
1,2-Dichloroethene	NE	NE	NA	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
cis-1,2-Dichloroethene	6	90	NA	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		**0.101**	**J**	ND		ND	
1,1,1-Trichloroethane	810	640	NA	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
Benzene	1.2	17	NA	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
Ethylbenzene	5.8	86	NA	ND		ND		ND		ND		ND		ND		ND		ND		ND		**0.021**	**J**	ND		ND		ND	
Naphthalene	2.0	29	NA	ND		ND		ND		ND		ND		ND		ND		ND		ND		**0.029**	**J**	ND		**0.033**	**J**	ND	
Toluene	490	750	NA	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
Trichloroethene	0.41	6	NA	ND		**0.170**	**J**	ND		**0.117**	**J**	ND		ND		**0.440**		**0.505**		ND		ND		**0.616**		ND		ND	
Xylenes	58	260	NA	ND		ND		ND		ND		ND		ND		ND		ND		ND		**0.078**	**J**	ND		ND		ND	
Diesel Range Organics (DRO) (mg/kg)																													
DRO	NE	NE	10	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	

Table 2A
Summary of Historical Soil Analytical Results - LO-13 Control Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

Boring Location:				**CSSB-25**				**CSSB-26**				**CSMW-1**		**CSMW-2**				**CSMW-3**				**CSMW-4**				**CSMW-5**			
Sample ID:				**CSSB25-1**		**CSSB25-2**		**CSSB26-1**		**CSSB26-2**		**CSSW1-1**		**CSSW2-1**		**CSSW2-2**		**CSSW3-1**		**CSSW3-2**		**CSSW4-1**		**CSSW4-2**		**CSSW5-1**		**CSSW5-2**	
Sample Depth (ft bgs):				**4-6**		**38-40**		**4-6**		**38-40**		**10-11**		**19.5-20**		**30-32**		**22-24**		**33-34.7**		**6-7**		**32-34**		**14.4-15.5**		**28-30**	
Sample Date				**6/23/1999**		**6/23/1996**		**6/25/1999**		**6/25/1999**		**9/11/1996**		**9/11/1996**		**9/11/1996**		**9/14/1996**		**9/14/1996**		**9/15/1996**		**9/15/1996**		**9/15/1996**		**9/15/1996**	
Field QC:				**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**	
Parameter*	**EPA RSL [1]**	**Maine DEP RAG[2]**	**Former DEP Guideline[3]**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method 8260B (mg/kg)																													
2-Butanone	2,700	20,000	NA	ND		ND		ND		ND		0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.006	U	0.005	U	0.006	U	0.005	U
Methylene Chloride	35	490	NA	ND		ND		ND		**0.036**	**J**	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.006	U	0.005	U	0.006	U	0.005	U
1,2,4-Trichlorobenzene	5.8	86	NA	ND		ND		ND		ND		0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.006	U	0.005	U	0.006	U	0.005	U
1,2-Dichloroethene	NE	NE	NA	ND		ND		ND		ND		0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.006	U	0.005	U	0.006	U	0.005	U
cis-1,2-Dichloroethene	6	90	NA	ND		ND		ND		ND		0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.006	U	0.005	U	0.006	U	0.005	U
1,1,1-Trichloroethane	810	640	NA	ND		ND		ND		ND		0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.006	U	0.005	U	0.006	U	0.005	U
Benzene	1.2	17	NA	ND		ND		ND		ND		0.006	U	0.006	U	0.006	U	0.006	U	**0.002**	**J**	0.006	U	0.005	U	0.006	U	0.005	U
Ethylbenzene	5.8	86	NA	ND		ND		ND		ND		0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.006	U	0.005	U	0.006	U	0.005	U
Naphthalene	2.0	29	NA	ND		ND		ND		ND		0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.006	U	0.005	U	0.006	U	0.005	U
Toluene	490	750	NA	ND		ND		ND		**0.039**	**J**	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U	0.006	U	0.005	U	0.006	U	0.005	U
Trichloroethene	0.41	6	NA	ND		ND		ND		**0.070**	**J**	**0.003**	**J**	0.006	U	0.006	U	0.006	U	0.005	U	0.006	U	0.005	U	0.006	U	0.005	U
Xylenes	58	260	NA	ND		ND		ND		ND		**0.001**	**J**	0.006	U	0.006	U	0.006	U	0.005	U	0.006	U	0.005	U	0.006	U	0.005	U
Diesel Range Organics (DRO) (mg/kg)																													
DRO	NE	NE	10	NS		NS		NS		NS		ND<5.5		**200**		**7**		ND<5.9		ND<5.3		ND<5.7		ND<5.2		ND<5.5		ND<5.1	

Table 2A
Summary of Historical Soil Analytical Results - LO-13 Control Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

Boring Location:				**CSMW-6**				**CSMW-7**						**CSMW-8**		
Sample ID:				**CSMW6-1**		**CSMW6-2**		**CSMW7-1**		**CSMW7-2**				**CSSW8-1**		**CSSW8-2**
Sample Depth (ft bgs):				**6-8**		**32-34**		**6-8**		**25-27**				**6-8**		**32-34**
Sample Date				**10/9/1996**		**10/9/1996**		**10/8/1996**		**10/8/1996**				**9/16/1996**		**9/16/1996**
Field QC:				**FS**		**FS**		**FS**		**FS**		**FD**		**FS**		**FS**
Parameter*	**EPA RSL [1]**	**Maine DEP RAG[2]**	**Former DEP Guideline[3]**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method 8260B (mg/kg)																	
2-Butanone	2,700	20,000	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006		0.006	U
Methylene Chloride	35	490	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006		0.006	U
1,2,4-Trichlorobenzene	5.8	86	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006		0.006	U
1,2-Dichloroethene	NE	NE	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006		**0.007**	
cis-1,2-Dichloroethene	6	90	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006		0.006	U
1,1,1-Trichloroethane	810	640	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006		**0.004**	**J**
Benzene	1.2	17	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006		0.006	U
Ethylbenzene	5.8	86	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006		0.006	U
Naphthalene	2.0	29	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006		0.006	U
Toluene	490	750	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006		0.006	U
Trichloroethene	0.41	6	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	**0.003**	**J**	**0.034**	**J**
Xylenes	58	260	NA	0.006	U	0.006	U	0.006	U	0.006	U	0.006		0.006	U	0.006	U
Diesel Range Organics (DRO) (mg/kg)																	
DRO	NE	NE	10	ND<5.7		ND<5.9		ND<5.6		ND<6.0		ND<5.6		ND<5.8		ND<5.5	

Table 2A
Summary of Historical Soil Analytical Results - LO-13 Control Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

NOTES:

mg/kg - milligrams per kilogram

*Only samples and analytes with detections above the limit of detection (LOD) or estimated below the LOD are shown, all other sample results were below the laboratory LOD and were qualified as non-detect (U).

1 - US EPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites, May 2023 (THQ 0.1 or 1x10-6)

2 - Maine Department of Environmental Protection Remedial Action Guidelines (RAGs), November 15, 2023 Table 1: Maine RAGs for the Soil Exposure Pathway, by Exposure Scenario - Residential

3 - Former guideline provided for reference since current criteria are not available.

J - Results are considered estimated due to non-conformances in the data quality assurance/quality check (QA/QC)

U - Result was below the laboratory reporting limit or is considered non-detect based on blank contamination

NE - Not established

NS - Not sampled

THQ - Target hazard quotient

FS - field sample

FD - field duplicate

bgs - below ground surface

NA - Not applicable, current criteria available or criteria vary by compound with all results below the reporting limit.

Bold Exceeds laboratory reporting limit or is an estimated concentration

Exceeds applicable comparison criteria

Table 2B
Summary of 2017 Soil Analytical Results - LO-13 Control Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

Boring Location:			CSSB-27						CSSB-28				CSSB-29				CSSB-30				CSSB-31		CSSB-32			
Sample ID:			CSSB-27-1		CSSB-27-1-D		CSSB-27-2		CSSB-28-1		CSSB-28-2		CSSB-29-1		CSSB-29-2		CSSB-30-1		CSSB-30-2		CSSB-31-1		CSSB-32-1		CSSB-32-2	
Sample Depth (ft bgs):			5-7		5-7		20-22		19.5-20		20-22		10-12		12-14		10-12		12-14		5-7		19-21		21-23	
Sample Date:			7/19/2017		7/19/2017		7/19/2017		7/19/2017		7/19/2017		7/19/2017		7/19/2017		7/19/2017		7/19/2017		7/19/2017		7/19/2017		7/19/2017	
Field QC:			FS		FD		FS		FS		FS		FS		FS		FS		FS		FS		FS		FS	
Parameter*	**EPA RSL[1]**	**Maine DEP RAG[2]**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (PAH) by EPA Method 8270D with SIM (mg/kg)																										
naphthalene	2.0	29	**0.0376**	**J**	**0.0598**	**J**	**0.0093**		0.0019	U	**0.00092**	**J**	0.0019	U	0.002	U	**0.0009**	**J**	**0.0076**	**J**	0.0019	U	0.0019	U	0.0019	U
2-methylnaphthalene	24	330	**0.0378**		**0.110**	**J**	**0.0236**		**0.0011**	**J**	**0.0029**	**J**	**0.0013**	**J**	0.002	U	**0.0028**	**J**	**0.0231**	**J**	0.0019	U	0.0019	U	0.0019	U
acenaphthylene	NE	4900	0.002	U	0.0018	UJ	0.0018	U	0.0019	U	0.0019	U	0.0019	U	**0.00083**	**J**	0.0019	U	0.0019	U	0.0019	U	0.0019	U	0.0019	U
acenaphthene	360	4,900	**0.0409**		**0.0333**	**J**	**0.0106**		0.0019	U	**0.0015**	**J**	0.0019	U	0.002	U	0.0019	U	**0.0024**	**J**	0.0019	U	0.0019	U	0.0019	U
fluorene	240	3,300	**0.0644**	**J**	**0.0551**	**J**	**0.0134**		0.0019	U	0.0019	U	0.0019	U	0.002	U	0.0019	U	**0.0043**	**J**	0.0019	U	0.0019	U	0.0019	U
phenanthrene	NE	2,500	**0.210**		**0.200**		**0.0352**		**0.00087**	**J**	**0.0051**		**0.0012**	**J**	**0.0087**		**0.0014**	**J**	**0.0086**	**J**	0.0019	U	**0.0013**	**J**	**0.005**	
anthracene	1,800	25,000	0.002	U	0.0018	UJ	0.0018	U	0.0019	U	0.0019	U	0.0019	U	**0.002**	**J**	0.0019	U	0.0019	U	0.0019	U	**0.00092**	**J**	**0.0011**	**J**
fluoranthene	240	3,300	**0.0057**	**J**	**0.0041**	**J**	**0.0011**	**J**	**0.0009**	**J**	**0.0059**		**0.0013**	**J**	**0.0407**		0.0019	U	**0.0035**	**J**	**0.0013**	**J**	**0.0031**	**J**	**0.0067**	
pyrene	180	2,500	**0.0159**	**J**	**0.0137**	**J**	**0.0025**	**J**	0.0019	U	**0.0023**	**J**	**0.0015**	**J**	**0.0409**		0.0019	U	**0.0042**	**J**	**0.0008**	**J**	**0.0037**	**J**	**0.0055**	
benzo(a)anthracene	1.1	16	**0.0015**	**J**	0.0018	UJ	0.0018	U	0.0019	U	0.0019	U	**0.00084**	**J**	**0.0277**		0.0019	U	**0.0046**	**J**	0.0019	U	**0.0026**	**J**	**0.0035**	**J**
chrysene	110	1600	**0.0013**	**J**	0.0018	UJ	0.0018	U	0.0019	U	**0.00096**	**J**	0.0019	U	**0.0205**		0.0019	U	**0.0039**	**J**	0.0019	U	**0.0023**	**J**	**0.0029**	**J**
benzo(b)fluoranthene	1.1	16	0.002	U	0.0018	UJ	0.0018	U	0.0019	U	0.0019	U	0.0019	U	**0.0257**		0.0019	U	**0.0044**	**J**	0.0019	U	**0.0022**	**J**	**0.0037**	
benzo(k)fluoranthene	11	160	0.002	UJ	0.0018	UJ	0.0018	U	0.0019	U	0.0019	U	0.0019	U	**0.0085**		0.0019	U	**0.0019**	**J**	0.0019	U	**0.0013**	**J**	**0.0014**	**J**
benzo(a)pyrene	0.11	1.6	0.002	U	0.0018	UJ	0.0018	U	0.0019	U	0.0019	U	0.0019	U	**0.0195**		0.0019	U	**0.0026**	**J**	0.0019	U	**0.0019**	**J**	**0.0027**	**J**
indeno(1,2,3-cd)pyrene	1.1	16	0.002	UJ	0.0018	UJ	0.0018	U	0.0019	U	0.0019	U	**0.00081**	**J**	**0.0109**		0.0019	U	**0.0017**	**J**	0.0019	U	**0.0016**	**J**	**0.0018**	**J**
dibenzo(a,h)anthracene	0.11	1.6	0.002	UJ	0.0018	UJ	0.0018	U	0.0019	U	0.0019	U	0.0019	U	**0.0032**	**J**	0.0019	U	0.0019	UJ	0.0019	U	**0.0011**	**J**	0.0019	U
benzo(g,h,i)perylene	NE	2,500	0.002	UJ	0.0018	UJ	0.0018	U	0.0019	U	0.0019	U	**0.00084**	**J**	**0.0108**		0.0019	U	**0.0015**	**J**	0.0019	U	**0.0017**	**J**	**0.002**	**J**
Extractable Petroleum Hydrocarbons (EPH) by MassDEP Method EPH-04-1.1 (mg/kg)																										
C9-C18-aliphatics	NE	2,500	**1400**	**J**	**1200**	**J**	**70**	**J**	**6.7**	**J**	**4.7**	**J**	6.6	UJ	**48**	**J**	6.5	UJ	**16**	**J**	7.0	UJ	6.9	UJ	6.6	UJ
C19-C36 aliphatics	NE	100,000	**280**		**280**		**21**	**J**	**11**	**J**	12	U	11	U	**63**		11	U	**10**	**J**	12	U	11	U	11	U
Unadjusted C11-C22	NE	2600	**1100**		**900**		**35**		7.2	U	7.1	U	6.6	U	**23**		6.5	U	**9.5**	**J**	7.0	U	6.9	U	6.6	U
Volatile Petroleum Hydrocarbons (VPH) by MassDEP Method VPH-04-1.1 (mg/kg)																										
MTBE	47	690	0.036	U	0.039	U	0.046	U	0.050	U	0.051	U	0.045	U	0.043	U	0.031	U	0.036	UJ	0.049	U	0.039	U	0.049	U
benzene	1.2	17	0.036	U	0.039	U	0.046	U	0.050	U	0.051	U	0.045	U	0.043	U	0.031	U	0.036	UJ	0.049	U	0.039	U	0.049	U
toluene	490	750	0.036	U	0.039	U	0.046	U	0.050	U	0.051	U	0.045	U	0.043	U	0.031	U	0.036	UJ	0.049	U	0.039	U	0.049	U
ethylbenzene	5.8	86	0.036	U	0.039	U	0.046	U	0.050	U	0.051	U	0.045	U	0.043	U	0.031	U	0.036	UJ	0.049	U	0.039	U	0.049	U
total xylenes	58	260	0.036	U	0.039	U	0.046	U	0.050	U	0.051	U	0.045	U	0.043	U	0.031	U	0.036	UJ	0.049	U	0.039	U	0.049	U
naphthalene	2.0	29	**2.7**		**1.3**		**0.17**	**J**	0.050	U	0.051	U	0.045	U	**0.0091**	**J**	**0.023**	**J**	**0.4**	**J**	0.049	U	0.039	U	0.049	U
C5-C8 aliphatics	NE	1,700	**5.0**	**J**	**2.7**	**J**	2.2	U	2.4	U	2.4	U	2.2	U	2.1	U	1.5	U	1.7	UJ	2.3	U	1.8	U	2.4	U
C9-C12 aliphatics	NE	2,500	**120**	**J**	**85**	**J**	**18**		3.2	U	3.2	U	2.9	U	2.7	U	2.0	U	**21**	**J**	3.1	U	2.5	U	3.2	U
C9-C10 aromatics	NE	660	**98**		**63**		**11**		0.40	U	**1.8**	**J**	**0.65**	**J**	0.34	U	**1.7**	**J**	**14**	**J**	**0.39**	U	**0.56**	**J**	0.40	U

NOTES:

mg/kg - milligrams per kilogram

*Only samples and analytes with detections above the limit of detection (LOD) or estimated below the LOD are shown, all other sample results were below the laboratory LOD and were qualified as non-detect (U).

1 - US EPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites, May 2023 (THQ 0.1 or 1x10-6)

2 - Maine Department of Environmental Protection (DEP) Remedial Action Guidelines (RAGs), November 15, 2023, Table 1: Maine RAGs for the Soil Exposure Pathway, by Exposure Scenario (THQ=1 or $1x10^{-5}$) - residential

3 - Maine DEP Remediation Guidelines for Petroleum Contaminated Sites in Maine (PGs), May 23, 2014, Table 5: Soil Remediation Guidelines for Petroleum Target Compounds and Hydrocarbon Fractions (THQ=1 or 1x10-5)

J - Results are considered estimated

UJ - The compound or analyte was reported as not detected by the laboratory; however, the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

U - Result was below the laboratory reporting limit or is considered non-detect based on blank contamination

NE - Not established

FS - field sample

FD - field duplicate

bgs - below ground surface

Bold Exceeds laboratory LOD or is an estimated concentration (J) below the LOD

Exceeds applicable comparison criteria

Table 3
Summary of Historical Groundwater Analytical Results - LO-13 Launch Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

Well ID:					**LSMW-1**				**LSMW-3**				**LSMW-6**						
Sample ID:					**LSW1-1**		**LSW1-2**		**LSW3-1**		**LSW3-2**		**LSW6-1**				**LSW6-2**		
Sample Date:					**11/3/1996**		**5/29/1997**		**11/3/1996**		**5/29/1997**		**11/3/1996**				**5/29/1997**		
Field QC:					**FS**		**FS**		**FS**		**FS**		**FS**		**FD**		**FS**		**FD**	
Parameter*	**Former MEGs[1]**	**Current RAG[2]**	**MCL[3]**	**Tapwater[4]**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method 8260B or 524.2 (µg/L)																				
cis-1,2-Dichloroethene	NA	25	70	2.5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	**0.5**		**0.5**	
Toluene	NA	1,100	1,000	110	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Trichloroethene	NA	2.8	5	0.28	0.5	U	0.5	U	0.5	U	0.5	U	**0.8**		**0.8**		**2**		**2**	
Total Petroleum Hydrocarbons (TPH) (µg/L)																				
DRO	50	NE	NE	NE	**210**		50	U	**52**		50	U	50	U	50	U	50	U	50	U
GRO	50	NE	NE	NE	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U

Table 3
Summary of Historical Groundwater Analytical Results - LO-13 Launch Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

				Well ID:	**LSMW-7**																**LSMW-8**			
				Sample ID:	**LSW7-1**		**LSW7-2**		**LSW7-3**		**LSW7-4**		**LSMW7-1202**		**LSMW7-0403**		**LSMW7-0903**		**LSMW7-0504**		**LSW8-1**		**LSW8-2**	
				Sample Date:	**11/2/1996**		**5/29/1997**		**10/26/1999**		**5/17/2000**		**12/5/2002**		**4/23/2003**		**9/18/2003**		**5/11/2004**		**11/2/1996**		**5/29/1997**	
				Field QC:	**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**	
Parameter*	**Former MEGs[1]**	**Current RAG[2]**	**MCL[3]**	**Tapwater[4]**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method 8260B or 524.2 (µg/L)																								
cis-1,2-Dichloroethene	NA	25	70	2.5	0.5	U	0.5	U	NS		NS		NS		NS		NS		NS		0.5	U	0.5	U
Toluene	NA	1,100	1,000	110	**1**		0.5	U	NS		NS		NS		NS		NS		NS		0.5	U	0.5	U
Trichloroethene	NA	2.8	5	0.28	0.5	U	0.5	U	NS		NS		NS		NS		NS		NS		0.5	U	0.5	U
Total Petroleum Hydrocarbons (TPH) (µg/L)																								
DRO	50	NE	NE	NE	**150**		**70**		**180 J**		50	U	50	U	50	U	50	U	50	U	**173**		50	U
GRO	50	NE	NE	NE	50	U	50	U	NS		NS		NS		NS		NS		NS		50	U	50	U

Table 3
Summary of Historical Groundwater Analytical Results - LO-13 Launch Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

					Well ID:	LSDW-1															
					Sample ID:	LSTAP		LSTAP-1				LSTAP-2		LSTAP-3		LSDW1-0903		LSDW1-0504		LSDW1-1008		LSDW1-0409	
					Sample Date:	11/1996		5/28/1997				5/1997		5/1997		9/18/2003		5/11/2004		10/28/2008		4/30/2009	
					Field QC:	FS		FS		FD		FS		FS		FS		FS		FS		FS	
Parameter*	**Former MEGs[1]**	**Current RAG[2]**	**MCL[3]**	**Tapwater[4]**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method 8260B or 524.2 (µg/L)																					
cis-1,2-Dichloroethene	NA	25	70	2.5	ND		0.5	U	0.5	U	0.5	U	0.5	U	NS		NS		NS		NS	
Toluene	NA	1,100	1,000	110	ND		0.5	U	0.5	U	0.5	U	0.5	U	NS		NS		NS		NS	
Trichloroethene	NA	2.8	5	0.28	ND		0.5	U	0.5	U	0.5	U	0.5	U	NS		NS		NS		NS	
Total Petroleum Hydrocarbons (TPH) (µg/L)																					
DRO	50	NE	NE	NE	ND		50	U	50	U	50	U	50	U	50	U	NS		50	U	50	U
GRO	50	NE	NE	NE	ND		50	U	50	U	50	U	50	U	NS		NS		NS		NS	

Table 3
Summary of Historical Groundwater Analytical Results - LO-13 Launch Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

Well ID:					**LSDW-1**								**Offsite Residence**	
Sample ID:					**LSDW1-1009**		**LSDW1-0510**		**LSDW1-1110**		**LSDW1-0511**		**Downgradient residencetw**	
Sample Date:					**10/31/2009**		**5/25/2010**		**11/2/2010**		**5/25/2011**		**8/25/2025**	
Field QC:					**FS**		**FS**		**FS**		**FS**		**FS**	
Parameter*	**Former MEGs[1]**	**Current RAG[2]**	**MCL[3]**	**Tapwater[4]**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method 8260B or 524.2 (µg/L)														
cis-1,2-Dichloroethene	NA	25	70	2.5	NS		NS		NS		NS		0.050	U
Toluene	NA	1,100	1,000	110	NS		NS		NS		NS		NS	
Trichloroethene	NA	2.8	5	0.28	NS		NS		NS		NS		0.050	U
Total Petroleum Hydrocarbons (TPH) (µg/L)														
DRO	50	NE	NE	NE	50	U	50	U	NS		NS		NS	
GRO	50	NE	NE	NE	NS		NS		NS		NS		NS	

Table 3
Summary of Historical Groundwater Analytical Results - LO-13 Launch Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

NOTES:

µg/L - micrograms per liter

*Only samples and analytes with detections above the limit of detection (LOD) or estimated below the LOD are shown, all other sample results were below the laboratory LOD and were qualified as non-detect (U).

1 - Former Maximum Exposure Guidelines (MEGs) included for reference for GRO and DRO comparison.

2 - Maine DEP Remedial Action Guidelines (RAGs) for Contaminated Sites, residential scenario, November 15, 2023

3 - US EPA National Primary Drinking Water Regulations, May 2009

4 - EPA Regional Screening Level (RSL) for tapwater, target hazard quotient (THQ) 0.1, May 2023

J - Results are considered estimated due to non-conformances in the data quality assurance/quality check (QA/QC)

U - Result was below the laboratory reporting limit or is considered non-detect based on blank contamination

THQ - Target hazard quotient

FS - field sample

FD - field duplicate

NE - Not established

NA - Not applicable, current criteria available

Bold Exceeds laboratory reporting limit or is an estimated concentration

Exceeds applicable comparison criteria

Table 4A
Summary of Historical Groundwater Analytical Results - LO-13 Control Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

				Well Location:	CSMW-3		CSMW-5																	
				Sample ID:	CSW3-2		CSW5-1		CSW5-2				CSW5-3		CSW5-4		CSMW5-1202		CSMW5-0403		CSMW5-0903		CSMW5-0504		CSMW5-0904	
				Sample Date:	5/28/1997		11/4/1996		5/28/1997				10/26/1999		5/17/2000		12/4/2002		4/23/2003		9/18/2003		5/11/2004		9/30/2004	
				Field QC:	FS		FS		FS		FD		FS		FS		FS		FS		FS		FS		FS	
Parameter*	Former MEGs[1]	Current RAG[2]	MCL[3]	Tapwater[4]	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method 8260B (µg/L)																										
Acetone	NA	18,000	NE	14,000	2	U	2	U	2	U	2	U	NS		NS		NS		NS		NS		NS		NS	
1,1,1-Trichloroethane	NA	8,000	200	800	**0.6**		**0.8**		**1**		**1**		NS		NS		NS		NS		NS		NS		NS	
cis-1,2-Dichloroethene	NA	25	70	4	0.5	U	0.5	U	0.5	U	0.5	U	NS		NS		NS		NS		NS		NS		NS	
Trichloroethene	NA	2.8	5	0.28	0.5	U	0.5	U	0.5	U	0.5	U	NS		NS		NS		NS		NS		NS		NS	
Extractable Petroleum Hydrocarbons (EPH) by MA DEP EPH 04-1.1 (µg/L)																										
C9-C18-aliphatics	NA	350	NA	NA	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
C19-C36 aliphatics	NA	40,000	NA	NA	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Unadjusted C11-C22 aromatics	NA	600	NA	NA	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Total Petroleum Hydrocarbons (TPH) (µg/L)																										
DRO	50	NE	NE	NE	50	U	**230**		**180**		**240**		**220**	**J**	**120**	**J**	NS		NS		**88**		50	U	**250**	
GRO	50	NE	NE	NE	50	U	50	U	50	U	50	U	NS		NS		NS		NS		NS		NS		NS	

Table 4A
Summary of Historical Groundwater Analytical Results - LO-13 Control Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

				Well Location:	**CSMW-5**																		
				Sample ID:	**CSMW5-0405**		**CSMW5-0905**		**CSMW5-0506**		**CSMW5-1006**		**CSMW5-0507**		**CSMW5-1007**		**CSMW5-0408**		**CSMW5-1008**		**CSMW5-0409**		**CSMW5-1009**	
				Sample Date:	**4/25/2005**		**9/15/2005**		**5/23/2006**		**10/24/2006**		**5/24/2007**		**10/24/2007**		**4/30/2008**		**10/28/2008**		**4/30/2009**		**10/30/2009**	
				Field QC:	**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**	
Parameter*	**Former MEGs[1]**	**Current RAG[2]**	**MCL[3]**	**Tapwater[4]**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method 8260B (µg/L)																							
Acetone	NA	18,000	NE	14,000	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
1,1,1-Trichloroethane	NA	8,000	200	800	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
cis-1,2-Dichloroethene	NA	25	70	4	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Trichloroethene	NA	2.8	5	0.28	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Extractable Petroleum Hydrocarbons (EPH) by MA DEP EPH 04-1.1 (µg/L)																								
C9-C18-aliphatics	NA	350	NA	NA	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
C19-C36 aliphatics	NA	40,000	NA	NA	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Unadjusted C11-C22 aromatics	NA	600	NA	NA	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
Total Petroleum Hydrocarbons (TPH) (µg/L)																								
DRO	50	NE	NE	NE	50	U	50	U	50	U	**260**	**J**	50	U	50	U	50	U	50	U	50	U	50	U
GRO	50	NE	NE	NE	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	

Table 4A
Summary of Historical Groundwater Analytical Results - LO-13 Control Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

				Well Location:	CSMW-5										CSMW-9									
				Sample ID:	CSMW5-0510		CSMW5-1110		CSMW5-0511		CSMW5-1111		CSMW5-0512		CSW9-3				CSW9-4				CSMW9-1202		CSMW9-0403	
				Sample Date:	5/25/2010		11/2/2010		5/25/2011		11/16/2011		5/23/2012		10/26/1999				5/17/2000				12/4/2002		4/23/2003	
				Field QC:	FS		FS		FS		FS		FS		FS		FD		FS		FD		FS		FS	
Parameter*	Former MEGs[1]	Current RAG[2]	MCL[3]	Tapwater[4]	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method 8260B (µg/L)																										
Acetone	NA	18,000	NE	14,000	NS		NS		NS		NS		NS		**20**	**J**	**20 J**		20	U	20	U	NS		NS	
1,1,1-Trichloroethane	NA	8,000	200	800	NS		NS		NS		NS		NS		2	U	2	U	1	U	1	U	NS		NS	
cis-1,2-Dichloroethene	NA	25	70	4	NS		NS		NS		NS		NS		**1.5**	**J**	**1.6 J**		**1.6**		**1.5**		NS		NS	
Trichloroethene	NA	2.8	5	0.28	NS		NS		NS		NS		NS		**1.2**	**J**	**1.4 J**		**1.5**		**1.6**		NS		NS	
Extractable Petroleum Hydrocarbons (EPH) by MA DEP EPH 04-1.1 (µg/L)																										
C9-C18-aliphatics	NA	350	NA	NA	NS		100	U	100	U	100	U	100	U	NS		NS		NS		NS		NS		NS	
C19-C36 aliphatics	NA	40,000	NA	NA	NS		100	U	100	U	100	U	100	U	NS		NS		NS		NS		NS		NS	
Unadjusted C11-C22 aromatics	NA	600	NA	NA	NS		100	U	100	U	100	U	100	U	NS		NS		NS		NS		NS		NS	
Total Petroleum Hydrocarbons (TPH) (µg/L)																										
DRO	50	NE	NE	NE	50	U	NS		NS		NS		NS		80	U	90	U	50	U	50	U	50	U	50	U
GRO	50	NE	NE	NE	NS		NS		NS		NS		NS		50	U	50	U	40	U	40	U	NS		NS	

Table 4A
Summary of Historical Groundwater Analytical Results - LO-13 Control Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

				Well Location:	CSMW-9				CSMW-10									
				Sample ID:	CSMW9-0903		CSMW9-0504		CSW10-3		CSW10-4		CSMW10-1202		CSMW10-0403		CSMW10-0903		CSMW10-0504	
				Sample Date:	9/18/2003		5/11/2004		10/26/1999		5/17/2000		12/4/2002		4/23/2003		9/18/2003		5/11/2004	
				Field QC:	FS		FS		FS		FS		FS		FS		FS		FS	
Parameter*	**Former MEGs[1]**	**Current RAG[2]**	**MCL[3]**	**Tapwater[4]**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method 8260B (µg/L)																				
Acetone	NA	18,000	NE	14,000	NS		NS		**20**	**J**	20	U	NS		NS		NS		NS	
1,1,1-Trichloroethane	NA	8,000	200	800	NS		NS		**1.3**	**J**	**1.3**		NS		NS		NS		NS	
cis-1,2-Dichloroethene	NA	25	70	4	NS		NS		ND<2		1	U	NS		NS		NS		NS	
Trichloroethene	NA	2.8	5	0.28	NS		NS		ND<2		1	U	NS		NS		NS		NS	
Extractable Petroleum Hydrocarbons (EPH) by MA DEP EPH 04-1.1 (µg/L)																				
C9-C18-aliphatics	NA	350	NA	NA	NS		NS		NS		NS		NS		NS		NS		NS	
C19-C36 aliphatics	NA	40,000	NA	NA	NS		NS		NS		NS		NS		NS		NS		NS	
Unadjusted C11-C22 aromatics	NA	600	NA	NA	NS		NS		NS		NS		NS		NS		NS		NS	
Total Petroleum Hydrocarbons (TPH) (µg/L)																				
DRO	50	NE	NE	NE	50	U	50	U	**120**	**J**	50	U	50	U	50	U	50	U	50	U
GRO	50	NE	NE	NE	NS		NS		50	U	40	U	NS		NS		NS		NS	

Table 4A
Summary of Historical Groundwater Analytical Results - LO-13 Control Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

Well Location:					**CSMW-11**														**CSDW-1**					
Sample ID:					**CSW11-3**		**CSW11-4**		**CSMW11-1202**		**CSMW11-0403**		**CSMW11-0903**		**CSMW11-0504**		**CSTAP-1**				**CSTAP-2**	
Sample Date:					**10/26/1999**		**5/17/2000**		**12/4/2002**		**4/23/2003**		**9/18/2003**		**5/11/2004**		**11/4/1996**				**5/28/1997**	
Field QC:					**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FD**		**FS**	
Parameter*	**Former MEGs[1]**	**Current RAG[2]**	**MCL[3]**	**Tapwater[4]**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method 8260B (µg/L)																						
Acetone	NA	18,000	NE	14,000	**20**	**J**	20	U	NS		NS		NS		NS		0.5	U	0.5	U	0.5	U
1,1,1-Trichloroethane	NA	8,000	200	800	**2.9**		**1.8**		NS		NS		NS		NS		0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	NA	25	70	4	2	U	1	U	NS		NS		NS		NS		0.5	U	0.5	U	0.5	U
Trichloroethene	NA	2.8	5	0.28	**0.8**	**J**	**0.8**	**J**	NS		NS		NS		NS		0.5	U	0.5	U	0.5	U
Extractable Petroleum Hydrocarbons (EPH) by MA DEP EPH 04-1.1 (µg/L)																						
C9-C18-aliphatics	NA	350	NA	NA	NS		NS		NS		NS		NS		NS		NS		NS		NS	
C19-C36 aliphatics	NA	40,000	NA	NA	NS		NS		NS		NS		NS		NS		NS		NS		NS	
Unadjusted C11-C22 aromatics	NA	600	NA	NA	NS		NS		NS		NS		NS		NS		NS		NS		NS	
Total Petroleum Hydrocarbons (TPH) (µg/L)																						
DRO	50	NE	NE	NE	60	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
GRO	50	NE	NE	NE	50	U	40	U	NS		NS		NS		NS		50	U	50	U	50	U

Table 4A
Summary of Historical Groundwater Analytical Results - LO-13 Control Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

					Well Location:	**CSDW-1**												
					Sample ID:	**CSDW1-0903**		**CSDW1-0504**		**CSDW1-0904**		**CSDW1-0405**		**CSDW1-0905**		**CSDW1-0506**		**CSDW1-1006**	
					Sample Date:	**9/19/2003**		**5/11/2004**		**9/30/2004**		**4/25/2005**		**9/22/2005**		**5/23/2006**		**10/24/2006**	
					Field QC:	**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**	
Parameter*	**Former MEGs[1]**	**Current RAG[2]**	**MCL[3]**	**Tapwater[4]**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method 8260B (µg/L)																		
Acetone	NA	18,000	NE	14,000	NS		NS		NS		NS		NS		NS		NS	
1,1,1-Trichloroethane	NA	8,000	200	800	NS		NS		NS		NS		NS		NS		NS	
cis-1,2-Dichloroethene	NA	25	70	4	NS		NS		NS		NS		NS		NS		NS	
Trichloroethene	NA	2.8	5	0.28	NS		NS		NS		NS		NS		NS		NS	
Extractable Petroleum Hydrocarbons (EPH) by MA DEP EPH 04-1.1 (µg/L)																		
C9-C18-aliphatics	NA	350	NA	NA	NS		NS		NS		NS		NS		NS		NS	
C19-C36 aliphatics	NA	40,000	NA	NA	NS		NS		NS		NS		NS		NS		NS	
Unadjusted C11-C22 aromatics	NA	600	NA	NA	NS		NS		NS		NS		NS		NS		NS	
Total Petroleum Hydrocarbons (TPH) (µg/L)																		
DRO	50	NE	NE	NE	50	U	50	U	50	U	50	U	50	U	50	U	50	U
GRO	50	NE	NE	NE	NS		NS		NS		NS		NS		NS		NS	

Table 4A
Summary of Historical Groundwater Analytical Results - LO-13 Control Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

NOTES:

µg/L - micrograms per liter

*Only samples and analytes with detections above the limit of detection (LOD) or estimated below the LOD are shown, all other sample results were below the laboratory LOD and were qualified as non-detect (U).

1 - Maine Center for Disease Control MEGs for Drinking Water, dated December 31, 2016 (provided for historical context)

2 - Maine DEP Remedial Action Guidelines (RAGs) for Contaminated Sites, November 15, 2023 residential scenario

3 - US EPA National Primary Drinking Water Regulations, May 2009

4 - EPA Regional Screening Level (RSL) for tapwater, target hazard quotient (THQ) 0.1, May 2023

J - Results are considered estimated due to non-conformances in the data quality assurance/quality check (QA/QC)

U - Result was below the laboratory reporting limit or is considered non-detect based on blank contamination

THQ - target hazard quotient

FS - field sample

FD - field duplicate

NS - Not sampled

NE - Not established

NA - Not applicable, current criteria available or criteria vary by compound with all results below the reporting limit.

Bold Exceeds laboratory reporting limit or is an estimated concentration

Exceeds applicable comparison criteria

Table 4B
Summary of 2017 Groundwater Analytical Results - LO-13 Control Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

Parameter*	EPA MCL[1]	EPA RSL Tapwater[2]	Maine DEP RAG[3]	Well Location: CSMW-100				CSMW-101	
				Sample ID: CSMW-100-0717		CSMW-100-0717-D		CSMW-101-0717	
				Sample Date: 7/21/2017		7/21/2017		7/21/2017	
				Field QC: FS		FD		FS	
				Result	Qualifier	Result	Qualifier	Result	Qualifier
Extractable Petroleum Hydrocarbons (EPH) by MassDEP Method EPH-04-1.1 (ug/L)									
C9-C18-aliphatics	NE	NE	350	100	U	100	U	100	U
C19-C36 aliphatics	NE	NE	40,000	140	U	140	U	140	U
Unadjusted C11-C22 aromatics	NE	NE	600	100	U	100	U	100	U
Polycyclic Aromatic Hydrocarbons (PAH) by EPA Method 8270D with SIM (ug/L)									
naphthalene	NE	0.17	1	0.05	U	0.05	UJ	0.05	U
2-methylnaphthalene	NE	3.6	36	0.05	U	0.05	UJ	0.05	U
phenanthrene	NE	NE	180	0.05	U	0.05	UJ	0.05	U
acenaphthylene	NE	NE	520	0.05	U	0.05	UJ	0.05	U
acenaphthene	NE	53	540	0.05	U	0.05	UJ	0.05	U
fluorene	NE	29	290	0.05	U	0.05	UJ	0.05	U
anthracene	NE	180	1,800	0.05	U	0.05	UJ	0.05	U
fluoranthene	NE	80	800	0.05	U	0.05	UJ	0.05	U
pyrene	NE	12	120	0.05	U	0.05	UJ	0.05	U
benzo(a)anthracene	NE	0.03	0.3	0.05	U	0.05	UJ	0.05	U
chrysene	NE	25	250	0.05	U	0.05	UJ	0.05	U
benzo(b)fluoranthene	NE	0.25	2.5	0.05	U	0.05	UJ	0.05	U
benzo(k)fluoranthene	NE	2.5	25	0.05	U	0.05	UJ	0.05	U
benzo(a)pyrene	0.02	0.025	0.25	0.05	U	0.05	UJ	0.05	U
indeno(1,2,3-cd)pyrene	NE	0.25	2.5	0.05	U	0.05	UJ	0.05	U
dibenzo(a,h)anthracene	NE	0.025	0.25	0.05	U	0.05	UJ	0.05	U
benzo(g,h,i)perylene	NE	NE	600	0.05	U	0.05	UJ	0.05	U
Volatile Petroleum Hydrocarbons (VPH) by MassDEP Method VPH-04-1.1 (ug/L)									
methyl tert-butyl ether	NE	14	140	0.50	U	0.50	U	0.50	U
benzene	5	0.46	4.6	0.50	U	0.50	U	0.50	U
toluene	1000	11	1,100	0.50	U	0.50	U	0.50	U
ethylbenzene	700	1.5	15	0.50	U	0.50	U	0.50	U
total xylenes	10000	19	190	0.50	U	0.50	U	0.50	U
naphthalene	NE	0.17	1	0.030	U	0.030	U	0.030	U
C5-C8 aliphatics	NE	NE	180	60	U	60	U	60	U
C9-C12 aliphatics	NE	NE	350	80	UJ	80	U	80	U
C9-C10 aromatics	NE	NE	71	**13**	**J**	**12**	**J**	**12**	**J**

NOTES:

ug/L - micrograms per liter

*Only samples and analytes with detections above the limit of detection (LOD) or estimated below the LOD are shown, all other sample results

1 - US EPA National Primary Drinking Water Regulations, May 2009

2 - EPA Regional Screening Level (RSL) for tapwater, target hazard quotient (THQ) 0.1, May 2023

3 - Maine DEP Remedial Action Guidelines (RAGs) for Contaminated Sites, November 15, 2023 residential scenario

J - Results are considered estimated

UJ - The compound or analyte was reported as not detected by the laboratory; however, the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

U - Result was below the laboratory reporting limit or is considered non-detect based on blank contamination

NE - Not established

NS - Not sampled

FS - field sample

FD - field duplicate

bgs - below ground surface

Bold Exceeds laboratory LOD or is an estimated concentration (J) below the LOD

LOD exceeds comparison criteria

Exceeds applicable comparison criteria

Table 5
Summary of Historical Indoor Air Analytical Results - LO-13 Launch Site
Loring Air Force Base LO-13 Launch and Control Sites
Route 1A, Caswell, Maine

Sample Location:			Apartment 1						Apartment 2						Apartment 3						Background			
Sample ID:			**Unknown**		**Living Room**		**Bedroom**		**Unknown**		**Living Room**		**Bedroom**		**Unknown**		**Living Room**		**Bedroom**		**1**		**2**	
Sample Date:			**1/19/1995**		**9/30/1996**		**9/30/1996**		**1/19/1995**		**9/30/1996**		**9/30/1996**		**1/19/1995**		**9/30/1996**		**9/30/1996**		**9/30/1996**		**9/30/1996**	
Field QC:			**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**		**FS**	
Parameter*	**Current RAGs[1]**	**Air RSL[2]**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Volatile Organic Compounds (VOCs) by EPA Method TO-14 (ppbv)																								
Benzene	3.6	0.36	ND		**1.9**		**1.6**		ND		0.2	U	0.2	U	**3.61**		**6.4**		**5.8**		0.2	U	0.2	U
Toluene	5200	520	**3.4**		**5.9**		**5.2**		**2.72**		**1.5**		**0.86**		**6.8**		**18**		**17**		0.2	U	0.2	U
Ethylbenzene	11	1.1	ND		0.2	U	0.2	U	ND		0.2	U	0.2	U	**6.71**		**1.2**		**1.4**		0.2	U	0.2	U
Total xylenes	100	10	ND		**1.2**		**1.3**		ND		0.2	U	0.2	U	**6.84**		**5.4**		**6.5**		0.2	U	0.2	U

NOTES:
ppbv - parts per billion by volume
*Only samples and analytes with detections above the limit of detection (LOD) or estimated below the LOD are shown, all other sample results were below the laboratory LOD and were qualified as non-detect (U).
1 - Maine Remediation Action Guidelines for Sites Contaminated with Hazardous Substances, November 15, 2023
2 - US EPA Regional Screening Levels for Chemical Contaminants at Superfund Sites, residential THQ of 0.1, May 2023
-Results from 1995 reported as two results (1 L Tedlar bag and 500 mL glass bulb), higher of two reported here.
U - Result was below the laboratory reporting limit or is considered non-detect based on blank contamination
FS - field sample
FD - field duplicate
NE - Not established
NA - Not applicable, current criteria available
THQ - Target hazard quotient
Bold Exceeds laboratory quantitation limit
Exceeds applicable comparison criteria

Table 6
Monitoring Well Elevation Evaluation for May 2012 and July 2017 Gauging Events
Former Loring Air Force Base LO-13 Control Site
Caswell, Maine

Monitoring Well ID	Gauging Date	Approx. Screened Interval (feet bgs)[1]	Riser Height (feet ags)	Ground Surface Elevation[2] (AMSL)	Top of Riser Elevation (AMSL)	Depth to Bottom (feet btor)	Depth to Water from Ground Surface (feet bgs)	Depth to Water from Top of Riser (feet btor)	Water Level Elevation (AMSL)
CSMW-9	5/23/2012	111-121	2.75	853.93	856.68	NM	64.66	67.41	789.27
	7/21/2017					123.75	68.40	71.15	785.53
CSMW-10	5/23/2012	93-103	2.57	853.88	856.45	NM	62.98	65.55	790.90
	7/21/2017					105.57	66.83	69.40	787.05
CSMW-11*	5/23/2012	108-118	1.5	859.23	860.73	NM	NM	82.50	778.23
	2017 extrap					NM	NM	86.30^	774.44^
CSMW-100	7/21/2017	57-77	3.30	856.35	859.65	83.60	69.95	73.25	786.40
CSMW-101	7/21/2017	57-77	2.60	853.98	856.58	81.98	67.01	69.61	786.97

Notes:

^ - Extrapolated based on an average difference between 2012 and 2017 in CSMW-9 and CSMW-10 of 3.8 feet

*Data gathered from prior reports, not based on any field check during 2017 gauging event.

bgs - below ground surface

ags - above ground surface

TOR - Top of Riser

AMSL - above mean sea level

[1)] Elevation survey was referenced to a previously installed monitoring well with a known ground surface elevation

APPENDIX A

PHOTO LOGS

Photo Log (2005 & 2017 Site Visits)
Loring Air Force Base LO-13 Control Site
Route 1A, Caswell, Maine



1. Former barracks building, view facing west (2017).



2. Former mess hall, view facing southwest, note location of former UST indicated with an arrow (2017).



3. Northeast side of former barracks buildings showing CSMW-2, view facing southwest (2005).



4. Collapsed former paint shed behind mess hall (2017).

Photo Log (2005 & 2017 Site Visits)
Loring Air Force Base LO-13 Control Site
Route 1A, Caswell, Maine



5. Former Administration Building (2017).



6. Location of former Generator Building (arrow). Unknown building to the left. Radar towers in background (2005).



7. Radar towers. Three of four top platforms have been dismantled as of 2013 (2017).



8. Radar towers. Three of four top platforms have been dismantled as of 2013 (2017).

Photo Log (2005 & 2017 Site Visits)
Loring Air Force Base LO-13 Control Site
Route 1A, Caswell, Maine



9. General interior building conditions (2017).



10. General interior building conditions (2017).



11. General interior building conditions (2017).



12. General interior building conditions (2017).

Photo Log (2005 & 2017 Site Visits)
Loring Air Force Base LO-13 Control Site
Route 1A, Caswell, Maine



13. Location of former UST behind administration building (2017).



14. One of multiple former generator buildings (2017).



7. Water tank cradle building behind barracks building (2017).



8. View of the northeast end of the barracks building, UST removed from right of photo (2017).

Photo Log (2015 Site Visit)
Loring Air Force Base LO-13 Launch Site
Route 1A, Caswell, Maine



1. Small shed beside shop building.



2. Shop building, facing southwest.



3. Missile maintenance and acid neutralization put area, view facing northeast.



4. Apartments (former barracks), view facing south.

Photo Log (2015 Site Visit)
Loring Air Force Base LO-13 Launch Site
Route 1A, Caswell, Maine



5. Back side of apartments (former barracks), view facing east.



6. Back side of apartments where UST was located adjacent to chimney, view facing north.



7. One of three former missile silos in southwest portion of the Site, view facing northeast.



8. Conditions inside accessible missile silo.

Photo Log (2015 Site Visit)
Loring Air Force Base LO-13 Launch Site
Route 1A, Caswell, Maine



9. Conditions inside accessible missile silo.



10. Debris stored on asphalt pad around missile silos. Material placed by current owner.

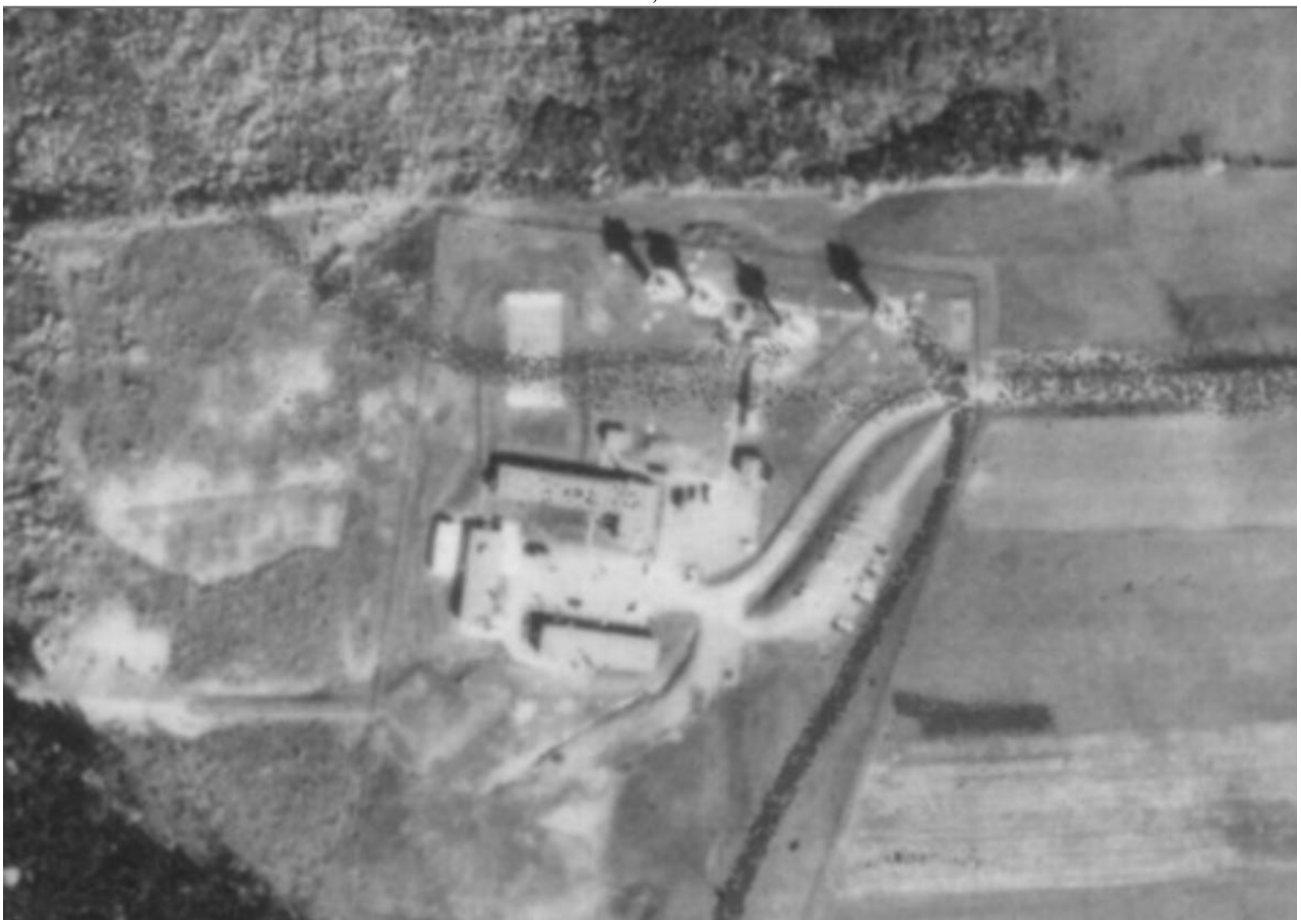


11. Debris stored on asphalt pad around missile silos. Material placed by current owner.



12. Location of demolished pump house, view facing northwest.

Historical Aerial Photographs
LO-13 Launch and Control Sites
Caswell, Maine



9-13-1962 – Control Site

Historical Aerial Photographs
LO-13 Launch and Control Sites
Caswell, Maine



5-15-1970 – Control Site

Historical Aerial Photographs
LO-13 Launch and Control Sites
Caswell, Maine



8-30-1980 – Control Site

Historical Aerial Photographs
LO-13 Launch and Control Sites
Caswell, Maine



10-15-1962 – Launch Site – Launch area

Historical Aerial Photographs
LO-13 Launch and Control Sites
Caswell, Maine



1970 – Launch Site – Launch Area

Historical Aerial Photographs
LO-13 Launch and Control Sites
Caswell, Maine



8-30-1980 – Launch Site – Launch area

Historical Aerial Photographs
LO-13 Launch and Control Sites
Caswell, Maine



10-15-1962

Historical Aerial Photographs
LO-13 Launch and Control Sites
Caswell, Maine



1970 – Launch Site – Barracks area

APPENDIX B

CUMULATIVE BORING AND WELL CONSTRUCTION LOGS

WESTON MANAGERS ENGINEERS/CONSULTANTS

TEST BORING LOG
BORING NO. CSMW-1

PROJECT: MEFUDS – Nike LO-13 Control Site | SHEET NO. 1 OF 3
CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings | RIG: B-61 | ELEVATION (ground) 857.91 ft
DATE STARTED 9/11/96
DATE FINISHED 9/12/96
DRILLER J. Rudnicki
INSPECTOR T. Warr

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4" ID	1 7/8" ID		
				WT.		150#		
				FALL		30"		

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
	0	14/24	2-2 4-5	TILL SILTY SAND W/ GRAVEL: Brown, f.-c. SAND, some silt, trace gravel. Stiff, dry.	
				2.0'	
		16/24	4-4 5-5	SANDY SILT: Brown SILT, some f.-c. sand, trace gravel, trace clay.	
				4.0'	
	5	20/24	6-10 8-7	SANDY ELASTIC SILT: Gray-brown SILT, some f.-c. sand, trace gravel, trace clay. Stiff, wet, mod. plasticity. Silty f. sand lens from 7.1'-7.6'.	
		22/24	5-6 5-5		
		24/24	4-5 6-8		
				9.7'	
	10	24/24	3-3 3-4	OUTWASH WELL GRADED SAND W/ SILT: Yellow-brown SAND, trace silt. Stiff, moist.	OVM = 5.9 ppm Collected analytical sample CSSW1-1 (10'-11')
				12.0'	
cement/ bentonite grout		24/24	5-5 5-5	ELASTIC SILT: Yellow-brown SILT, trace f. sand, trace clay. Stiff, wet.	
	15	18/19	4-4 3-50/1"		
				15.5'	
		14/24	-		Augered interval (15.6'-17.0')
				17.0'	
			7-6	TILL SILTY SAND W/ GRAVEL: Gray-brown, f.-c. SAND, some silt, little f.-c. gravel. Stiff, moist. Augered through rock from 15.6'-17.0'.	
		16/24	7-7 13-15		
	20	24/24	12-11 7-8		
		19/24	13-11 15-15		
				23.0'	
				SANDY ELASTIC SILT W/ GRAVEL: Gray-brown SILT, little f.-c. sand, little gravel, trace clay. Stiff, wet, low plasticity. Gravel content increases w/ depth.	
	25	13/24	15-15 4-9		
		17/24	11-12 10-10		
		16/24	20-12 12-14		
	30				

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TEST BORING LOG
BORING NO. CSMW-1

PROJECT: MEFUDS – Nike LO-13 Control Site | SHEET NO. 2 OF 3
CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-00
BORING CONTRACTOR: Maine Test Borings | RIG: B-61 | ELEVATION (ground) 857.91 .

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4"ID	1 7/8"ID		
				WT.		150#		
				FALL		30"		

DATE STARTED 9/11/96
DATE FINISHED 9/12/96
DRILLER J. Rudnicki
INSPECTOR T. Warr

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
cement/ bentonite grout	30	12/24	3-4		
			4-5		Augered interval (31.0'-35.0')
		12/24	2-2		
			2-4		
		13/24	4-3		
	35		2-2	35.0'	
		12/24	2-2	SANDY ELASTIC SILT: Brown SILT, some f.-c. sand, little f.-c. gravel, trace clay. Loose, wet, mod. plasticity.	
			2-2		
		13/24	2-2	38.0'	
			2-2		Augered interval (38.0'-40.0')
	40	19/24	2-4	40.0'	
			5-6	OUTWASH WELL GRADED SAND W/ SILT: Brown, f. SAND, trace silt. Moist. Silty sand lenses from 13.4'-14.0' and 14.4'-15.5'.	
		24/24	6-7		
			7-7		
	45	24/24	6-6		
natural backfill			6-7		
		0/24	9-8		
			6-4		
		23/24	5-6	48.5'	
			7-6	ELASTIC SILT W/ SAND: Brown SILT, some f. sand, trace clay. Saturated, low plasticity.	
	50	23/24	2-3		
			7-7	52.0'	
		19/24	8-9	TILL SILTY SAND W/ GRAVEL: Brown, f.-c. SAND, some f.-c. gravel, little silt. Moist.	
			11-11		
		14/24	9-9		
	55		16-12		
		16/24	8-59		
			35-40		
		21/24	28-25		
			21-18		
	60				

4" steel protective casing, 4" ID, with locking cap

Screen: 2" PVC with 0.010" slots

Riser: 2" PVC

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WESTON MANAGERS DESIGNERS/CONSULTANTS

TEST BORING LOG
BORING NO. CSMW-1

PROJECT: MEFUDS – Nike LO-13 Control Site | SHEET NO. 3 OF 3

CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-001

BORING CONTRACTOR: Maine Test Borings | RIG: B-61 | ELEVATION (ground) 857.91 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4" ID	1 7/8" ID		
				WT.		150#		
				FALL		30"		

DATE STARTED 9/11/96 | DATE FINISHED 9/12/96 | DRILLER J. Rudnicki | INSPECTOR T. Warr

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
natural backfill	60	24/24	5-9	WEATHERED BEDROCK ELASTIC SILT W/ SAND: Dk. yellow SILT, some f. sand, trace gravel, trace clay. Stiff, moist, mod. plasticity.	High angle bedding present.
			16-22		
		14/24	48-94	63.5'	
NO WELL INSTALLED	65			END OF BORING	
	70				
	75				
	80				
	85				
	90				

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WESTON MANAGERS ENGINEERS/CONSULTANTS

TEST BORING LOG
BORING NO. CSMW-1B

PROJECT: MEFUDS – Nike LO-13 Control Site
SHEET NO. 1 OF 2

CLIENT: US Army Corps of Engineers, New England Division
JOB NO. 10971-010-00

BORING CONTRACTOR: Maine Test Borings RIG: B-61
ELEVATION (PVC) 860.73 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4" ID	1 7/8" ID		
				WT.		150#		
				FALL		30"		

DATE STARTED 9/13/96
DATE FINISHED 9/13/96
DRILLER J. Rudnicki
INSPECTOR T. Warr

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
pea stone; cement/bentonite grout; bentonite; sand; 4" steel protective casing, 4" ID, with locking cap; Screen: 2" PVC with 0.010" slots; Riser: 2" PVC	0			OVERBURDEN Lithology determined during drilling of CSMW-1.	
	5				
	10				
	15				
	20				
	25				
	30				

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WESTON MANAGERS DESIGNERS/CONSULTANTS

TEST BORING LOG
BORING NO. CSMW-1B

PROJECT: MEFUDS – Nike LO-13 Conrol Site | SHEET NO. 2 OF 2

CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-001

BORING CONTRACTOR: Maine Test Borings | RIG: B-61 | ELEVATION (PVC) 860.73 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4"ID	1 7/8"ID		
				WT.		150#		
				FALL		30"		

DATE STARTED 9/13/96

DATE FINISHED 9/13/96

DRILLER J. Rudnicki

INSPECTOR T. Warr

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
sand	30				
	35				
bentonite	40			40.0' END OF BORING	
	45				
	50				
	55				
	60				

4" steel protective casing, 4" ID, with locking cap

Screen: 2" PVC with 0.010" slots

Riser: 2" PVC

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TEST BORING LOG
BORING NO. CSMW-2

PROJECT: MEFUDS – Nike LO-13 Control Site	SHEET NO. 1 OF 2
CLIENT: US Army Corps of Engineers, New England Division	JOB NO. 10971-010-00
BORING CONTRACTOR: Maine Test Borings RIG: B-61	ELEVATION (PVC) 859.56 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
11/3/96	12:10	dry	below top of PVC	DIA.	4 1/4"ID	1 7/8"ID		
				WT.		150#		
				FALL		30"		

DATE STARTED 9/11/96
DATE FINISHED 9/11/96
DRILLER J. Rudnicki
INSPECTOR T. Warr

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
pea stone	0	22/24	3-10	TILL SILTY SAND: Gray, f.-c. SAND, some silt, trace gravel. Firm, dry.	
			15-18		
		22/24	15-15		
			18-16		
	5	21/24	7-8		
			8-9	6.0'	
		23/24	10-10	SANDY ELASTIC SILT: Gray-brown SILT, some f.-c. sand, trace gravel. Firm, moist.	
			12-12		
cement/ bentonite grout		22/24	5-14		
			11-9	9.5'	
	10	24/24	3-4	OUTWASH WELL GRADED SAND W/ SILT: Yellow-brown, f. SAND, trace to little silt. Loose, moist.	
			7-8		
		24/24	9-10		
			12-17		
sand	15	24/24	19-17		
			23-25		
bentonite		18/24	11-17		
			22-22		
		24/24	22-19		OVM = 4.7 ppm Collected analytical sample CSSW2-1 (19.5'-20') Petroleum odor
			21-23		
	20	23/24	9-14		
			15-14		
sand		24/24	9-11		
			12-12		
		16/24	3-6		
	25		9-14	25.4'	
				TILL SILTY SAND W/ GRAVEL: Gray, f.-c. SAND, some silt, little f.-c. gravel, trace clay. Firm, saturated, low plasticity.	Collected geotechnical sample
	30				

4" steel protective casing, 4" ID, with locking cap

Screen: 2" PVC with 0.010" slots

Riser: 2" PVC

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WESTON MANAGERS ENGINEERS/CONSULTANTS

TEST BORING LOG
BORING NO. CSMW2

PROJECT: MEFUDS – Nike LO-33 Control Site
SHEET NO. 2 OF 2
CLIENT: US Army Corps of Engineers, New England Division
JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings
RIG: B-61
ELEVATION (PVC) 859.56 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4" ID	1 7/8" ID		
				WT.		150#		
				FALL		30"		

DATE STARTED 9/11/96
DATE FINISHED 9/11/96
DRILLER J. Rudnicki
INSPECTOR T. Warr

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
sand	30	10/24	4-7		OVM = background
			11-10		Collected analytical sample CSSW222
	35	15/24	2-6		
			8-10	37.0'	
				END OF BORING	
	40				
	45				
	50				
	55				
	60				

4" steel protective casing, 4" ID, with locking cap

Screen: 2" PVC with 0.010" slots

Riser: 2" PVC

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TEST BORING LOG
BORING NO. CSMW-3

PROJECT: MEFUDS – Nike LO-13 Control Site
CLIENT: US Army Corps of Engineers, New England Division
BORING CONTRACTOR: Maine Test Borings
RIG: B-61

SHEET NO. 1 OF 2
JOB NO. 10971-010-00
ELEVATION (PVC) 856.49 ft
DATE STARTED 9/14/96
DATE FINISHED 9/15/96
DRILLER J. Rudnicki
INSPECTOR T. Warr

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
11/3/96	12:45	dry	below top of PVC	DIA.	4 1/4" ID	1 7/8" ID		
				WT.		150#		
				FALL		30"		

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
pea stone	0	5/18	6	Augered through bituminous. 0.5'	
			5-3	FILL ELASTIC SILT: SILT, trace gravel, trace clay. Stiff, wet, mod. plasticity. 2.0'	
		21/24	4-4	OUTWASH	
			5-6	WELL GRADED SAND W/ SILT: Yellow-brown, f. SAND, trace silt. Loose, moist.	
bentonite	5	24/24	4-4		
			5-6		
		24/24	5-6		
			8-8		
		20/24	9-9		
			8-8		
	10	23/24	3-3		
			5-7	12.0'	
		24/24	9-10	SILTY SAND: Yellow-brown, f. sand, little silt. Loose, moist. Clay content increases w/ depth.	
			9-10		
	15	24/24	3-5		
			7-8		
sand		24/24	1-2		
			6-18	17.6'	
		17/24	16-18	TILL SILTY SAND W/ GRAVEL: Gray, f.-c. SAND, little little silt, little gravel. Stiff, moist.	
			16-16	20.0'	
	20	18/24	10-52	SILTY GRAVEL W/ SAND: Gray, f.-c. GRAVEL and f.-c. SAND, little silt. Stiff, moist.	
			52-47		
		24/24	27-29		
			32-28	23.4'	
		14/23	19-23	ELASTIC SILT: Gray SILT, little clay, trace f. sand. Stiff, wet, mod. plasticity.	
	25		27-150/3"		
		23/24	-	27.0'	
			4-9	GRAVELLY SILT: Brown SILT, some f.-c. gravel, little f.-c. sand. Stiff, moist.	
		16/24	12-12		
			13-17		
	30				

OVM = 5.3 ppm
Collected analytical sample DUPS-6 (10'-11')

OVM = 30 ppm
Collected analytical sample CSSW3-1 (22'-24')
OVM = background
Collected analytical sample DUPS-6 (24'-25')

4" steel protective casing, 4" ID, with locking cap

Screen: 2" PVC with 0.010" slots

Riser: 2" PVC

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TEST BORING LOG
BORING NO. CSMW-3

PROJECT: MEFUDS – Nike LO-13 Control Site | SHEET NO. 2 OF 2
CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings | RIG: B-61 | ELEVATION (PVC) 856.49 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4"ID	1 7/8"ID		
				WT.		150#		
				FALL		30"		

DATE STARTED 9/14/96
DATE FINISHED 9/15/96
DRILLER J. Rudnicki
INSPECTOR T. Warr

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
bentonite	30	21/24	14-23	TILL GRAVELLY SILT: Brown SILT, some f.-c. gravel, little f.-c. sand. Stiff, moist.	
			18-24		
		16/20	20-27		
			34-34		
			39-120/2"	34.7'	
	35	16/20		END OF BORING	
	40				
	45				
	50				
	55				
	60				

4" steel protective casing, 4" ID, with locking cap

Screen: 2" PVC with 0.010" slots

Riser: 2" PVC

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TEST BORING LOG
BORING NO. CSMW-4

PROJECT: MEFUDS – Nike LO-13 Control Site | SHEET NO. 1 OF 2
CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-00
BORING CONTRACTOR: Maine Test Borings | RIG: B-61 | ELEVATION (PVC) 856.53 ft.

GROUNDWATER					CAS.	SAMP.	CORE	TUBE	
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS			DATE STARTED 9/15/96
11/3/96	12:40	dry	below top of PVC	DIA.	4 1/4"ID	1 7/8"ID			DATE FINISHED 9/15/96
				WT.		150#			DRILLER J. Rudnicki
				FALL		30"			INSPECTOR T. Warr

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
pea stone	0	5/18	5- 8-9	Augered through bituminous. 0.5' FILL SILTY SAND: Gray, f.-c. SAND, little silt, trace f.-c. gravel. Loose, wet. 2.0'	Rock in nose of spoon.
		19-24	12-10 6-8	TILL SILT W/ GRAVEL: Gray SILT, some f.-c. gravel, little f.-c. sand. Stiff, wet. Clay content increases w/ depth. Gravel content decreases w/ depth. 6.0'	
bentonite	5	20/24	8-7 6-6		
		23/24	5-7 8-8	OUTWASH WELL GRADED SAND W/ SILT: Yellow-brown, f. SAND, trace silt, trace f.-c. gravel. Loose, moist.	OVM = background Collected analytical sample CSSW4-1 (6.0'-7.0')
		19/24	8-7 7-8		
	10	24/24	6-7 8-8	12.0'	
		24/24	7-7 8-7	SILTY SAND: Yellow-brown, f. SAND, little silt. Loose, moist. 14.0'	
		24/24	8-6 9-14	WELL GRADED SAND W/ SILT: Yellow-brown, f. SAND, trace silt. Loose, moist. Silt content increases w/ depth. 15.7'	
sand	15	4/24	12-17 18-17	TILL SILTY SAND W/ GRAVEL: Gray-brown, f.-c. SAND, little f.-c. gravel, little silt. Stiff, moist. Gravel content increases w/ depth.	
		13/24	16-14 12-14		
	20	20/24	14-17 19-20	22.0'	
		19/24	22-25 19-20	GRAVELLY SILT: Brown SILT and f.-c. GRAVEL, little f.-c. sand. Stiff, moist.	
		21/24	18-24 79-31		
	25	13/21	31-25 65-100/0.3'		
		15/24	8-14 80-60		
	30				

4' steel protective casing, 4" ID, with locking cap

Screen: 2" PVC with 0.010" slots

Riser: 2" PVC

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WESTON MANAGERS DESIGNERS/CONSULTANTS

TEST BORING LOG
BORING NO. CSMW-4

PROJECT: MEFUDS – Nike LO-13 Control Site	SHEET NO. 2 OF 2
CLIENT: US Army Corps of Engineers, New England Division	JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings RIG: B-61	ELEVATION (PVC) 856.53 ft
GROUNDWATER	DATE STARTED 9/15/96
DATE / TIME / WATER ELEVATION / DATUM	DATE FINISHED 9/15/96
	DRILLER J. Rudnicki
	INSPECTOR T. Warr

	TYPE	CAS.	SAMP.	CORE	TUBE
	TYPE	HSA	SS		
	DIA.	4 1/4" ID	1 7/8" ID		
	WT.		150#		
	FALL		30"		

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
bentonite	30	19/24	16-21	TILL. GRAVELLY SILT: Brown SILT and f.-c. GRAVEL, little f.-c. sand. Stiff, moist.	OVM = background. Collected analytical sample CSSW4-2 (32.0'-34.0')
			15-21		
		23/24	16-19		
			17-21		
	35	13/24	24-28		Collected geotechnical sample (34.0'-36.0')
			30-20	36.0'	
				END OF BORING	
	40				
	45				
	50				
	55				
	60				

4" steel protective casing, 4" ID, with locking cap

Screen: 2" PVC with 0.010" slots

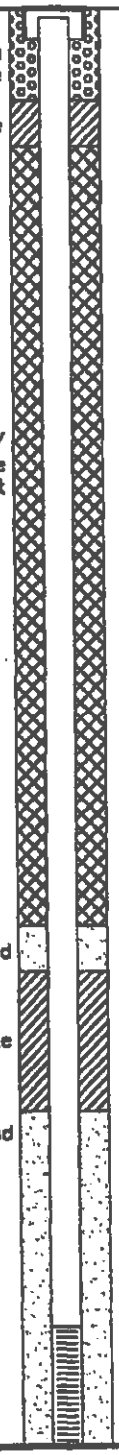
Riser: 2" PVC

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TEST BORING LOG
BORING NO. CSMW-5

PROJECT: MEFUDS – Nike LO-13 Control Site	SHEET NO. 1 OF 2
CLIENT: US Army Corps of Engineers, New England Division	JOB NO. 10971-010-00
BORING CONTRACTOR: Maine Test Borings	RIG: B-61
	ELEVATION (PVC) 852.68 ft
	DATE STARTED 9/11/96
	DATE FINISHED 9/11/96
	DRILLER J. Rudnicki
	INSPECTOR T. Warr

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
11/4/96	09:15	appox. 31.0 ft	below top of PVC	DIA.	4 1/4"ID	1 7/8"ID		
				WT.		150#		
				FALL		30"		



DEPTH (FEET)	RECOVERY (in.)	BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
0	12/24	3-4	FILL/TILL	
		4-5	SANDY ELASTIC SILT: Brown SILT, some f.-c. sand, little f.-c. gravel, trace clay. Loose, wet, low plasticity.	
	12/24	2-2		
		2-4		
5	13/24	4-3		
		2-2		
	12/24	2-2		
		2-2		
	13/24	2-2		
		2-2	10.0'	
10	19/24	2-4	OUTWASH	
		5-6	WELL GRADED SAND W/ SILT: Brown, f. SAND, trace silt. Moist. Silty sand lenses from 13.4'-14.0' and 14.4'-15.5'.	
	24/24	6-7		
		7-7		
15	24/24	6-6		
		6-7		
	0/24	9-8		
		6-4		
	23/24	5-6	18.6'	
		7-6	ELASTIC SILT W/ SAND: Brown SILT, some f. sand, trace clay. Saturated, low plasicity.	OVM = 5.0 ppm Collected analytical sample CSSW5-1 (14.4'-15.5')
20	23/24	2-3		
		7-7	22.0'	
	19/24	8-9	TILL	
		11-11	SILTY SAND W/ GRAVEL: Brown, f.-c. SAND, some f.-c. gravel, little silt. Moist.	OVM = 25 ppm Collected analytical sample CSSW5-2 (28.0'-30.0')
25	14/24	9-9		
		16-12		
	16/24	8-59		
		35-40		
	21/24	28-25		
		21-18		
30				

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TEST BORING LOG
BORING NO. CSMW-5

PROJECT: MEFUDS – Nike LO-13 Control Site | SHEET NO. 2 OF 2
CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings | RIG: B-61 | ELEVATION (PVC) 852.68 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4"ID	1 7/8"ID		
				WT.		150#		
				FALL		30"		

DATE STARTED 9/11/96
DATE FINISHED 9/11/96
DRILLER J. Rudnicki
INSPECTOR T. Worr

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
sand	30	19/24	11-19	TILL SILTY SAND W/ GRAVEL: Brown, f.-c. SAND, little f.-c. gravel, little silt. Moist.	
			14-14		
		18/24	9-11		Collected geotechnical sample (32'-34')
			18-31		
	35	16/24	22-24		
			26-25		
		12/24	21-17		
			18-24		
backfill		18/24	12-73		
	40		48-22	40.0'	
				END OF BORING	
	45				
	50				
	55				
	60				

4" steel protective casing, 4" ID, with locking cap

Screen: 2" PVC with 0.010" slots

Riser: 2" PVC

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WESTON MANAGERS DESIGNERS/CONSULTANTS

TEST BORING LOG
BORING NO. CSMW-6

PROJECT: MEFUDS – Nike LO-13 Control Site	SHEET NO. 1 OF 2
CLIENT: US Army Corps of Engineers, New England Division	JOB NO. 10971-010-00
BORING CONTRACTOR: Maine Test Borings RIG: B-51	ELEVATION (PVC) ND

GROUNDWATER					CAS.	SAMP.	CORE	TUBE	
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS			DATE STARTED 10/9/96
				DIA.	4 1/4"ID	1 7/8"ID			DATE FINISHED 10/9/96
				WT.		150#			DRILLER D. McKeen
				FALL		30"			INSPECTOR R. Eichhorn

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0	–	3-6	TILL SILT W/ GRAVEL AND GRAVELLY SILT: Tan SILT, little to equal parts gravel. Firm, dry, nonplastic.	OVM = background Collected analytical sample CSSW6-1 (5'-8')
			8-7		
		–	8-10		
			13-14		
	5	–	7-10		
			11-13		
		–	9-16		
			26-30		
		–	29-30		
			28-28		
	10	–	19-67		
			106-51		
		–	15-26		
			24-25	14.0'	
	15	–	12-19	SILT W/ SAND AND GRAVEL: Gray SILT and f.-c. SAND, some gravel, Firm, nonplastic. Samples alternated between dry and moist.	
			21-29		
		–	44-54		
			64-28		
		–	51-200/?		
	20				
		22/24	16-37		
			32-28		
		20/24	29-56		
			32-25		
	25				
		10/10	20-100/0.2'		
		24/24	9-17		
			65-20		
	30		–		

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TEST BORING LOG
BORING NO. CSMW-6

PROJECT: MEFUDS – Nike LO-13 Control Site | SHEET NO. 2 OF 2
CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings | RIG: B-51 | ELEVATION (PVC) ND

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4" ID	1 7/8" ID		
				WT.		150#		
				FALL		30"		

DATE STARTED 10/9/96
DATE FINISHED 10/9/96
DRILLER D. McKeen
INSPECTOR R. Eichhorn

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	30	–	28-18		
			22-31		
		–	24-26	ELASTIC SILT: Lt. brown SILT, little clay, trace sand. Firm, saturated, low plasticity. 32.0'	OVM = background Collected analytical sample CSSW6-2 (32'-34')
			22-21	SILTY GRAVEL: GRAVEL, and SILT, little f. sand. Firm, dry, nonplastic. 34.0'	
	35			END OF BORING No saturation encountered except a 0.2' section at 32' BGS.	
	40				
	45				
	50				
	55				
	60				

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TEST BORING LOG
BORING NO. CSMW-7

PROJECT: MEFUDS – Nike LO-13 Control Site	SHEET NO. 1 OF 2
CLIENT: US Army Corps of Engineers, New England Division	JOB NO. 10971-010-00
BORING CONTRACTOR: Maine Test Borings RIG: B-51	ELEVATION (PVC) 844.77 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
11/3/96	13:00	dry	below top of PVC	DIA.	4 1/4"ID	1 7/8"ID		
				WT.		150#		
				FALL		30"		

DATE STARTED	10/8/96
DATE FINISHED	10/8/96
DRILLER	D. McKeen
INSPECTOR	R. Eichhorn

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
pea stone	0	16/24	2-4	TILL SILT W/ GRAVEL: Lt. brown SILT, trace f. gravel, trace f.-c. sand, trace organics. Firm, dry, nonplastic. 2.0'	
			4-4		
		14/24	8-18	GRAVELLY SILT: Lt. brown SILT, little-some gravel, trace-little f.-c. sand, trace clay. Firm-stiff, non-low plastic. 6'-12' BGS moist, other intervals dry.	
			18-16		
	5	14/24	18-19		
			19-14		
Portland grout		22/24	7-8		OVM = background Collected analytical sample CSSW7-1 (6'-8')
			13-18		
		22/24	17-17		
			18-17		
	10	20/24	7-12		
			11-15		
bentonite		20/24	17-17		
			16-15		
	15	22/24	27-23		
			17-17		
		20/24	9-14		
			15-26	18.0'	
sand		20/24	41-15	ELASTIC SILT: Lt. brown SILT, trace clay, Firm, wet, low plasticity. 19.0'	
			15/82		
	20		13-100/0.1"	WEATHERED BEDROCK: Gray Dolomitic, c. SAND and GRAVEL. 20.0'	
		6/7		SILT W/ GRAVEL: Dk. brown SILT and f.-c. GRAVEL. Firm, wet, nonplastic. 22.5'	
				Little-some GRAVEL deeper than 23' BGS. Samples becomes dry to moist at 28' BGS.	
		12/24	10-20		
			16-15		
4" steel protective casing, 4" ID, with locking cap	25	18/24	11-48		OVM = background Collected analytical sample CSSW7-2 (25'-27')
			52-48		
Screen: 2" PVC with 0.010" slots		7/24	36-40		
			30-20		
Riser: 2" PVC	30		-		

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WESTON MANAGERS DESIGNERS/CONSULTANTS

TEST BORING LOG
BORING NO. CSMW-7

PROJECT: MEFUDS – Nike LO-13 Control Site	SHEET NO. 2 OF 2
CLIENT: US Army Corps of Engineers, New England Division	JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings RIG: B-51	ELEVATION (PVC) 844.77 ft
GROUNDWATER	DATE STARTED 10/8/96
DATE / TIME / WATER ELEVATION / DATUM	DATE FINISHED 10/8/96
	DRILLER D. McKeen
	INSPECTOR R. Eichhorn

	TYPE	CAS.	SAMP.	CORE	TUBE
	DIA.	4 1/4" ID	1 7/8" ID		
	WT.		150#		
	FALL		30"		

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
	30	–	36-40		
			30-20		
		–	16-18		
			23-99		
	35	–	16-18		
			23-99	36.0'	
				END OF BORING Backfilled w/ bentonite grout to total well depth.	
	40				
	45				
	50				
	55				
	60				

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TEST BORING LOG
BORING NO. CSMW-8

PROJECT: MEFUDS – Nike LO-13 Control Site	SHEET NO. 1 OF 2
CLIENT: US Army Corps of Engineers, New England Division	JOB NO. 10971-010-00
BORING CONTRACTOR: Maine Test Borings RIG: B-61	ELEVATION (PVC) 857.47 ft
	DATE STARTED 9/16/96
	DATE FINISHED 9/17/96
	DRILLER J. Rudnicki
	INSPECTOR T. Warr

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
11/3/96	13:00	dry	below top of PVC	DIA.	4 1/4" ID	1 7/8" ID		
				WT.		150#		
				FALL		30"		

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
pea stone	0	5/24	1-2	TOPSOIL 1.0'	OVM = 93 ppm Collected analytical sample CSSW8-1' (6.0'-8.0')
			2-3	TILL SILTY SAND W/ GRAVEL: Brown, f.-c. SAND, some silt, little f.-c. gravel. Stiff, moist. Moisture content varies w/ depth.	
		24/24	8-6		
			8-12		
	5	24/24	14-12		
			10-11		
cement/ bentonite grout		24/24	6-10		
			10-16		
		18/24	12-10		
			15-18		
sand	10	17/24	8-10		
			10-14		
bentonite		20/24	12-20		
			18-12		
	15	19/24	5-8		
			8-9		
		13/24	10-19		
			11-12		
		20/24	16-18		
sand			22-20		
	20	24/24	12-11		
			16-11		
		23/24	11-12		
			14-19		
		14/24	18-14		
	25		14-12		
		24/24	5-6		
			9-9		
		5/15	14-18		
			100/3"		
	30				

4" steel protective casing, 4" ID, with locking cap

Screen: 2" PVC with 0.010" slots

Riser: 2" PVC

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TEST BORING LOG
BORING NO. CSMW-8

PROJECT: MEFUDS – Nike LO-13 Control Site	SHEET NO. 2 OF 2
CLIENT: US Army Corps of Engineers, New England Division	JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings RIG: B-61	ELEVATION (PVC) 857.47 ft
	DATE STARTED 9/16/96
	DATE FINISHED 9/17/96
	DRILLER J. Rudnicki
	INSPECTOR T. Warr

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4"ID	1 7/8"ID		
				WT.		150#		
				FALL		30"		

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
bentonite	30	18/24	3-10	TILL	
			12-11	SILTY GRAVEL W/ SAND: Gray-brown, f.-c. GRAVEL, some silt, little f.-c. sand. Stiff, moist.	OVM = 30 ppm Collected analytical sample CSSW8-2 (32.0'-34.0')
		24/24	15-24		
			32-32		
	35	21/24	25-27		Collected geotechnical sample (34.0'-36.0')
			36-46	36.0'	
				END OF BORING	
	40				
	45				
	50				
	55				
	60				

4" steel protective casing, 4" ID, with locking cap

Screen: 2" PVC with 0.010" slots

Riser: 2" PVC

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TEST BORING LOG
BORING NO. CSSB-1

PROJECT: MEFUDS – Nike LO-13 Control Site	SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division	JOB NO. 10971-010-00
BORING CONTRACTOR: Maine Test Borings RIG: B-51	ELEVATION (ground) 855.59 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE	
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS			DATE STARTED 9/11/96
				DIA.	4 1/4"ID	1 7/8"ID			DATE FINISHED 9/11/96
				WT.		150#			DRILLER D. McKeen
				FALL		30"			INSPECTOR R. Eichhorn

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0	19/24	2-6 20-17	TOPSOIL Dk. brown SILT and ORGANICS. 0.7'	
		15/24	13-19 17-14	TILL SANDY ELASTIC SILT: lt. brown SILT and f.-c. SAND, trace-little f.-c. gravel. Firm, dry, nonplastic. 2.0'	
	5	5/24	17-28 80/6"	SILTY SAND W/ GRAVEL: Gray, f.-c. SAND, little f.-c. gravel, little silt. Firm, dry, nonplastic. 6.0'	
		15/24	19-10 19-13	OUTWASH SANDY SILT: Gray-tan SILT and f.-c. SAND, trace clay, trace gravel. Firm, dry, nonplastic. 7.8'	OVM = 14 ppm Clay lenses. Collected analytical sample CSSB1-1 (6'-8')
	10	19/24	6-10 5-8	TILL ELASTIC SILT: Dk. brown SILT, trace-some clay, trace-little sand and gravel. Firm, moist, low-mod. plasticity.	
		12/24	6-8 9-10	12.0'	
		11/24	12-11 15-17	SANDY CLAY: CLAY, trace silt, trace sand. Firm, wet, high plasticity. 14.0'	
	15	19/4	6-17 14-10	ELASTIC SILT: Dk. brown SILT, trace-some clay, trace-little, sand and gravel. Firm, saturated, low-mod. plasticity. 14.8'	
		14/24	16-14 17-21	OUTWASH POORLY GRADED SAND W/ SILT: Tan f. SAND, trace silt. Firm, moist, nonplastic.	OVM = background Collected analytical sample CSSB1-2 (18'-20')
		22/24	12-13 17-19	20.0'	
	20			END OF BORING	
	25				
	30				

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TEST BORING LOG
BORING NO. CSSB-2

PROJECT: MEFUDS – Nike LO-13 Control Site
CLIENT: US Army Corps of Engineers, New England Division
BORING CONTRACTOR: Maine Test Borings
RIG: B-51

SHEET NO. 1 OF 1
JOB NO. 10971-010-001
ELEVATION (ground) 857.17 ft
DATE STARTED 9/11/96
DATE FINISHED 9/11/96
DRILLER D. McKeen
INSPECTOR R. Eichhorn

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4" ID	1 7/8" ID		
				WT.		150#		
				FALL		30"		

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0	12/24	3-11	TILL SILT W/ SAND: SILT, trace f.-c. sand, trace gravel. Firm, dry, nonplastic.	
			14-15		
		19/24	8-9		
			7-8	2.0' ELASTIC SILT: Lt. brown SILT and CLAY, trace f.-c. sand, trace f.-c. gravel. Firm, dry, mod. plasticity.	
	5	24/24	12-12		
			12-13	5.4'	
		19/24	10-11	OUTWASH POORLY GRADED SAND W/ SILT: Tan, f. sand, trace silt. Loose, dry, nonplastic.	OVM = background Collected analytical sample CSSB2-1 (6'-8')
			12-12		
		22/24	4-6		
			7-7		
	10	19/24	4-5		Oxidation-staining in 1/4" bands.
			7-50/0.2	12.0'	
		24/24	9-18	TILL ELASTIC SILT W/ SAND: Brown SILT, trace f. sand, trace f.-c. gravel. Firm, dry, nonplastic.	
			14-14		
	15	12/18	16-17	14.0' SANDY ELASTIC SILT W/ GRAVEL: Brown SILT, little f.-c. sand, little gravel (size to 2"). Firm, dry, nonplastic.	
			70/6"		
		17/20	15-16		
			49-33		
		22/24	21-32		OVM = background Collected analytical sample CSSB2-2 (18'-20')
			32-27		
	20			20.0'	
				END OF BORING	
	25				
	30				

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TEST BORING LOG
BORING NO. CSSB-3

PROJECT: MEFUDS – Nike LO-13 Control Site
CLIENT: US Army Corps of Engineers, New England Division
BORING CONTRACTOR: Maine Test Borings
RIG: B-51

SHEET NO. 1 OF 1
JOB NO. 10971-010-00
ELEVATION (ground) 856.64 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4" ID	1 7/8" ID		
				WT.		150#		
				FALL		30"		

DATE STARTED 9/11/96
DATE FINISHED 9/11/96
DRILLER D. McKeen
INSPECTOR R. Eichhorn

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0	18/24	6	TILL PLASTIC SILT W/ GRAVEL: Red-brown silt, trace f.-c. sand, trace gravel. Firm-Stiff, dry, nonplastic.	
			7-6		
		24/24	5-8		
			8-8	4.0'	
	5	18/24	5-6	OUTWASH POORLY GRADED SAND W/ SILT: Tan, f. sand, trace silt. Loose-firm, dry, nonplastic.	Oxidation stains (1/4" thick).
			6-7		
		24/24	8-7		
			9-12		
		22/24	4-4		OVM = background Collected analytical sample CSSB3-1 (8'-10')
			5-7		
	10	22/24	5-8		
			8-6		
		22/24	5-5	13.0'	
			4-6	TILL SANDY LEAN CLAY: Olive SAND and CLAY. Firm, wet, mod. plasticity. 14.0'	
	15	15/24	2-3		
			7-10	FAT CLAY: CLAY, little f. sand. Firm, wet, high plasticity. 15.0'	
		15/24	17-16		
			18-14	WELL GRADED SAND W/ SILT AND GRAVEL: F.-c. SAND and GRAVEL, little-some silt. Loose-firm, dry, nonplastic.	OVM = background Collected analytical sample CSSB3-2 (18'-20')
		–	20-22		
			26-20	20.0'	
	20			END OF BORING	
	25				
	30				

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TEST BORING LOG
BORING NO. CSSB-4

PROJECT: MEFUDS – Nike LO-13 Control Site	SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division	JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings RIG: B-51	ELEVATION (ground) 856.65 ft
GROUNDWATER	DATE STARTED 9/12/96
DATE / TIME / WATER ELEVATION / DATUM	DATE FINISHED 9/12/96
	DRILLER D. McKeen
	INSPECTOR R. Eichhorn

	TYPE	CAS.	SAMP.	CORE	TUBE
	DIA.	4 1/4" ID	1 7/8" ID		
	WT.		150#		
	FALL		30"		

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0			Augered to approx. 5' BGS (9' angle depth).	Depths reported as angled depths. Depths BGS are approx. 1/2 angled depth.
	5				
	10	22/24	9-14 15-18	OUTWASH POORLY GRADED SAND W/ SILT: Tan, f. SAND, trace silt. Loose-firm, dry, nonplastic.	
	15	19/24	12-13 14-16	(Approx. 8' BGS) 16.0'	OVM = background Collected analytical sample CSSB4-1 (14'-16')
	20	22/24	12-13 13-23	TILL ELASTIC SILT: Dk. brown SILT, trace f. sand, trace clay. Firm, saturated, non-slightly plastic. (Approx. 11' BGS) 21.0'	OVM = background Collected analytical sample CSSB4-2 (19'-21')
	25			END OF BORING	
	30				

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TEST BORING LOG
BORING NO. CSSB-5

PROJECT: MEFUDS – Nike LO-13 Control Site
CLIENT: US Army Corps of Engineers, New England Division
BORING CONTRACTOR: Maine Test Borings
RIG: B-51

SHEET NO. 1 OF 1
JOB NO. 10971-010-00
ELEVATION (ground) 855.96
DATE STARTED 9/13/96
DATE FINISHED 9/13/96
DRILLER D. McKeen
INSPECTOR R. Eichhorn

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4" ID	1 7/8" ID		
				WT.		150#		
				FALL		30"		

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0			Augered to approx. 4' angle depth (approx. 2' BGS).	Depths reported as angled depths. Depths BGS are approx. 1/2 angled depth.
				(Approx. 2' BGS) 4.0'	
	5	8/24	3-4	TILL LEAN CLAY: Dk. brown CLAY and SILT, trace f.-c. sand. Firm-stiff, moist, mod. plasticity.	
			3-1		
		9/24	7-22		
			18-23		
				(Approx. 5' BGS) 9.0'	
	10	22/24	7-10	OUTWASH POORLY GRADED SAND W/ SILT: Gray-tan, f. SAND, trace silt. Loose-firm, dry, nonplastic.	
			12-15		
		22/24	18-18		
			27-42		
				(Approx. 7' BGS) 13.0'	
				TILL SANDY ELASTIC SILT: Brown SAND and SILT, little clay. Firm, dry, slight plasticity.	OVM = background Collected analytical sample CSSB5-1 (14'-16')
	15	22/24	11-17		
			17-16		
				(Approx. 8' BGS) 16.0'	
		22/24	11-14	FAT CLAY: Olive-brown CLAY, trace silt, trace f. sand. Firm-stiff, wet, high plasticity.	
			31-41		
				(Approx. 9' BGS) 18.0'	
				GRAVELLY LEAN CLAY: Olive-brown CLAY and GRAVEL, trace silt, trace f. sand. Stiff, moist, mod.-high plasticity.	OVM = background Collected analytical sample CSSB5-2 (19'-21')
	20	22/24	33-55		
			29-37		
				(Approx. 11' BGS) 21.0'	
				END OF BORING	
	25				
	30				

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TEST BORING LOG
BORING NO. CSSB-6

PROJECT: MEFUDS – Nike LO-13 Control Site | SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings | RIG: B-51 | ELEVATION (ground) ND

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4"ID	1 7/8"ID		
				WT.		150#		
				FALL		30"		

DATE STARTED 9/13/96
DATE FINISHED 9/13/96
DRILLER D. McKeen
INSPECTOR R. Eichhorn

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0			Augered to approx. 10' angle depth (approx. 5' BGS).	Depths reported as angled depths. Depths BGS are approx. 1/2 angled depth.
	10			(Approx. 5' BGS) 10.0'	
				OUTWASH POORLY GRADED SAND W/ SILT: Tan, f. SAND, trace silt. Loose-firm, dry, nonplastic.	OVM = background Collected analytical sample CSSB6-1 (14'-15')
	15			(Approx. 8' BGS) 16.0'	
				TILL SANDY SILT: Brown SILT, little-some sand, little clay. Firm, wet, slight plasticity.	OVM = background Collected analytical sample CSSB6-2 (19'-21')
	20			(Approx. 11' BGS) 21.0'	
				END OF BORING	
	25				
	30				

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TEST BORING LOG
BORING NO. CSSB-7

PROJECT: MEFUDS – Nike LO-13 Control Site	SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division	JOB NO. 10971-010-0C
BORING CONTRACTOR: Maine Test Borings RIG: B-51	ELEVATION (ground) 856.52 f

GROUNDWATER					CAS.	SAMP.	CORE	TUBE	
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS			DATE STARTED 10/8/96
				DIA.	4 1/4"ID	1 7/8"ID			DATE FINISHED 10/8/96
				WT.		150#			DRILLER D. McKeen
				FALL		30"			INSPECTOR R. Eichhorn

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0	13/24	4-19	TOPSOIL 0.5'	
			20-21	TILL SILT W/ GRAVEL: Tan-lt. brown SILT, trace-little f.-c. gravel, trace f.-c. sand. 6" layer of silt and clay at 4' BGS. Loose-firm, dry, non-slightly plastic.	
		15/24	17-12		
			15-12		
	5	10/24	10-22		
			18-20		OVM = background Collected analytical sample CSSB7-1 (6'-8')
		13/24	26-17		
			23-18	8.0'	
		22/24	7-11	OUTWASH POORLY GRADED SAND: Tan f. SAND, trace silt. Loose-firm, dry, nonplastic.	
	10		13-16		
		20/24	6-11		
			14-15		
		22/24	10-17		
			22-26		
	15	22/24	7-15		
			20-23		
		24/24	15-26		
			25-27	18.0'	
		24/24	8-12	TILL ELASTIC SILT: Brown SILT, trace clay, trace f. sand. Firm, wet, low plasticity. 20.0'	OVM = background Collected analytical sample CSSB7-2 (18'-20')
	20		12-15		
				END OF BORING	
	25				
	30				

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TEST BORING LOG
BORING NO. CSSB-8

PROJECT: MEFUDS – Nike LO-13 Control Site	SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division	JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings RIG: B-51	ELEVATION (ground) ND
GROUNDWATER	DATE STARTED 9/15/96
DATE / TIME / WATER ELEVATION / DATUM	DATE FINISHED 9/15/96
	DRILLER D. McKeen
	INSPECTOR R. Eichhorn

	CAS.	SAMP.	CORE	TUBE
TYPE	HSA	SS		
DIA.	4 1/4" ID	1 7/8" ID		
WT.		150#		
FALL		30"		

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0	16/24	5-7	FILL GRAVELLY SILT: Brown SILT, little gravel, trace f.-c. sand. Firm, dry, nonplastic.	
			8-10	2.0'	
		12/24	4-4	GRAVELLY CLAY: Red-brown CLAY, little gravel, little silt, trace f.-c. sand. Brick fragments. Firm, dry, nonplastic.	
			4-7		
	5	8/24	9-7		
			3-2	5.8'	
		19/24	7-12	OUTWASH POORLY GRADED SAND W/ SILT: Tan-brown f. SAND, trace-some silt, trace clay. Quartz fragments @ 8'-9'. Firm, dry-moist, nonplastic.	OVM = background Collected analytical sample CSSB8-1 (6'-8')
			14-10		
		24/24	5-6		
			6-7		
	10	19/24	6-6		
			8-10		
		24/24	6-6		
			8-10		
		24/24	–		
	15		–		
		22/24	10-11		
			14-14	18.0'	
		22/24	4-4	TILL ELASTIC SILT: Lt. brown SILT, little clay, trace f. sand. Firm, saturated, slight plasticity.	OVM = background Collected analytical sample CSSB8-2 (18'-20')
			13-13	20.0'	
	20			END OF BORING	
	25				
	30				

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WESTON
MANAGERS ENGINEERS/CONSULTANTS

TEST BORING LOG
BORING NO. CSSB-10

PROJECT: MEFUDS - Nike LO-13 Control Site
SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division
JOB NO. 10971-010-00
BORING CONTRACTOR: Maine Test Borings
RIG: B-51
ELEVATION (ground) 853.77 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4"ID	1 7/8"ID		
				WT.		150#		
				FALL		30"		

DATE STARTED 9/14/96
DATE FINISHED 9/14/96
DRILLER D. McKeen
INSPECTOR R. Eichhorn

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0			Augered to approx. 4' angle depth (approx. 2' BGS).	Depths reported as angled depths. Depths BGS are approx. 1/2 angled depth.
				(Approx. 2' BGS) 4.0'	
	5	10/24	8-10	TILL LEAN CLAY W/ GRAVEL: Lt. brown CLAY and SILT, trace f.-c. sand, trace gravel. Firm, moist, mod. plasticity.	
			62-24		
		10/10	10-20/3"		Refusal @ 7.5' possibly on foundation. Moved hole 2' over and continued.
				(Approx. 4' BGS) 8.5'	
	10	19/24	8-6	OUTWASH POORLY GRADED SAND W/ SILT: Lt. brown, f. SAND, trace silt. Loose-firm, dry, nonplastic.	
			19-22		
		22/24	21-20		OVM = background Collected analytical sample CSSB10-1 (11'-13')
			26-28		
	15	19/24	14-26		
			24-22		
		19/24	24-25		
			34-38		
	20	22/24			OVM = background Collected analytical sample CSSB10-2 (19'-21')
				(Approx. 11' BGS) 21.0'	
				END OF BORING	
	25				
	30				

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TEST BORING LOG
BORING NO. CSSB-11

PROJECT: MEFUDS – Nike LO-13 Control Site
CLIENT: US Army Corps of Engineers, New England Division
BORING CONTRACTOR: Maine Test Borings
RIG: B-51

SHEET NO. 1 OF 1
JOB NO. 10971-010-001
ELEVATION (ground) 852.85 ft
DATE STARTED 9/13/96
DATE FINISHED 9/13/96
DRILLER D. McKeen
INSPECTOR R. Eichhorn

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4"ID	1 7/8"ID		
				WT.		150#		
				FALL		30"		

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0			Augered to approx. 9' angle depth (approx. 5' BGS).	Depths reported as angled depths. Depths BGS are approx. 1/2 angled depth.
				(Approx. 5' BGS) 9.0'	
	10	22/24	7-10	OUTWASH POORLY GRADED SAND W/ SILT: Tan, f. SAND, trace silt. Firm, dry, nonplastic. Moist at 19.0'.	
			12-15		OVM = background Collected analytical sample CSSB11-1 (14'-16')
	15				
				(Approx. 10' BGS) 20.0'	
	20			TILL SILTY SAND W/ GRAVEL: Dk. brown, f.-c. SAND and GRAVEL, little silt, little clay. Firm, moist, slight plasticity.	OVM = background Collected analytical sample CSSB11-2 (19'-21')
				(Approx. 11' BGS) 21.0'	
				END OF BORING	
	25				
	30				

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WESTON MANAGERS ENGINEERS/CONSULTANTS

TEST BORING LOG
BORING NO. CSSB-12

PROJECT: MEFUDS – Nike LO-13 Control Site | SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-00
BORING CONTRACTOR: Maine Test Borings | RIG: B-51 | ELEVATION (ground) 853.17 f

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4"ID	1 7/8"ID		
				WT.		150#		
				FALL		30"		

DATE STARTED 9/13/96
DATE FINISHED 9/13/96
DRILLER D. McKeen
INSPECTOR R. Eichhorn

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0			Augered.	Depths reported as angled depths. Depths BGS are approx. 1/2 angled depth.
	5			(Approx. 5' BGS) 9.0'	
	10		4–10 12–13	OUTWASH POORLY GRADED SAND W/ SILT: Tan, f. SAND, trace silt. Firm, dry, nonplastic.	
	15		9–12 12–13	(Approx. 8' BGS) 16.0'	OVM = background Collected analytical sample CSSB12-1 (14'–16')
	20			TILL ELASTIC SILT: Dk. brown SILT, some clay, trace f. sand. Firm, moist, mod. plasticity.	OVM = background Collected analytical sample CSSB12-2 (19'–21')
				(Approx. 11' BGS) 21.0'	
	25			END OF BORING	
	30				

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TEST BORING LOG
BORING NO. CSSB-13

PROJECT: MEFUDS - Nike LO-13 Control Site
CLIENT: US Army Corps of Engineers, New England Division
BORING CONTRACTOR: Maine Test Borings
RIG: B-51

SHEET NO. 1 OF 1
JOB NO. 10971-010-001
ELEVATION (ground) 853.93 ft
DATE STARTED 9/15/96
DATE FINISHED 9/15/96
DRILLER D. McKeen
INSPECTOR R. Eichhorn

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4"ID	1 7/8"ID		
				WT.		150#		
				FALL		30"		

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0	20/24		TILL LEAN CLAY: Brown CLAY and SILT, trace f. sand, trace gravel. Firm, dry, mod. plasticity.	
				2.0'	
		13/24		ELASTIC SILT W/ GRAVEL: Tan SILT, little f.-c. sand, little gravel. Stiff, dry, nonplastic.	
	5	13/24			
		19/24			
				8.0'	
		22/24	3-5 6-11	ELASTIC SILT: Brown SILT, little-some clay, trace gravel, trace f.-c. sand. Firm-Stiff, moist-wet, mod. plasticity.	OVM = background Collected analytical sample CSSB13-1 (8'-10')
	10	22/24			
		22/24			
	15	22/24			
				16.0'	
		19/24		SILT W/ SAND: Brown SILT, little sand, trace gravel, trace clay. Firm, dry-moist, nonplastic.	
		22/24			OVM = background Collected analytical sample CSSB13-2 (18'-20')
	20				
				20.0'	
				END OF BORING	
	25				
	30				

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TEST BORING LOG
BORING NO. CSSB-14

PROJECT: MEFUDS – Nike LO-13 Control Site	SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division	JOB NO. 10971-010-00
BORING CONTRACTOR: Maine Test Borings	RIG: B-51
	ELEVATION (ground) 853.46 ±
	DATE STARTED 9/15/96
	DATE FINISHED 9/15/96
	DRILLER D. McKeen
	INSPECTOR R. Eichhorn

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4"ID	1 7/8"ID		
				WT.		150#		
				FALL		30"		

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0	9/24	1-1	TILL ELASTIC SILT W. GRAVEL: Brown SILT, trace f.-c. sand, trace f.-c. gravel. Firm, dry-moist, nonplastic.	
			2-5		
		6/24	15-18	2.0'	
			7-6	SANDY FAT CLAY: Gray-brown CLAY, little sand, little gravel. Firm-stiff, moist-wet, high plasticity.	
	5	9/24	3-2		
			2-4		
		12/24	3-4		
			4-4		
		19/24	3-3		OVM = background Collected analytical sample CSSB14-1 (8'-10')
			3-3	10.0'	
	10	19/24	7-19	SANDY ELASTIC SILT: SILT and f.-c. SAND, little f.-c. gravel. Firm, wet-saturated, non plastic.	
			20-28	12.0'	
		22/24	20-12	LEAN CLAY W/ GRAVEL: Lt. brown CLAY and SILT, trace f.-c. SAND, trace-little gravel. Stiff, saturated, mod. plasticity.	
			11-15		
	15	22/24	7-8		
			7-8		
		24/24	11-6		
			9-15		
		24/24	9-11		OVM = background Collected analytical sample CSSB14-2 (18'-20')
			9-8	20.0'	
	20			END OF BORING	
	25				
	30				

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TEST BORING LOG
BORING NO. CSSB-15

PROJECT: MEFUDS – Nike LO-13 Control Site | SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings | RIG: B-51 | ELEVATION (ground) 853.18 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4" ID	1 7/8" ID		
				WT.		150#		
				FALL		30"		

DATE STARTED 10/8/96
DATE FINISHED 10/8/96
DRILLER D. McKeen
INSPECTOR R. Eichhorn

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0	6/24	16-4 7-15	FILL wood, concrete, bricks 2.0'	
		6/24	5-6 3-4	TILL SILT W/ GRAVEL: Brown SILT, trace f.-c. gravel, trace f. sand. Firm, dry, nonplastic. 4.0'	
	5	5/24	9-7 5-4	LEAN CLAY: Lt. brown CLAY, some silt, trace f. sand. Firm, moist, mod. plasticity. 6.0'	
		12/24	4-8 13-13	SILT W. GRAVEL: Gray-brown SILT, little f.-c. gravel, trace f.-c. sand. Firm-stiff, dry, nonplastic.	
		17/24	6-9 12-7	10.0'	OVM = background Collected analytical sample CSSB15-1 (8'-10')
	10	17/24	6-5 7-7	ELASTIC SILT: Tan SILT, little clay, trace f. sand, trace f. gravel. Firm, wet, mod. plasticity.	
		14/24	2-3 8-7	13.0'	
		12/24	6-6 10-108	SANDY SILT W/ GRAVEL: SILT and f.-c. SAND, little gravel. Firm, wet, nonplastic.	
	15	–	8-12 13		
		–	8-16 26-29	20.0'	OVM = background Collected analytical sample CSSB15-2 (18'-20')
	20			END OF BORING	
	25				
	30				

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WESTON MANAGERS ENGINEERS/CONSULTANTS

TEST BORING LOG
BORING NO. CSSB-16

PROJECT: MEFUDS – Nike LO-13 Control Site
SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division
JOB NO. 10971-010-00
BORING CONTRACTOR: Maine Test Borings RIG: B-51
ELEVATION (ground) 852.98 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4"ID	1 7/8"ID		
				WT.		150#		
				FALL		30"		

DATE STARTED 10/8/96
DATE FINISHED 10/8/96
DRILLER D. McKeen
INSPECTOR R. Eichhorn

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0	24/24	5-5 5-3	FILL SILT W/ GRAVEL: Dk brown SILT, some f.-c. gravel, asphalt pieces.	
		0/24	2-2 1-1		
	5	4/24	1-1 1-3		
		0/24	2-2 1-2	8.0'	
		10/24	2-1 2-2	TILL FAT CLAY: Lt. brown CLAY, trace f. sand, trace gravel, trace organics. Firm, dry, high plasticity. 10.0'	OVM = background Collected analytical sample CSSB16-1 (10'-12')
	10	16/24	7-5 5-7	SILT W/ SAND: Brown SILT, little sand, trace f.-c. gravel. Firm, moist, nonplastic. 12'-14' BGS saturated, remaining intervals wet.	
		16/24	4-5 8-11		
	15	19/24	4-9 12-9		
		14/24	3-11 13-11		
		16/24	9-12 14-14	20.0'	OVM = background Collected analytical sample CSSB16-2 (18'-20')
	20			END OF BORING	
	25				
	30				

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TEST BORING LOG
BORING NO. CSSB-17

PROJECT: MEFUDS – Nike LO-13 Control Site
CLIENT: US Army Corps of Engineers, New England Division
BORING CONTRACTOR: Maine Test Borings
RIG: B-51

SHEET NO. 1 OF 1
JOB NO. 10971-010-001
ELEVATION (ground) 845.31 ft
DATE STARTED 10/9/96
DATE FINISHED 10/9/96
DRILLER D. McKeen
INSPECTOR R. Eichhorn

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4"ID	1 7/8"ID		
				WT.		150#		
				FALL		30"		

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0	19/24	1-3	TILL SILT W/ GRAVEL: LT. brown SILT, little-equal parts gravel, trace sand. Firm, dry, nonplastic. Becomes moist-wet at 8' BGS. Samples dry below 12' BGS.	
			3-8		
		0/24	6-7		
			8-12		
	5	18/24	8-9		
			12-18		OVM = background Collected analytical sample CSSB17-1 (6'-8')
		22/24	3-9		
			10-11		
		12/24	8-8		
			6-7		
	10	17/24	5-9		
			12-19		
		17/24	19-19		
			12-18		
	15	17/24	19-26		
			21-28		
		12/24	41-56		
			54-96		
		14/24	33-30		OVM = not functioning Collected analytical sample CSSB17-1 (18'-20')
			59-82	20.0'	
	20			END OF BORING	
	25				
	30				

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WESTON MANAGERS DESIGNERS/CONSULTANTS

TEST BORING LOG
BORING NO. CSSB-18

PROJECT: MEFUDS - Nike LO-13 Control Site | SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-00.
BORING CONTRACTOR: Maine Test Borings | RIG: B-51 | ELEVATION (ground) 861.78 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE	
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS			DATE STARTED 10/8/96
				DIA.	4 1/4"ID	1 7/8"ID			DATE FINISHED 10/8/96
				WT.		150#			DRILLER D. McKeen
				FALL		30"			INSPECTOR R. Eichhorn

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0	12/24	2-2	OUTWASH POORLY GRADED SAND: Tan f. SAND trace-little silt. Loose-stiff, dry, nonplastic.	
			2-3		
		20/24	4-4		
			6-5		
	5	17/24	5-4		
			5-2		
		10/20	6-7		
			9-8		
		22/28	6-6		OVM = background Collected analytical sample CSSB18-1 (8'-10')
			8-7	10.0'	
	10	20/24	5-5	TILL SILT W/ SANDX: Lt. brown-gray SILT and SAND, trace clay. Firm, saturated, nonplastic.	
			6-8		
		22/24	5-5		
			4-4		
	15	20/24	6-7		
			4-5		
		22/24	4-3		
			9-12	17.5'	
		15/24	10-10	SILT W/ SAND AND GRAVEL: Brown SILT, SAND, and GRAVEL. Firm, saturated, nonplastic.	OVM = background Collected analytical sample CSSB18-2 (18'-20')
			9-6	20.0'	
	20			END OF BORING	
	25				
	30				

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

Site Id: CSSB19	Project Number: 10971.010.001
Project Name: MEFUDS	
Location: Control Site, Caswell, Maine	
Ground Elev.: 0.00'	Datum:

Remarks: Drillers: Mel, Greg
Rig Type: Mobile Drill B-53

Date Drilled: 06/24/99 - 06/24/99	
Logged By: S.Combs	Project Manager:
Contractor: Maine Test Boring	
Drilling Method: HSA	
Total Depth: 40.00'	Completed Depth: 40.00'
Borehole Dia.: 4.00in	Static Water Level (bgs):
Blank Casing: type: dia: 0.00in fm: 0.0' to: 40.00'	
Screens: type: size: dia: fm: to:	
Annular Fill: type: fm: to: type: fm: to: type: fm: to:	

Depth (ft)	Soil Boring	Water Level	Recovery	Sample No.	Blow Count	Vapor	Material Description	Notes
0				0-2'	2 4 5 7		TOPSOIL/TILL; Olive f-SAND and Silt. Dry, loose, no odor, w-sorted, some rootlets.	OVM screening was not conducted.
				2-4'	5 4 5 7		Same as above with iron-staining throughout the interval.	
				4-6'	3 5 7 7			Soil sample CSSB19-1 was collected at 1045 on 6/24/99 from the 4-6' interval.
5				6-8'	7 7 7 6		Same as above, but wet.	
				8-10'	5 5 6 6		Same as above, but saturated.	
10				10-12'	3 6 6 8		Same as above, but more iron-staining.	
				12-14'	5 7 7 7			
				14-16'	1 7 4 4			
15				16-18'	4 7 5 10		16.7' Same as above, but more m-f-gravel, less cohesive, trace c-sand.	
				18-20'	4 7 8 8		Olive-gray-brown m-c-GRAVEL (angular), Silt, f-m-sand, moderate cohesion, no odor, saturated.	
20				20-22'	5 8 8 8			
				22-24'	9 10 8 6		22.6' Olive-brown SILT, trace Clay and f-sand. Cohesive, no odor, tightly compressed.	
				24-26'	3 6 12 7		24.1' Olive-brown c-m-f-SAND, c-m-f-Gravel (angular), some silt. Loose, wet, no odor.	
25				26-28'	9 8 9 8		Same as above, but more c-sand and f-gravel.	
				28-30'	5 9 13 12			

Site Id: CSSB19	Project Name: MEFUDS	Project Number: 10971.010.001

Depth (ft)	Soil Boring	Water Level	Recovery	Sample No.	Blow Count	Vapor	Material Description	Notes
				30–32'	8 14 16 12		Olive–brown c–m–f–SAND, c–m–f–Gravel (angular), some silt. Loose, wet, no odor.	
				32–34'	9 18 13 12		Same as above, but a little more c–sand.	
35				34–36'	4 12 16 11		Same as above, but saturated.	
				36–38'	8 18 32 30			Soil sample CSSB19–2 was collected at 1330 on 8/24/98 from the 38–40' interval.
				38–40'	3 12 12 15			
40							Bottom of Boring 40'.	
45								
50								
55								
60								
65								
70								

WESTON MANAGERS DESIGNERS/CONSULTANTS

Site Id: CSSB20	Project Number: 10971.010.001
Project Name: MEFUDS	
Location: Control Site, Caswell, Maine	
Ground Elev.: 0.00'	Datum:
Remarks: Drillers: Mel, Greg Rig Type: Mobile Drill B-53	

Date Drilled: 06/23/99 - 06/24/99	
Logged By: S.Combs	Project Manager:
Contractor: Maine Test Boring	
Drilling Method: HSA	
Total Depth: 40.00'	Completed Depth: 40.00'
Borehole Dia.: 4.00in	Static Water Level (bgs):
Blank Casing: type:	dia: 0.00in fm: 0.0' to: 40.00'
Screens: type: size:	dia: fm: to:
Annular Fill: type: type: type:	fm: to: fm: to: fm: to:

Soil Boring

Depth (ft)	Water Level	Recovery	Sample No.	Blow Count	Vapor	Material Description	Notes
			0-2'	1 6 9 10		FILL; Olive-yellow f-m-SAND, Silt, f-m-gravel, some c-gravel and rootlets. Dry, loose, no odor.	OVM screening was not conducted.
			2-4'	15 15 10 11		(4")	
5			4-6'	6 6 6 7		TILL; Olive f-SAND, Silt, some f-m-c-gravel (sub-rounded). Dry, firm, no odor.	Soil sample CSSB20-1 was collected at 1650 on 6/23/99 from the 4-6' interval.
			6-8'	6 6 6 5		Olive interbedded f-SAND similar to 4-6' interval.	
			8-10'	3 5 5 5		Same as 4-6' interval less gravel. Perched water at 8.8'. No odor.	
10			10-12'	4 6 6 5		Olive f-SAND and Silt. W-sorted, wet, loose, no odor.	
			12-14'	4 8 9 12			
15			14-16'	1 1 5 6			
			16-18'	6 6 7 7		Same as above except reddish and olive-yellow strigers through-out.	
			18.5-20'	1 5 6			
20			20-22'	1 4 5 5			
			22-24'	3 5 4 5		22.8' Same as above except slightly more silt.	
			24-26'	1 1 2 4		Olive SILT, little clay. No odor, cohesive, soft, saturated Perched water on layer.	
25			26-28'	11 12 14 12		27.4' Orange-brown c-GRAVEL, f-m-Sand, some m-f-gravel and silt. Gravel angular, wet, no odor.	
			28-30'	9 14 21 14		Olive-gray-brown SILT, f-m-c-Gravel, some f-sand. Wet, no odor, reddish stringers throughout.	

Site id: CSSB20	Project Name: MEFUDS	Project Number: 10971.010.001

Depth (ft)	Soil Boring	Water Level	Recovery	Sample No.	Blow Count	Vapor	Material Description	Notes
35				30–32'	9 15 17 12		Gray–brown m–GRAVEL (angular), some m–c–Sand, no odor.	
				32–34'	5 12 20 17		Olive–brown f–m–GRAVEL (sub–rounded/angular), f–m–c–Sand and silt, some clay. Saturated, no odor, loose.	
				34–36'	10 20 12 15		Olive–gray–brown SILT, m–c–Gravel (angular), some f–sand. Saturated, cohesive, no odor.	
				36–38'	9 17 25 32		Same as above, but slightly more m–c–gravel.	Soil sample CSSB20–2 was collected at 0900 on 8/24/99 from the 38–40' interval.
40				38–40'	7 19 30 32			
							Bottom of Borehole 40'.	

WESTON MANAGERS DESIGNERS/CONSULTANTS

Site Id: CSSB21	Project Number: 10971.010.001
Project Name: MEFUDS	
Location: Control Site, Caswell, Maine	
Ground Elev.: 0.00'	Datum:
Remarks: Drillers: Mel, Greg Rig Type: Mobile Drill B-53	

Date Drilled: 06/23/99 - 06/23/99	
Logged By: J. Ricker	Project Manager:
Contractor: Maine Test Boring	
Drilling Method: HSA	
Total Depth: 40.00'	Completed Depth: 40.00'
Borehole Dia.: 4.00in	Static Water Level (bgs):
Blank Casing: type: dia: 0.00in fm: 0.0' to: 40.00'	
Screens: type: size: dia: fm: to:	
Annular Fill: type: fm: to: type: fm: to: type: fm: to:	

Depth (ft)	Soil Boring	Water Level	Recovery	Sample No.	Blow Count	Vapor	Material Description	Notes
0				0-2'	2 3 3 3		FILL/TOPSOIL; Olive f-SAND, Silt, some c-sand and f-gravel, W-sorted, dry, no odor, loose, grass, rootlets.	OVM screening was not conducted.
				2-4'	2 2 3 5		Olive f-SAND, Silt. Dry, loose, w-sorted, no odor, rootlets. (4')	
5				4-6'	5 8 11 11		TILL: Olive-brown, f-m-c-SAND, Silt, f-m-c-gravel. Dry, firm, no odor, p-sorted.	Soil sample CSSB21-1 was collected at 1130 on 6/23/99 from the 4-6' interval.
				6-8'	9 11 9 17		Olive-brown f-m-c-SAND, Silt, f-m-gravel (rounded to sub-rounded). Moist, firm, no odor.	
				8-10'	6 16 17 18		Same as above with more angular c-gravel fragments.	
10				10-12'	4 12 12 14			
				12-14'	10 16 16 25			
				14-16'	7 12 12 12		Same as above, but very stiff.	
15				16-18'	9 14 25 16		Same as above, but wet at 17'.	
				18-20'	3 12 16 18		Same as above, moist to wet, slightly cohesive.	
20				20.5-22'	15 14 14			
				22-24'	12 15 19 25			
				24-26'	4 12 16 14			
25				26-28'	8 15 15 20		Same as above, some perched water on Till at ~26.2-26.7'.	
				28-30'	21 22 35 36			No recovery 28-30' interval.

Site Id: CSSB21	Project Name: MEFUDS	Project Number: 10971.010.001

Depth (ft)	Soil Boring	Water Level	Recovery	Sample No.	Blow Count	Vapor	Material Description	Notes
				30–32'	6 17 28 35		Olive–brown f–m–c–SAND, Silt, f–m–gravel (rounded to sub–rounded). Moist, firm, no odor.	
				32–34'	20 22 22 19			
35				34–36'	8 12 16 12		Brownish–orange f–SAND, f–m–c–Gravel, silt. Gravel (ang/ sub–ang). Loose, dry, no odor.	Refusal/augered from 36–38'
				38–40'	6 21 19 15			Soil sample CSSB21–2 was collected at 1530 on 6/23/99 from the 38–40' interval.
40							Bottom of Boring 40'.	
45								
50								
55								
60								
65								
70								

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Site Id: CSSB22	Project Number: 10971.010.001
Project Name: MEFUDS	
Location: Control Site, Caswell, Maine	
Ground Elev.: 0.00'	Datum:

Remarks: Drillers: Mel, Greg
Rig Type: Mobile Drill B-53

Date Drilled: 06/24/99 – 06/25/99	
Logged By: S.Combs	Project Manager:
Contractor: Maine Test Boring	
Drilling Method: HSA	
Total Depth: 40.00'	Completed Depth: 40.00'
Borehole Dia.: 4.00in	Static Water Level (bgs):
Blank Casing: type: dia: 0.00in fm: 0.0' to: 40.00'	
Screens: type: size: dia: fm: to:	
Annular Fill: type: fm: to: type: fm: to: type: fm: to:	

Depth (ft)	Soil Boring	Water Level	Recovery	Sample No.	Blow Count	Vapor	Material Description	Notes
0				0-2'	3 9 13 13		Fill; Olive-brown f-SAND and Silt, some c-gravel(subrounded) and m-sand, rootlets. Loose, dry, non-cohesive, no odor.	OVM screening was not conducted.
				2-4'	13 14 13 19		Same as above, but contains c-gravel (angular) and has iron staining throughout, no rootlets.	
				4-6'	5 11 13 15		Same as above, but more silt. Cohesive, moist.	Soil sample CSSB22-1 was collected at 1515 on 6/24/99 from the 4-6' interval.
5				6-8'	10 12 40 15		Same as above, but olive-yellow c-gravel flakes (angular).	
				8-10'	12 18 15 16		(10')	
				10-12'	7 15 13 12		Same as above, but more f-sand. Dry, loose.	
				12-14'	8 11 11 9		TILL: 12.6'GRAVEL BED;Olive-brown f-GRAVEL(subrounded), m-Gravel (angular),c-m-f-sand, little silt. Dry, loose, no odor.	
15				14-16'	1 3 3 5		Olive-brown c-m-f-GRAVEL (angular), some Silt and m-f-sand. Saturated, loose, no odor.	
				16-18'	5 7 5 5		16.2' Same as above, but less gravel, more silt/sand.	
				18-20'	1 4 3 7		Same as above, but more gravel subrounded.	
20				20-22'	1 6 6 6		Olive-gray-brown-c-m-f-GRAVEL (angular), Silt, f-m-sand. Moist, loose, no odor.	
				22-24'	11 11 14 21		22.3' Till; Light olive-brown SILT, f-Sand, c-m-f-gravel. Cohesive, moist, no odor.	
25				24-26'	5 12 12 23		Light olive-brown SILT, f-m-Sand, c-m-f-gravel. Cohesive, moist, no odor.	
				26-28'	18 35 28 21		26.2' Olive-gray-brown-SILT, f-Sand, c-m-gravel(angular), trace clay. Moist, cohesive, no odor. Little iron-staining.	
				28-30'	4 16 19 15		Olive-gray-brown m-f-SAND, c-m-Gravel(angular), some silt.	

Site Id: CSSB22	Project Name: MEFUDS	Project Number: 10971.010.001

Depth (ft)	Soil Boring	Water Level	Recovery	Sample No.	Blow Count	Vapor	Material Description	Notes
				30–32'	10 19 21 21		Dry, non–cohesive, loose, no odor.	
			N				32.8' Olive–gray–brown SILT, c–m–Gravel, f–sand. Cohesive,	
				32–34'	21 21 29 37		moist, no odor.	
			N					
35				34.5–36'	35 60 45			
			N					
							Same as above, but contains m–sand.	Soil sample CSSB22–2 was collected at 1040 on 6/25/99 from the 38–40' interval.
				38–40'	24 36 27 25			
40							Bottom of Boring 40'.	
45								
50								
55								
60								
65								
70								

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Site Id: CSSB23	Project Number: 10971.010.001
Project Name: MEFUDS	
Location: Control Site, Caswell, Maine	
Ground Elev.: 0.00'	Datum:
Remarks: Drillers: Mel, Greg Rig Type: Mobile Drill B-53	

Date Drilled: 06/22/99 - 06/22/99	
Logged By: J. Ricker	Project Manager:
Contractor: Maine Test Boring	
Drilling Method: HSA	
Total Depth: 40.00'	Completed Depth: 40.00'
Borehole Dia.: 4.00in	Static Water Level (bgs):
Blank Casing: type: dia: 0.00in fm: 0.0' to: 40.00'	
Screens: type: size: dia: fm: to:	
Annular Fill: type: fm: to: type: fm: to: type: fm: to:	

Soil Boring

Depth (ft)	Water Level	Recovery	Sample No.	Blow Count	Vapor	Material Description	Notes
			0-2'	5 14 12 8		FILL; Brown f-m-SAND, f-m-Gravel, c-sand, silt, dry, loose-crumbly, no odor.	OVM screening was not conducted.
			2-4'	15 15 12 11		Orange-brown f-m-SAND, Silt, f-m-c-gravel, dry-moist, slightly cohesive, poorly sorted, no odor. (4")	
5			4-6'	5 9 28 15		Same as above with quartz fragments.	Soil sample CSSB23-1 was collected at 0815 on 6/22/99 from the 4-6' interval.
			6-8'	15 11 11 15		TILL; Olive-brown f-SAND, Silt, some f-gravel, firm moist no odor.	
			8-10'	5 8 12 9		Brown f-m-c-SAND, Silt, some f-gravel, firm, moist, no odor.	
10			10-12'	9 9 10 9			
			12-14'	9 9 9 12		Brown f-m-c-SAND, Silt, f-m-gravel, some c-gravel(sub-ang.) weathered rock fragments, moist, crumbly, no odor.	
15			14-16'	8 12 14 14			
			16-18'	11 15 14 15		Same as above with more angular rock fragments.	
			18-20'	6 14 20 0"		Orange-brown f-m-SAND, Gravel, silt, no odor, moist.	
20			20-22'	10 60 26 36		GRAVEL; c-GRAVEL(subrounded)with silt, gravel 1-2" diam. Brown-Gray f-m-c-GRAVEL, f-m-Sand. Gravel fragments are angular, platy cleavage (Schist). Dry, loose, no odor.	Refusal/augered from 18-20'
			22-24'	32 23 25 21		Brown-gray f-m-SAND, f-m-Gravel, some c-sand and c-gravel, dry, firm, crumbly, no odor, similar to 12' to 16' interval.	
			24-26'	8 18 25 20		GRAVEL BED. Same as above more angular gravel fragments.	
25			26-28'	24 22 26 26			
			28-30'	14 29 19 12		TILL; Brown-f-m-SAND, f-m-c-Gravel, silt, poorly sorted, dry-moist, no odor.	

Site Id: CSSB23	Project Name: MEFUDS	Project Number: 10971.010.001

Depth (ft)	Soil Boring	Water Level	Recovery	Sample No.	Blow Count	Vapor	Material Description	Notes
				30–32'	6 18 10 15		Same as above with reddish gravel frgaments (iron).	
				32–34'	17 4 14 18			
35				34–36'	8 12 10 8		Brown f–SAND, m–Sand, silt, f–m–c–gravel (ang–subangular). poorly sorted, moist, no odor.	
				36–38'	9 10 10 10			Soil sample CSSB23–2 was collected at 1100 on 8/22/19 from the 38–40' interval.
40				38–40'	10 23 13 8		Bottom of Boring 40'.	
45								
50								
55								
60								
65								
70								

WESTON MANAGERS DESIGNERS/CONSULTANTS

Site Id: CSSB24	Project Number: 10971.010.001
Project Name: MEFUDS	
Location: Control Site, Caswell, Maine	
Ground Elev.: 0.00'	Datum:

Remarks: Drillers: Mel, Greg
Rig Type: Mobile Drill B-53

Date Drilled: 06/22/99 - 06/22/99	
Logged By: J. Ricker	Project Manager:
Contractor: Maine Test Boring	
Drilling Method: HSA	
Total Depth: 40.00'	Completed Depth: 40.00'
Borehole Dia.: 4.00in	Static Water Level (bgs):
Blank Casing: type:	dia: 0.00in fm: 0.0' to: 40.00'
Screens: type: size:	dia: fm: to:
Annular Fill: type:	fm: to:
type:	fm: to:
type:	fm: to:

Depth (ft)	Soil Boring	Water Level	Recovery	Sample No.	Blow Count	Vapor	Material Description	Notes
0				0-2'	5 17 25 22		FILL; Grayish-brown, f-m-c-SAND, Silt, f-m-c-gravel, grass rootlets. Dry, loose, poorly sorted, no odor.	OVM screening was not conducted.
				2-4'	18 15 12 8		Gray-brown, f-m-SAND, Silt, c-Sand, f-m-c-gravel (round/subround), mod-sorted. Loose-firm, dry, no odor.	
				4-6'	2 2 3 6		Orange-brown f-m-SAND, Silt, f-m-gravel, c-sand. Dry-moist, firm, slightly cohesive. No odor. (6")	Soil sample CSSB24-1 was collected at 1250 on 6/22/99 from the 4-6' interval.
5				6-8'	8 6 6 6		TILL; Gray f-SAND, f-m-Gravel, silt, c-sand, moist. Gravel is well rounded.	
				8-10'	2 5 6 6		Gray f-SAND, Silt, wet, slightly sticky, trace clay, No odor.	
10				10-12'	4 4 7 6		Gray f-SAND, Silt, f-gravel(rounded), some angular c-gravel fragments. Moist, loose to firm. No odor.	
				12-14'	4 4 7 4			
				14-16'	2 3 5 3		Same as above with slightly more gravel.	
15				16-18'	1 3 28 16		Same as 10-12' interval, but saturated.	
				18-20'	5 10 15 11		Orange-brown f-m-c-SAND, Silt, f-m-c-gravel (ang to sub-ang fragments)(similar to CSSB-23). Moist, loose, no odor.	
20				20-22	7 8 12 8		Same as above, but firm.	
				22-24'	4 8 12 12		22-22.5' Gray f-SAND, Silt, f-m-gravel(rounded), trace clay. Firm, moist-wet, very cohesive. 22.5-23.5' Brownish-orange f-m-c-SAND, Silt, f-m-c-gravel, moist, firm, poorly sorted.	
				24-26'	4 5 10 8		Orange-Brown f-SAND, Silt, f-gravel, some m-c-gravel. Firm, mod-sorted, no odor.	
25				26-28'	12 10 7 7		Gray-brown f-m-c-SAND, f-m-Gravel, silt, some c-gravel. Loose, crumbly, no odor, moist.	No Recovery 28-30' Interval c-gravel in tip of spoon
				28-30'	4 9 40 60		Olive-Brown f-m-c-SAND, Silt, f-m-gravel (fragments are	

Site Id: CSSB24	Project Name: MEFUDS	Project Number: 10971.010.001

Depth (ft)	Soil Boring	Water Level	Recovery	Sample No.	Blow Count	Vapor	Material Description	Notes
				30–32'	6 30 15 21		sub–ang. and sub–rounded). Loose, dry, no odor.	
				32–34'	22 35 28 24			No Recovery 32–34' interval.
35				34–36'	8 13 22 25		Same as 30–32' interval.	
				36–38'	12 22 20 25		Same as above with more angular c–gravel.	
				38–40'	4 12 15 12			Soil sample CSSB24–2 was collected at 1510 on 6/22/99 from the 38–40' interval.
40							Bottom of Boring 40'.	
45								
50								
55								
60								
65								
70								

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Site Id: CSSB25 . Project Number: 10971.010.001

Project Name: MEFUDS

Location: Control Site, Caswell, Maine

Ground Elev.: 0.00' . Datum:

Remarks: Drillers: Mel, Greg
Rig Type: Mobile Drill B-53

Date Drilled: 06/22/99 – 06/23/99

Logged By: J. Ricker | Project Manager:

Contractor: Maine Test Boring

Drilling Method: HSA

Total Depth: 40.00' | Completed Depth: 40.00'

Borehole Dia.: 4.00in | Static Water Level (bgs):

Blank Casing:
type: dia: 0.00in fm: 0.0' to: 40.00'

Screens:
type: size: dia: fm: to:

Annular Fill:
type: fm: to:
type: fm: to:
type: fm: to:

Soil Boring

Depth (ft)	Water Level	Recovery	Sample No.	Blow Count	Vapor	Material Description	Notes
			0–2'	2 6 5 5		FILL; Olive–tan f–SAND, Silt, f–gravel, some m–gravel. **Moist**, cohesive, firm, no odor, rootlets.	OVM screening was not conducted.
			2–4'	2 3 9 35			No Recovery 4–6' interval.
5			4–6'	3 6 18 15			
			8–8'	12 13 22 32		**Minimal** Recovery (Rock in tip). Olive f–m–SAND, f–m–Gravel, silt, some c–sand. Dry, loose, no odor. GRAVEL BED; (10")	Soil sample CSSB25–1 was collected at 1700 on 6/22/99 from the 6–8' interval.
10			10–12'	8 17 21 17		TILL; Olive–brown f–m–SAND, f–m–c–Gravel, silt, Quartz frags at 10.5 ft.(sub–ang. to sub–rounded). **Moist**, loose, no odor. GRAVEL BED;	Refusal/augered from 8–10' Refusal/augered from 12–14'
15			14–16'	11 27 18 21			Refusal/augered from 16–18'
			18–20'	18 30 22 22		TILL; Olive–brown f–m–c–SAND, Silt, f–m–c–gravel. **Dry, firm**, crumbly, no odor, p–sorted, frags are ang/sub–ang/sub–rd. GRAVEL BED;	
20			22–24'	25 2"			22' No Recovery in Gravel Bed. Refusal/augered from 24–25'
25			25–27'	18 45 0"		Gravel BED; Brown f–m–c–SAND, f–m–c–Gravel, some silt. **Dry, firm, no odor.**	Refusal/augered from 27–28'
			28–30'	9 15 25 19		TILL; Brown f–m–SAND, Silt, c–sand, f–m–c–gravel. Moist, firm, no–odor, p–sorted.	

Site Id: CSSB25	Project Name: MEFUDS	Project Number: 10971.010.001

Depth (ft)	Soil Boring	Water Level	Recovery	Sample No.	Blow Count	Vapor	Material Description	Notes
				30–32'	5 20 20 21		Till; Brown p–m–SAND, Silt, c–sand, f–m–c–gravel. Moist, firm, no odor, p–sorted.	
				34–36'	45 52 25 25		Same as above with angular rock fragments.	
35							Bottom of Boring 36.5' (Refusal).	Soil sample CSSB25–2 was collected at 0945 on 8/23/99 from the 36–37' interval.
40								
45								
50								
55								
60								
65								
70								

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Site Id: CSSB26	Project Number: 10971.010.001
Project Name: MEFUDS	
Location: Control Site, Caswell, Maine	
Ground Elev.: 0.00'	Datum:
Remarks: Driller: Mel, Greg Rig Type: Mobile Drill B-53	

Date Drilled: 06/25/99 - 06/25/99	
Logged By: S.Combs	Project Manager:
Contractor: Maine Test Boring	
Drilling Method: HSA	
Total Depth: 40.00'	Completed Depth: 40.00'
Borehole Dia.: 4.00in	Static Water Level (bgs):
Blank Casing: type: dia: 0.00in fm: 0.0' to: 40.00'	
Screens: type: size: dia: fm: to:	
Annular Fill: type: fm: to: type: fm: to: type: fm: to:	

Depth (ft)	Soil Boring	Water Level	Recovery	Sample No.	Blow Count	Vapor	Material Description	Notes
0				0-2'	1 2 5 6		TOPSOIL/FILL;Brown m-f-SAND, Silt, c-m-gravel (angular), little rootlets. Dry, loose, no odor. Olive-brown m-f-SAND, Silt, some c-m-gravel(angular). Slightly cohesive, no odor, dry. (6")	OVM screening was not conducted. Soil sample CSSB26-1 was collected at 1130 on 6/25/99 from the 4-6' interval.
5				4-6'	6 7 20 20			
				6-8'	19 21 32 37		TILL; Medium-brown f-m-SAND, c-m-f-Gravel (angular), some silt. Dry, loose, no odor. GRAVEL BED; TILL; Olive-brown SILT, some f-m-c-Sand, c-m-gravel (angular).Cohesive, moist, no odor, iron-staining.	Refusal/augered from 8-10'
10				10-12'	4 6 10 7		Gravel Bed;	Refusal/augered from 12-14'
				14-16'	10 11 15 14		TILL; same as 10-12' interval.	No recovery 14-16' interval. Refusal/augered from 16-18'
15							GRAVEL BED; Olive-brown c-m-f-GRAVEL (angular), some silt, c-m-f-sand. Moist, non-cohesive, no odor.	
20				18-20'	10 18 27 21			Refusal/augered from 20-22'
				22-24'	8 27 19 19			No recovery 22-24' interval. Refusal/augered from 24-25'
25				25-27'	25 50 3"			Refusal/augered from 27-30'

Site Id: CSSB26	Project Name: MEFUDS	Project Number: 10971.010.001

Depth (ft)	Soil Boring	Water Level	Recovery	Sample No.	Blow Count	Vapor	Material Description	Notes
				30–32'	10 16 26 20		Olive–brown c–m–f–GRAVEL, silt. Dry, firm, no odor.	
				32–34'	22 34 40 25			No recovery 32–34' interval. Refusal/Augered from 34–36'
35				36–38'	10 14 17 14		TILL; Brown–gray f–m–c–SAND, f–m–c–Gravel, silt. (Gravel is sub–angular). Loose, dry, no odor.	Soil sample CSSB26–2 was collected at 1315 on 8/25/98 from the 36–38' interval.
				38–40'	7 22 20 31		Gray SILT, f–Sand, c–gravel (angular), m–f–gravel(sub–round) Dry, loose, no odor.	
40							Bottom of Boring 40'.	
45								
50								
55								
60								
65								
70								

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Date Drilled: 06/23/99 – 06/23/99

Logged By: J. Ricker | Project Manager: J. Ricker

Contractor: Henry Michaud & Sons

Drilling Method: Air Hammer

Total Depth: 121.00' | Completed Depth: 121.00'

Site Id: CSMW-9 | Project Number: 10971.010.001

Borehole Dia.: 6.00in | Static Water Level (bgs): 74.26'

Project Name: MEFUDS

Location: Control Site, Caswell, Maine

Blank Casing:
type: PVC dia: 2.00in fm: -3.2' to: 111.00'

Ground Elev.: 0.00' | Datum: Not Surveyed

Screens:
type: Slotted size: 0.010india: 2.00in fm: 111.00' to: 121.00'

Remarks:

Annular Fill:
type: Grout fm: 0.00' to: 98.00'
type: Bentonite Chips fm: 98.00' to: 103.00'
type: #1 Silica Sand fm: 103.00' to: 121.00'

Depth (ft)	Well Construction	Water Level	Recovery	Sample No.	Blow Count	Vapor	Material Description	Notes
20	MP. EL. 0.00						OVERBURDEN; Lithology determined during drilling of CSMW-8.	
40								
60							BEDROCK (55').	
80								
100								
120							END OF BORING 121'.	
140								

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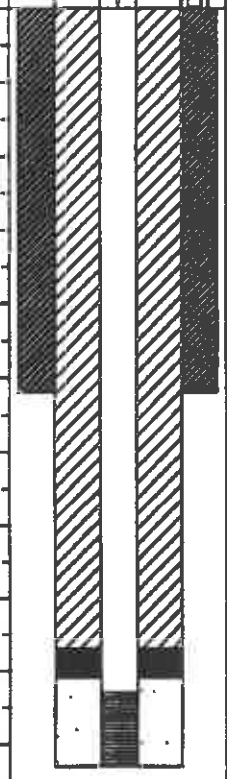
Site Id: CSMW-10	Project Number: 10971.010.001
Project Name: MEFUDS	
Location: Control Site, Caswell, Maine	
Ground Elev.: 0.00'	Datum: Not Surveyed
Remarks:	

Date Drilled: 06/24/99 - 05/24/99	
Logged By: J. Ricker	Project Manager: J. Ricker
Contractor: Henry Michaud & Sons	
Drilling Method: Air Hammer	
Total Depth: 103.00'	Completed Depth: 103.00'
Borehole Dia.: 6.00in	Static Water Level (bgs): 72.49'

Blank Casing:
type: PVC dia: 2.00in fm: -2.5' to: 93.00'

Screens:
type: Slotted size: 0.010india: 2.00in fm: 93.00' to: 103.00'

Annular Fill:
type: Grout fm: 0.00' to: 87.00'
type: Bentonite fm: 87.00' to: 91.00'
type: #1 Silica Sand fm: 91.00' to: 103.00'



Depth (ft)	Water Level	Recovery	Sample No.	Blow Count	Vapor	Material Description	Notes
						OVERBURDEN; Lithology determined during drilling of CSMW-5.	
						BEDROCK(48').	
						END OF BORING 103'.	

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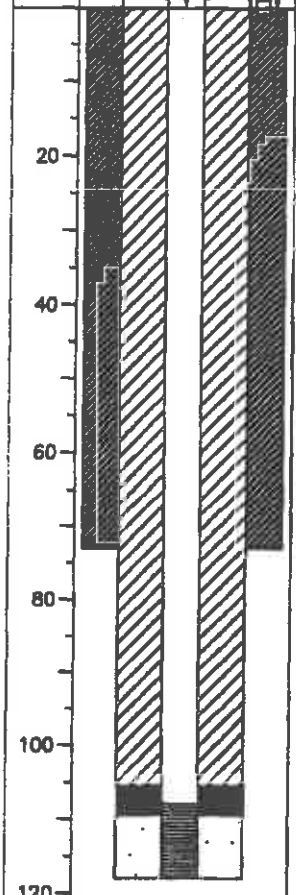
Site Id: CSMW-11	Project Number: 10971.010.001
Project Name: MEFUDS	
Location: Control Site, Caswell, Maine	
Ground Elev.: 0.00'	Datum: Not Surveyed
Remarks:	

Date Drilled: 06/23/99 - 06/23/99	
Logged By: J. Ricker	Project Manager: J. Ricker
Contractor: Henry Michaud & Sons	
Drilling Method: Air Hammer	
Total Depth: 118.00'	Completed Depth: 118.00'
Borehole Dia.: 6.00in	Static Water Level (bgs): 90.65'

Blank Casing:
type: PVC dia: 2.00in fm: -1.5' to: 108.00'

Screens:
type: Slotted size: 0.010india: 2.00in fm: 108.00' to: 118.00'

Annular Fill:
type: Grout fm: 0.00' to: 105.50'
type: Bentonite fm: 105.50' to: 109.50'
type: #1 Silica Sand fm: 109.50' to: 118.00'



Water Level	Recovery	Sample No.	Blow Count	Vapor	Material Description	Notes
					OVERBURDEN; Lithology determined during drilling of CSSB19 and CSSB21.	
					BEDROCK (71').	
					END OF BORING 118'.	

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Soil Boring Log

CSMW-100

CLIENT USACE FUDS - Former Loring Air Force Base
PROJECT NAME LO-13 Control Site
PROJECT # 15001301
PROJECT LOCATION Route 1A, Caswell, Maine
DATE STARTED 7/18/17 **LOGGED BY** S. Gannon
DEPTH TO WATER* 73.25 feet bgs **DIAMETER** 6 inches
CONTRACTOR S.W. Cole Engineering, Inc./Jeff Lee
WELL MATERIALS PVC, 0.010" slotted screen, solid riser
DRILLING METHOD Drive and wash, 2" split spoon sampler
ANNULUS MATERIALS #2 Silica Sand and Bentonite Chips
DRILLING EQUIPMENT CME 85
TOC ELEVATION 862.95 **GROUND ELEVATION** 859.65
NOTES Boring not samped, for well installation only

Depth (ft)	Penetration/ Recovery (in)	Blow Counts	Field Screening (ppm)	Lab Analytical Sample	Graphic Log	LITHOLOGY	WELL DIAGRAM
							Well Finish: Stand Pipe
0	24/12	2 5 6 5	0.0			0-12" Brown fine to coarse SAND and SILT, some organic material, some light grey coarse Gravel, medium dense, moist [TOPSOIL; SM]	
	24/1	3 5 4 5	0.0			0-1" Angular fine to coarse GRAVEL and brown fine to medium SAND, loose, moist (GW)	
5	24/16	4 3 2 3	0.0			0-16" Brown medium SILT and CLAY, some fine to coarse Sand, trace subangular fine Gravel, medium stiff, moist (CL-ML)	2" PVC Riser
	24/12	5 3 3 2	0.0			0-12" Light brown SILT and CLAY, some fine to coarse Sand, trace subangular fine Gravel, medium stiff, moist (CL-ML)	
10	24/6	2 6 6 8	0.0			0-6" Light brown SILT and CLAY, some fine to medium Sand, stiff, wet (CL-ML)	
	24/7	8 8 8 9	0.0			0-7" Light brown SILT and CLAY, some fine Sand, trace subrounded coarse Gravel, very stiff, wet (CL-ML)	Backfill Material
15	24/13	7 10 11 13	0.0			0-13" Light orange brown medium to coarse SAND and subrounded fine to coarse GRAVEL, some iron staining, medium dense, dry (SW)	
	24/8	12 18 17 18	0.0			0-8" Light orange brown to light grey medium to coarse SAND, some angular fine to coarse Gravel, dense, dry (SP)	
20	24/12	7 14 15 19	0.0			0-12" Light brown fine to coarse SAND and light grey angular fine to coarse GRAVEL, some Silt, medium dense, wet (SW)	

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Soil Boring Log

CSMW-100

CLIENT USACE FUDS - Former Loring Air Force Base **PROJECT NAME** LO-13 Control Site

PROJECT # 15001301 **PROJECT LOCATION** Route 1A, Caswell, Maine

Depth (ft)	Penetration/ Recovery (in)	Blow Counts	Field Screening (ppm)	Lab Analytical Sample	Graphic Log	LITHOLOGY	WELL DIAGRAM
25	24/5	10 12 15 18	0.0			0-5" Light brown fine to coarse SAND, some Silt, some grey angular fine Gravel, medium dense, wet (SW)	
30	24/4	33 50/1"	0.0			0-4" Light brown fine to medium SAND, some grey angular fine to coarse Gravel, some Silt, very dense, dry (SP)	
35						Boulder at 35 feet bgs. Drilled down to 40 feet bgs. No cores collected.	Bentonite Seal
40	24/2	36 36 50/4"	0.0			0-2" Grey subrounded to subangular fine to coarse GRAVEL, some coarse Sand, very dense, wet (GW)	
45	24/15	16 24 39 50/5"	0.0			0-15" Light brown SILT and CLAY, some light brown and grey fine to medium Sand, some subangular fine to coarse Gravel, hard, moist (CL-ML)	
						Augered through to bedrock.	
50							

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Soil Boring Log

CSMW-100

CLIENT USACE FUDS - Former Loring Air Force Base
PROJECT NAME LO-13 Control Site
PROJECT # 15001301
PROJECT LOCATION Route 1A, Caswell, Maine

Depth (ft)	Penetration/ Recovery (in)	Blow Counts	Field Screening (ppm)	Lab Analytical Sample	Graphic Log	LITHOLOGY	WELL DIAGRAM
55							
60						Weathered bedrock at 63 feet bgs. No cores collected. Roller bit advanced to end of boring.	Silica Sand Pack
65						Competent bedrock. No cores collected. Formation mapped as Carys Mills limestone, siltstone, and slate greywacke. Roller bit advanced to end of boring to set well.	0.010" Slotted Screen
70							
75							
80						End of boring @ 80 feet bgs (no refusal)	

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Soil Boring Log

CSMW-101

CLIENT USACE FUDS - Former Loring Air Force Base
PROJECT NAME LO-13 Control Site
PROJECT # 15001301
PROJECT LOCATION Route 1A, Caswell, Maine
DATE STARTED 7/19/17 **LOGGED BY** M. Willis
DEPTH TO WATER* 69.69 feet bgs **DIAMETER** 6 inches
CONTRACTOR S.W. Cole Engineering, Inc./Jeff Lee
WELL MATERIALS PVC, 0.010" slotted screen, solid riser
DRILLING METHOD Drive and wash, 2" split spoon sampler
ANNULUS MATERIALS #2 Silica Sand and Bentonite Chips
DRILLING EQUIPMENT CME 85
TOC ELEVATION 859.18 **GROUND ELEVATION** 856.58
NOTES Boring not samped, for well installation only

Depth (ft)	Penetration/ Recovery (in)	Blow Counts	Field Screening (ppm)	Lab Analytical Sample	Graphic Log	LITHOLOGY	WELL DIAGRAM
0	24/6	2 7 6 7	0.0			0-16" Dark brown fine SAND and SILT, medium dense, dry [TOPSOIL; SM]	Well Finish:
	24/10	8 8 5 6	0.0			0-10" Brown SILT, some fine to coarse Gravel, soft, dry (ML)	
5	24/8	2 1 3 3	0.0			0-8" Brown SILT and CLAY, some fine Gravel, trace medium to coarse Sand, soft, moist (CL-ML)	2" PVC Riser
	24/10	5 6 10 8	0.0			0-10" Brown SILT and CLAY, some fine Gravel, trace medium to coarse Sand, bottom 1" brown fine Sand, soft, moist (CL-ML)	
10	24/20	8 9 11 14	0.0			0-20" Brown fine SAND, medium dense, dry (SP)	
	24/13	10 10 15 17	0.0			0-13" Brown fine SAND, dense, dry (SP)	Backfill Material
15	24/18	7 11 13 16	0.0			0-18" Brown fine SAND, medium dense, dry (SP)	
	24/21	15 15 16 15	0.0			0-21" Brown fine SAND, dense, dry (SP)	
20	24/9	10 12 14 14	0.0			0-9" Brown fine to coarse SAND, medium dense, dry (SW)	

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Soil Boring Log

CSMW-101

CLIENT USACE FUDS - Former Loring Air Force Base **PROJECT NAME** LO-13 Control Site

PROJECT # 15001301 **PROJECT LOCATION** Route 1A, Caswell, Maine

Depth (ft)	Penetration/ Recovery (in)	Blow Counts	Field Screening (ppm)	Lab Analytical Sample	Graphic Log	LITHOLOGY	WELL DIAGRAM
25	24/15	5 3 8 15	0.0			0-15" Light brown SILT and CLAY, some fine Sand, bottom 2" fine to coarse Gravel, some orange staining, stiff, moist (CL-ML)	
30	24/6	6 8 9 16	0.0			0-6" Brown SILT, some medium to coarse Sand, little fine to coarse Gravel, very stiff, dry (ML)	
35	24/9	11 8 5 9	0.0			0-9" Brown SILT, some medium to coarse Sand, little fine to coarse Gravel, stiff, dry (ML)	Bentonite Seal
40	24/10	9 17 15 17	0.0			0-10" Brown and grey medium to coarse SAND and SILT, some coarse Gravel, dense, dry (SM)	
45	24/3	18 15 12 15	0.0			0-3" Light brown and grey medium to coarse SAND and SILT, some coarse Gravel, medium dense, dry (SM)	
50	24/18	17 21 38 50/5"	0.0			0-18" Light brown SILT and CLAY, some angular coarse Sand, some fine to coarse Gravel, hard, moist (CL-ML)	
						Bedrock encountered at 53 feet bgs. No cores collected. Formation	

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Soil Boring Log

CSMW-101

CLIENT USACE FUDS - Former Loring Air Force Base
PROJECT NAME LO-13 Control Site
PROJECT # 15001301
PROJECT LOCATION Route 1A, Caswell, Maine

Depth (ft)	Penetration/ Recovery (in)	Blow Counts	Field Screening (ppm)	Lab Analytical Sample	Graphic Log	LITHOLOGY	WELL DIAGRAM
55						mapped as Carys Mills limestone, siltstone, and slate greywacke. Roller bit advanced to 71 feet bgs.	
60							Silica Sand Pack
65							0.010" Slotted Screen
70						Bedrock fracture encountered at 71 feet bgs. No cores collected. Formation mapped as Carys Mills limestone, siltstone, and slate greywacke. Roller bit advanced to end of boring to set well.	
75							
80						End of boring @ 80 feet bgs (no refusal)	

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Soil Boring Log

CSSB-27
PAGE 1 OF 1

CLIENT USACE FUDS - Former Loring Air Force Base
PROJECT NAME LO-13 Control Site
PROJECT # 15001301
PROJECT LOCATION Route 1A, Caswell, Maine
DATE STARTED 7/19/17 **LOGGED BY** S. Gannon
DEPTH TO WATER* 4 feet bgs **DIAMETER** 2 inches
CONTRACTOR County Environmental Engineering/Craig Brescia
WELL MATERIALS NA
DRILLING METHOD Direct Push
ANNULUS MATERIALS NA
DRILLING EQUIPMENT Geoprobe 540U Truck Rig w/ 2" macrocore
TOC ELEVATION _____ **GROUND ELEVATION** NA
NOTES Sampled for EPH carbon fractions, VPH, and PAHs with SIM. Oleophilic dye test saturated at 5 to 7 feet bgs.

Depth (ft)	Penetration/ Recovery (in)	Blow Counts	Field Screening (ppm)	Lab Analytical Sample	Graphic Log	LITHOLOGY	WELL DIAGRAM
0	48/48	NA	0.0			0-4" Light brown medium to fine SAND, organic material [TOPSOIL; SP]	No well installed
						4-6" Black ASH/FILL	
						6-48" Light brown fine to medium SAND, some Silt, some Clay, little subrounded fine to coarse Gravel, moist (SP)	
	48/36		0.0			0-3" Light brown fine SAND and SILT, relatively dense compared to above, dry (SM)	
5			48.5			3-36" Light grey SILT and CLAY, some fine Sand, wet (CL-ML)	
			38.6 Saturated	CSSB-27-1 (5-7)			
			20.9				
	48/40		10.8			0-20" Light grey SILT and CLAY, wet (CL-ML)	
			16.8				
10			12.0			20-40" Light brown fine SAND and SILT, dry, band of iron staining at 38" (SM)	
			1.7				
	48/30		0.0			0-6" Light grey SILT and CLAY, wet (CL-ML)	
						6-30" Light brown fine SAND and SILT, dry (SM)	
			1.2				
15			0.3				
	48/32		0.2			0-1" Light grey SILT and CLAY, wet (CL-ML)	
			0.0			1-32" Light brown fine to coarse SAND, some Silt, trace Clay, trace subangular fine Gravel, relatively dense compared to above, moist (SW)	
20	24/20		0.4			0-3" Light grey SILT and CLAY, wet (CL-ML)	
			0.1	CSSB-27-2 (20-22)		3-22" Light brown fine to coarse SAND, some subangular fine to coarse Gravel, dry (SW)	
						Refusal @ 22 feet bgs	
25							

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Soil Boring Log

CSSB-28
PAGE 1 OF 1

CLIENT USACE FUDS - Former Loring Air Force Base
PROJECT NAME LO-13 Control Site
PROJECT # 15001301
PROJECT LOCATION Route 1A, Caswell, Maine
DATE STARTED 7/19/17 **LOGGED BY** S. Gannon
DEPTH TO WATER* Not encountered **DIAMETER** 2 inches
CONTRACTOR County Environmental Engineering/Craig Brescia
WELL MATERIALS NA
DRILLING METHOD Direct Push
ANNULUS MATERIALS NA
DRILLING EQUIPMENT Geoprobe 540U Truck Rig w/ 2" macrocore
TOC ELEVATION _____ **GROUND ELEVATION** NA
NOTES Sampled for EPH carbon fractions, VPH, and PAHs with SIM.

Depth (ft)	Penetration/ Recovery (in)	Blow Counts	Field Screening (ppm)	Lab Analytical Sample	Graphic Log	LITHOLOGY	WELL DIAGRAM
0	48/34		0.0			0-6" Dark brown fine SAND and SILT, organic material, moist [TOPSOIL; SM]	No well installed
		NA				6-34" Light brown fine to coarse SAND and SILT, some subangular fine Gravel, relatively dense compared to above, moist (SM)	
	48/30		0.0			0-8" Dark grey fine SAND and SILT, some subangular coarse Sand, moist (SM)	
5						8-16" Light grey fine SAND and SILT, relatively dense compared to above, moist (SM)	
						16-30" Light brown fine to coarse SAND and SILT, little subangular fine Gravel, moist (SM)	
	48/48		0.0			0-12" Light grey fine SAND and SILT, moist (SM)	
			0.4			12-20" Brownish-grey fine to coarse SAND and SILT, moist (SM)	
10			0.0			20-36" Light grey SILT and CLAY, trace subangular coarse Gravel, moist (CL-ML)	
						36-48" Light brown fine to coarse SAND and SILT, dry (SM)	
	48/36		0.0			0-24" Light brown fine to medium SAND, relatively loose compared to above, dry (SP)	
			0.4				
15			0.1			24-36" Light grey fine to coarse SAND and SILT, moist (SM)	
	48/36		0.0			0-36" Light brown fine SAND and SILT, dry (SM)	
20	48/48		0.0	CSSB-28-1 (19.5-20) CSSB-28-2 (20-22)		0-48" Light brown fine SAND and SILT, relatively dense compared to above, dry, band of wet grey Clay at 18-19" (SM)	
						Refusal @ 24 feet bgs	
25							

CREDERE ENV 2015 - GINT STD US LAB.GDT - 2/14/18 08:53 - P:\15001301 USACE LORING FUDS RI-RA\WORK\TASK 7 (7.1_7.2(A)) - FIELD\BORING LOGS\CONTROL SITE SOIL BORINGS.GPJ

Credere Associates, LLC
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Westbrook, Maine 04092
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Soil Boring Log

CSSB-29
PAGE 1 OF 1

CLIENT USACE FUDS - Former Loring Air Force Base
PROJECT NAME LO-13 Control Site
PROJECT # 15001301
PROJECT LOCATION Route 1A, Caswell, Maine
DATE STARTED 7/19/17 **LOGGED BY** S. Gannon
DEPTH TO WATER* Not encountered **DIAMETER** 2 inches
CONTRACTOR County Environmental Engineering/Craig Brescia
WELL MATERIALS NA
DRILLING METHOD Direct Push
ANNULUS MATERIALS NA
DRILLING EQUIPMENT Geoprobe 540U Truck Rig w/ 2" macrocore
TOC ELEVATION _____ **GROUND ELEVATION** NA
NOTES Sampled for EPH carbon fractions, VPH, and PAHs with SIM.

Depth (ft)	Penetration/ Recovery (in)	Blow Counts	Field Screening (ppm)	Lab Analytical Sample	Graphic Log	LITHOLOGY	WELL DIAGRAM
0	48/30	NA	0.0			0-7" Dark brown fine SAND and SILT, organic material, dense, moist [TOPSOIL; SM]	No well installed
						7-16" Dark brown medium to coase SAND, some subangular coarse Gravel, dry (SP)	
						16-30" Light brown fine to coarse SAND and SILT, some Clay, relatively dense compared to above, moist (SM)	
	48/34		0.0			0-24" Light brown fine to coarse SAND and SILT, some subangular fine Gravel, moist (SM)	
5						24-34" Light grey fine to coarse SAND and SILT, some subangular fine Gravel, relatively dense compared to above, moist (SM)	
	48/30		0.0			0-12" Light grey fine to coarse SAND, some medium Gravel, trace black ash/fill material, relatively loose compared to above, dry (SW)	
10			0.1			12-30" Light brown fine SAND and SILT, relatively dense compared to above, dry (SM)	
			0.1	CSSB-29-1 (10-12)			
	24/6		0.0			0-6" Light brown fine SAND and SILT, relatively dense compared to above, moist (SM)	
				CSSB-29-2 (12-14)			
15						Refusal @ 14 feet bgs	
20							
25							

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Soil Boring Log

CSSB-30
PAGE 1 OF 1

CLIENT USACE FUDS - Former Loring Air Force Base
PROJECT NAME LO-13 Control Site
PROJECT # 15001301
PROJECT LOCATION Route 1A, Caswell, Maine
DATE STARTED 7/19/17 **LOGGED BY** S. Gannon
DEPTH TO WATER* 11 feet bgs **DIAMETER** 2 inches
CONTRACTOR County Environmental Engineering/Craig Brescia
WELL MATERIALS NA
DRILLING METHOD Direct Push
ANNULUS MATERIALS NA
DRILLING EQUIPMENT Geoprobe 540U Truck Rig w/ 2" macrocore
TOC ELEVATION _____ **GROUND ELEVATION** NA
NOTES Sampled for EPH carbon fractions, VPH, and PAHs with SIM.

Depth (ft)	Penetration/ Recovery (in)	Blow Counts	Field Screening (ppm)	Lab Analytical Sample	Graphic Log	LITHOLOGY	WELL DIAGRAM
0	48/34	NA	0.0			0-4" Light brown SAND and SILT, organic material, moist [TOPSOIL; SM]	No well installed
						4-12" Grey angular coarse GRAVEL and rock flakes and brown subangular medium to coarse SAND, dry (GW)	
						12-34" Light brown fine to coarse SAND and SILT, some subrounded fine to coarse Gravel, dry (SM)	
	48/22		0.0			0-8" Light grey SILT and CLAY, some subangular fine to coarse Gravel, possible fill layer, relatively loose compared to above, saturated (CL-ML)	
5						8-12" Dark brown SILT and CLAY, organic material (wood), saturated (CL-ML)	
						12-22" Light grey fine to medium SAND and SILT, relatively dense compared to above, moist (SM)	
	48/32		0.0			0-12" Brownish grey fine to coarse SAND and SILT, some subangular fine to coarse Gravel, relatively loose compared to above, saturated (SM)	
10						12-32" Grey SILT and CLAY, relatively dense compared to above, wet (CL-ML)	
				CSSB-30-1 (10-12)			
	48/48		0.0			0-48" Grey fine to coarse SAND and SILT, some Clay, some subangular fine Gravel, relatively dense compared to above, wet (SM)	
				CSSB-30-2 (12-14)			
15						Refusal @ 16 feet bgs	
20							
25							

CREDERE ENV 2015 - GINT STD US LAB.GDT - 2/14/18 08:53 - P:\15001301 USACE LORING FUDS RI-RA\WORK\TASK 7 (7.1_7.2(A)) - FIELD\BORING LOGS\CONTROL SITE SOIL BORINGS.GPJ

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Soil Boring Log

CSSB-31
PAGE 1 OF 1

CLIENT USACE FUDS - Former Loring Air Force Base
PROJECT NAME LO-13 Control Site
PROJECT # 15001301
PROJECT LOCATION Route 1A, Caswell, Maine
DATE STARTED 7/19/17 **LOGGED BY** S. Gannon
DEPTH TO WATER* 15 feet bgs **DIAMETER** 2 inches
CONTRACTOR County Environmental Engineering/Craig Brescia
WELL MATERIALS NA
DRILLING METHOD Direct Push
ANNULUS MATERIALS NA
DRILLING EQUIPMENT Geoprobe 540U Truck Rig w/ 2" macrocore
TOC ELEVATION _____ **GROUND ELEVATION** NA
NOTES Sampled for EPH carbon fractions, VPH, and PAHs with SIM.

Depth (ft)	Penetration/ Recovery (in)	Blow Counts	Field Screening (ppm)	Lab Analytical Sample	Graphic Log	LITHOLOGY	WELL DIAGRAM
0	48/27	NA	0.0	CSSB-31-1 (5-7)		0-27" Organic material on top, light orange brown fine to coarse SAND, some subrounded fine Gravel, dry (SW)	No well installed
	48/30		0.0			0-24" Light brown fine to coarse SAND, trace subangular fine Gravel, dry (SW)	
5							
						24-30" Light grey subangular fine to coarse SAND and fine GRAVEL, dry (SW)	
	48/48		0.0			0-48" Light brown and grey fine to coarse SAND and SILT, some fine Gravel, moist (SM)	
10							
	48/36		0.0			0-24" Light brown fine to coarse SAND, some Silt, some Clay, trace subangular fine Gravel, wet (SW)	
						24-36" Light brown fine to medium SAND, some Silt, trace Gravel, wet (SP)	
15							
	60/48		0.1			0-24" Light brown fine to coarse SAND, trace subrounded fine Gravel, relatively dense compared to above, dry (SW)	
			0.0			24-48" Light brown fine to coarse SAND, wet (SW)	
20							
						End of boring @ 21 feet bgs (no refusal)	
						Note: Drilled interval 16 to 20 feet bgs and overdrilled to 21 feet bgs because the sample tube was not full (incomplete recovery)	
25							

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Soil Boring Log

CSSB-32
PAGE 1 OF 1

CLIENT USACE FUDS - Former Loring Air Force Base
PROJECT NAME LO-13 Control Site
PROJECT # 15001301
PROJECT LOCATION Route 1A, Caswell, Maine
DATE STARTED 7/19/17 **LOGGED BY** S. Gannon
DEPTH TO WATER* 14 feet bgs **DIAMETER** 2 inches
CONTRACTOR County Environmental Engineering/Craig Brescia
WELL MATERIALS NA
DRILLING METHOD Direct Push
ANNULUS MATERIALS NA
DRILLING EQUIPMENT Geoprobe 540U Truck Rig w/ 2" macrocore
TOC ELEVATION _____ **GROUND ELEVATION** NA
NOTES Sampled for EPH carbon fractions, VPH, and PAHs with SIM.

Depth (ft)	Penetration/ Recovery (in)	Blow Counts	Field Screening (ppm)	Lab Analytical Sample	Graphic Log	LITHOLOGY	WELL DIAGRAM
0	48/41	NA	0.0			0-3" Brown fine to coarse SAND and SILT, organic material, dry [TOPSOIL; SM]	No well installed
						3-38" Light brown fine to coarse SAND, some fine to coarse Gravel, relatively dense compared to above, dry (SW)	
	48/26		0.0			38-41" Light brown SILT and CLAY, some fine to coarse Sand, trace subrounded fine Gravel, moist (CL-ML)	
5						0-6" Light brown SILT and CLAY, some fine to coarse Sand, trace subrounded fine Gravel, moist (CL-ML)	
						6-10" Dark grey angular fine to coarse GRAVEL (slate), some fine to coarse Sand, relatively loose compared to above, dry (GW)	
	48/25		0.0			10-26" Light brown SILT and CLAY, some grey fine to medium Sand, little subrounded fine Gravel, relatively dense compared to above, moist (CL-ML)	
						0-3" Light brown SILT and CLAY, little fine to medium Sand, trace rounded coarse Gravel, moist (CL-ML)	
10						3-6" Black coarse ASH/FILL material, relatively loose compared to above, dry	
						6-25" Light brown fine to coarse SAND, some Silt, dry (SW)	
	48/48		0.0			0-48" Light brown fine SAND and SILT, trace Clay, band of black ash/fill material at 7", relatively dense compared to above, moist, wet at 32" (SM)	
15							
	48/32		0.0			0-12" Light brown fine SAND and SILT, some Clay, moist, band of black ash/fill material at 12" (SM)	
						12-20" Light brown medium to coarse SAND, some subangular fine to coarse Gravel, dry (SP)	
						20-32" Light brown fine to coarse SAND and SILT, some Gravel, moist (SM)	
20	48/29		0.0	CSSB-32-1 (19-21)		0-29" Light orange brown fine to coarse SAND, some angular fine to coarse Gravel, relatively dense compared to above, moist (SW)	
				CSSB-32-2 (21-23)			
	48/31		0.0			0-31" Light orange brown fine to medium SAND, some Silt, some subangular fine to coarse Gravel, dry (SW)	
25							
						End of boring @ 28 feet bgs (no refusal)	

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TEST BORING LOG
BORING NO. LSMW-1

PROJECT: MEFUDS – Nike LO-13 Launch Site	SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division	JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings RIG: B-61	ELEVATION (PVC) 778.38 ft
GROUNDWATER	DATE STARTED 9/17/96
DATE / TIME / WATER ELEVATION / DATUM	DATE FINISHED 9/17/96
	DRILLER J. Rudnicki
	INSPECTOR T. Warr

	CAS.	SAMP.	CORE	TUBE
TYPE	HSA	SS		
DIA.	4 1/4" ID	1 7/8" ID		
WT.		150#		
FALL		30"		

DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
0	24/24	3-4	TOPSOIL 0.5'	
		4-4	FILL SANDY SILT: Brown SILT, little f.-c. sand, trace f.-c. gravel. Loose, wet. 2.0'	
	19/24	3-3		
		2-3	TILL ELASTIC SILT W/ SAND: Brown SILT, little f.-c. sand, trace f.-c. gravel, trace clay. Stiff, wet, low plasticity.	
5	13/24	6-4		
		4-9		
	23/24	8-5		
		7-8	8.0'	
	23/24	7-5	ELASTIC SILT W/ GRAVEL: Brown SILT, some f.-c. gravel, little f.-c. SAND, trace clay. Stiff, saturated, mod. plasticity.	OVM = background Collected analytical sample LSMW1-1 (8'-10')
		7-16		
10	5/24	11-17		
		14-10	12.0'	
	19/24	22-38	SILTY GRAVEL W/ SAND: Brown, f.-c. GRAVEL, little f.-c. sand, little silt. Stiff, moist.	
		45-42		
15	13/24	16-18		
		32-33		
	14/24	10-6		OVM = background Collected analytical sample LSMW1-2 (18'-18.3')
		48-43	18.3'	
	4/4	10/4"	END OF BORING Auger refusal.	
20				
25				
30				

WELL CONSTRUCTION

pea stone

bentonite

sand

bentonite

4" steel protective casing, 4" ID, with locking cap

Screen: 2" PVC with 0.010" slots

Riser: 2" PVC

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WESTON MANAGERS ENGINEERS/CONSULTANTS

TEST BORING LOG
BORING NO. LSMW-2

PROJECT: MEFUDS – Nike LO-13 Launch Site | SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings | RIG: B-51 | ELEVATION (ground) 776.54 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4" ID	1 7/8" ID		
				WT.		150#		
				FALL		30"		

DATE STARTED 9/25/96
DATE FINISHED 9/25/96
DRILLER D. McKeen
INSPECTOR R. Eichhorn

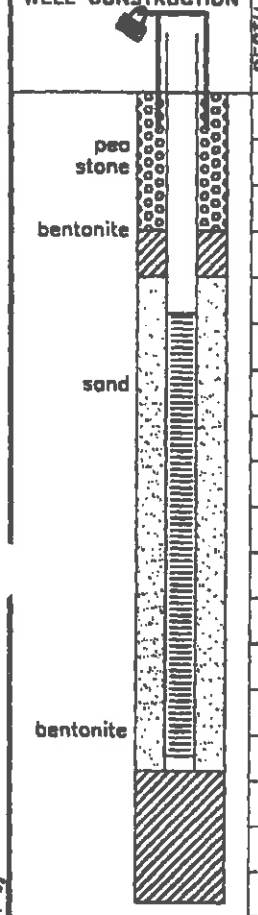
WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0	12/24	4-11 14-13	TOPSOIL/FILL SILT, trace-little gravel, trace organics. Loose, dry, nonplastic. 2.0'	
	5	6/24	10-21 20-20	TILL ELASTIC SILT: SILT, little clay, trace f.-c. sand, trace gravel. Firm, moist, mod. plasticity.	
		14/24	7-11 16-20		
		19/24	19-20 20-21		OVM = background Collected analytical sample LSMW2-1 (6'-8')
		20/24	8-13 15-20	10.0'	
	10	20/24	16-11 16-15	FAT CLAY: Lt. brown CLAY, trace silt, trace f. sand, trace f.-c. gravel. Firm, moist, mod. plasticity. 12.0'	
		12/24	18-30 100/0"	WELL GRADED GRAVEL: F.-c. gravel, trace sand. Likely weathered bedrock. 14.2'	OVM = background Collected analytical sample LSMW2-2 (12'-14')
	15	0/0.2	50/0.2"	END OF BORING Spoon refusal on bedrock.	
	20				
	25				
	30				

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TEST BORING LOG
BORING NO. LSMW-3

PROJECT: MEFUDS – Nike LO-13 Launch Site | SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings | RIG: B-61 | ELEVATION (PVC) 774.88 ft
DATE STARTED 9/24/96
DATE FINISHED 9/24/96
DRILLER J. Rudnicki
INSPECTOR T. Warr

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4" ID	1 7/8" ID		
				WT.		150#		
				FALL		30"		



DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
0	24/24	2-5	TOPSOIL 0.5'	
		5-8	FILL SILT W/ SAND: Brown SILT, little f.-c. sand, trace f.-c. gravel. Firm, moist. Sand percentage increases w/ depth.	
	24/24	5-10		
		11-11		
5	16/24	10-11		
		15-10	6.0'	
	20/24	6-8	TILL SANDY ELASTIC SILT: Gray SILT, some f.-c. sand, little f.-c. gravel, trace clay. Stiff, wet, mod. plasticity. 8.0'	OVM = background Collected analytical sample LSMW3-1 (6'-8')
		9-11		
	24/24	14-16		
		16-17	SILTY SAND: Gray-brown, f.-c. SAND, some silt, little f.-c. gravel, trace clay. Stiff, wet, low plasticity.	
10	0/24	5-6		
		17-21		
	5/24	16-17		
		16-19	14.0'	Rock in nose of spoon.
15	18/24	5-6	SANDY ELASTIC SILT: Gray-brown SILT, some f.-c. sand, little f.-c. gravel, trace clay. Stiff, wet, low plasticity. 16.0'	
		5-7		
	4/10	16-100/5"	POORLY GRADED SAND W/ SILT: Gray, f.-c. SAND, little f.-c. gravel, little silt. Stiff, moist. 17.7'	
20			END OF BORING Auger refusal.	
25				
30				

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TEST BORING LOG
BORING NO. LSMW-4

PROJECT: MEFUDS – Nike LO-13 Launch Site	SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division	JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings RIG: B-61	ELEVATION (ground) 772.54 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4" ID	1 7/8" ID		
				WT.		150#		
				FALL		30"		

DATE STARTED 9/24/96
DATE FINISHED 9/24/96
DRILLER J. Rudnicki
INSPECTOR T. Warr

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0	24/24	4-5	TOPSOIL 0.5'	
			6-5	FILL SANDY SILT: Brown SILT, some f.-c. sand, trace f.-c. gravel. Soft, moist. Sand and gravel percentages increase w/ depth. 4.0'	
		22/24	9-10		
			11-16		
	5	10/24	37-52	TILL SILTY SAND W/ GRAVEL: Gray-brown, f.-c. SAND, some silt, little f.-c. gravel. Stiff, moist. Moisture content increases w/ depth.	OVM = background Collected analytical sample LSMW4-1 (6'-8')
			33-18		
		19/24	12-13		
			11-7		
		17/24	6-8		
			10-10	10.0'	
	10	22/24	3-5	ELASTIC SILT: Gray SILT, trace clay, trace f.-c. sand. Stiff, saturated, low plasticity. 12.0'	
			4-3		
		18/24	5-5	SILTY SAND W/ GRAVEL: Gray, f.-c. SAND, little f.-c. gravel, little silt, trace clay. Stiff, saturated, low plasticity.	
			5-7		
	15	18/24	9-12		
			13-13	16.0'	
		3/24	8-9	SILTY GRAVEL W/ SAND: Gray, f.-c. GRAVEL, little f.-c. sand, little silt. Stiff, moist.	Much of recovery is broken rock. OVM = background Collected analytical sample LSMW4-2 (18'-19.6')
			7-11		
		12/47	9-18		
			22-50/1"	19.6'	
	20			END OF BORING Auger refusal.	
	25				
	30				

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TEST BORING LOG
BORING NO. LSMW-5

PROJECT: MEFUDS – Nike LO-13 Launch Site
CLIENT: US Army Corps of Engineers, New England Division
BORING CONTRACTOR: Maine Test Borings
RIG: B-61

SHEET NO. 1 OF 1
JOB NO. 10971-010-001
ELEVATION (ground) 763.01 ft
DATE STARTED 9/24/96
DATE FINISHED 9/24/96
DRILLER J. Rudnicki
INSPECTOR T. Warr

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4"ID	1 7/8"ID		
				WT.		150#		
				FALL		30"		

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0	19/24	3-12	TOPSOIL 0.5'	
			10-7	FILL SILTY SAND W/ GRAVEL: Gray-brown, f.-c. SAND, little silt, little f.-c. gravel. Loose, moist.	
		21/24	6-12		
			17-19	4.0'	
	5	19/24	10-12	WELL GRADED SAND W/ SILT: Brown, f.-c. SAND, trace silt, trace f.-c. gravel. Loose, wet.	
			12-21		
		6/24	6-8		
			0-9	8.0'	
		19/24	4-4	TILL SILTY SAND W/ GRAVEL: Yellow-brown, f.-c. SAND, little silt, little f.-c. gravel, trace clay. Stiff, saturated, low plasticity. 10.0'	OVM = background Collected analytical sample LSMW5-1 (8'-10')
			4-5		
	10	21/24	6-10	GRAVELLY ELASTIC SILT: Gray-brown SILT and f.-c. GRAVEL, little f.-c. sand, trace clay. Stiff, wet, low plasticity.	
			10-10		
		24/24	12-10		
			11-16	14.0'	
	15	20/24	6-12	ELASTIC SILT W/ GRAVEL: Gray-brown SILT, little f.-c. gravel, trace f.-c. sand, trace clay. Stiff, wet, low plasticity.	
			13-16		
		16/24	13-32		
			21-11		OVM = background Collected analytical sample LSMW5-2 (18'-18.8')
		9/10	9-50/4"	18.8'	
	20			END OF BORING Auger refusal.	
	25				
	30				

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TEST BORING LOG
BORING NO. LSMW-6

PROJECT: MEFUDS – Nike LO-13 Launch Site | SHEET NO. 1 OF 2
CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-001
BORING CONTRACTOR: Henry Michaud & Sons | RIG: Air Rotary | ELEVATION (PVC) 764.47 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	Steel			
10/11/96	0842	744.86	feet	DIA.	6" ID			
				WT.				
				FALL				

DATE STARTED 10/8/96
DATE FINISHED 10/8/96
DRILLER B. Michaud
INSPECTOR T. Warr

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
pea stone	0			OVERBURDEN Lithology determined during drilling of LSMW-5.	
backfill	5				
	10				
cement/ bentonite grout	15				
				19.0'	
	20			WEATHERED BEDROCK QUARTZITE	
				22.0'	
				COMPETENT BEDROCK QUARTZITE	
29' steel protective casing, 5" ID, flush mount with locking cap Screen: 2" PVC with 0.010" slots (63'-73') Riser: 2" PVC	25				
	30				

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TEST BORING LOG
BORING NO. LSMW-6

PROJECT: MEFUDS – Nike LO-13 Launch Site | SHEET NO. 2 OF 2
CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-001
BORING CONTRACTOR: Henry Michaud & Sons | RIG: Air Rotary | ELEVATION (PVC) 764.47 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	Steel			
10/11/96	0842	744.86	feet	DIA.	6" ID			
				WT.				
				FALL				

DATE STARTED 10/8/96
DATE FINISHED 10/8/96
DRILLER B. Michaud
INSPECTOR T. Worr

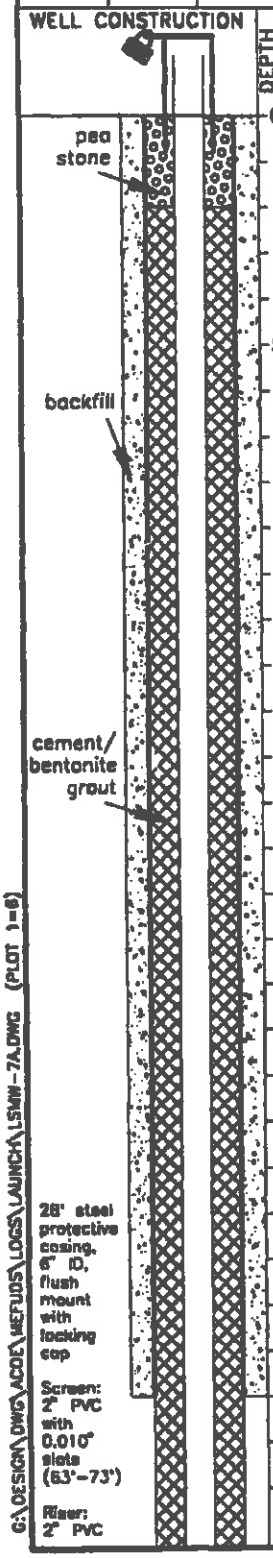
WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
cement/ bentonite grout	30			COMPETENT BEDROCK QUARTZITE	
bentonite	35				
#0 sand	40				
	45				
	50				
29' steel protective casing, 6" ID, flush mount with locking cap	55				
Screen: 2" PVC with 0.010" slots (63'–73')	60			60.0' END OF BORING	Fracture zone from 58'–60'. Well yield approx. 20 gpm.
Riser: 2" PVC					

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TEST BORING LOG
BORING NO. LSMW-7

PROJECT: MEFUDS – Nike LO-13 Launch Site | SHEET NO. 1 OF 2
CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-001
BORING CONTRACTOR: Henry Michaud & Sons | RIG: Air Rotary | ELEVATION (PVC) 778.35 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE	
DATE	TIME	WATER ELEVATION	DATUM	TYPE	Steel				DATE STARTED 10/8/96
10/11/96	1148	749.09	feet	DIA.	6" ID				DATE FINISHED 10/8/96
				WT.					DRILLER B. Michaud
				FALL					INSPECTOR T. Warr



DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
0			OVERBURDEN Lithology determined during drilling of LSMW-2.	
15.0'			WEATHERED BEDROCK QUARTZITE	
19.0'			COMPETENT BEDROCK QUARTZITE	

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TEST BORING LOG
BORING NO. LSMW-7

PROJECT: MEFUDS – Nike LO-13 Launch Site	SHEET NO. 2 OF 2
CLIENT: US Army Corps of Engineers, New England Division	JOB NO. 10971-010-001
BORING CONTRACTOR: Henry Michaud & Sons	RIG: Air Rotary
	ELEVATION (PVC) 778.35 ft
	DATE STARTED 10/8/96
	DATE FINISHED 10/8/96
	DRILLER B. Michaud
	INSPECTOR T. Warr

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	Steel			
10/11/96	1148	749.09	feet	DIA.	6" ID			
				WT.				
				FALL				

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
cement/ bentonite grout; bentonite; #0 sand; 28' steel protective casing, 6" ID, flush mount with locking cap; Screen: 2" PVC with 0.010" slots (63'–73'); Riser: 2" PVC	30, 35, 40, 45, 50, 55, 60			COMPETENT BEDROCK QUARTZITE 55.0' END OF BORING	Fracture zone from 48'–55'. Well yield approx. 2–3 gpm.

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TEST BORING LOG
BORING NO. LSMW-8

PROJECT: MEFUDS – Nike LO-13 Launch Site
CLIENT: US Army Corps of Engineers, New England Division
BORING CONTRACTOR: Henry Michaud & Sons
RIG: Air Rotary

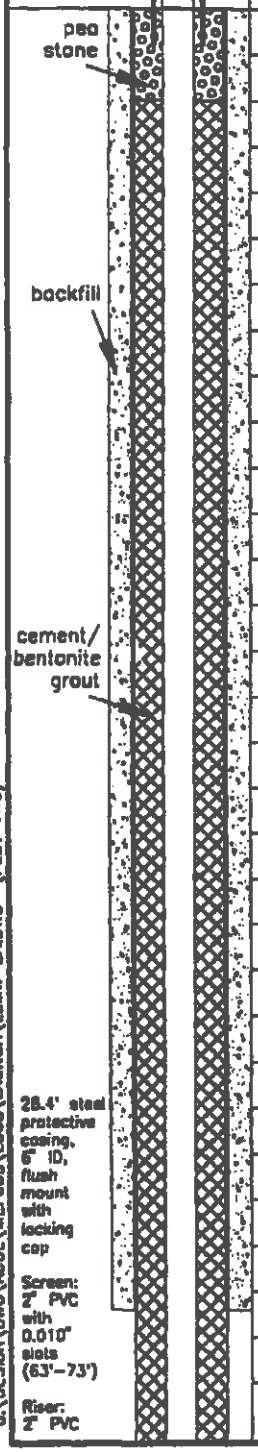
SHEET NO. 1 OF 2
JOB NO. 10971-010-001
ELEVATION (PVC) 774.89 ft
DATE STARTED 10/8/96
DATE FINISHED 10/9/96
DRILLER B. Michaud
INSPECTOR T. Warr

GROUNDWATER

DATE	TIME	WATER ELEVATION	DATUM
10/11/96	1024	749.07	feet

	CAS.	SAMP.	CORE	TUBE
TYPE	Steel			
DIA.	6" ID			
WT.				
FALL				

WELL CONSTRUCTION



DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
0			OVERBURDEN Lithology determined during drilling of LSMW-7.	
5				
10				
15				
19.0'				
20			WEATHERED BEDROCK QUARTZITE	
23.0'				
25			COMPETENT BEDROCK QUARTZITE	
30				

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TEST BORING LOG
BORING NO. LSMW-8

PROJECT: MEFUDS – Nike LO-13 Launch Site | SHEET NO. 2 OF 2
CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-001
BORING CONTRACTOR: Henry Michaud & Sons | RIG: Air Rotary | ELEVATION (PVC) 774.89 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE	
DATE	TIME	WATER ELEVATION	DATUM	TYPE	Steel				DATE STARTED 10/8/96
10/11/96	1024	749.07	feet	DIA.	6" ID				DATE FINISHED 10/9/96
				WT.					DRILLER B. Michaud
				FALL					INSPECTOR T. Warr

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
cement/ bentonite grout bentonite #0 sand 28.4' steel protective casing, 6" ID, flush mount with locking cap Screen: 2" PVC with 0.010" slots (63'-73') Riser: 2" PVC	30 35 40 45 50 55 60			COMPETENT BEDROCK QUARTZITE	Fracture zone from 39'-43'. Well yield approx. 5-6 gpm. Fracture zone from 47'-49'. Well yield approx. 10-12 gpm.
				50.0' END OF BORING	

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WESTON MANAGERS ENGINEERS/CONSULTANTS

TEST BORING LOG
BORING NO. LSSB-1

PROJECT: MEFUDS – Nike LO-13 Launch Site | SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings | RIG: B-51 | ELEVATION (ground) 778.57 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4"ID	1 7/8"ID		
				WT.		150#		
				FALL		30"		

DATE STARTED 9/24/96
DATE FINISHED 9/24/96
DRILLER D. McKeen
INSPECTOR R. Eichhorn

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0			FILL SANDY ELASTIC SILT: Lt. brown SILT and f.-c. SAND, trace f.-c. gravel. Loose-firm, moist, nonplastic.	Depths reported as angled depths. Depths BGS are approx. 1/2 angled depth.
				(Approx. 2' BGS) 4.0'	
	5	18/24	5-15 22-30	TILL ELASTIC SILT W/ SAND: Olive to brown SILT, little clay, trace f.-c. sand, trace gravel. Firm, moist, slight-mod. plasticity.	
		12/24	22-29 18-20		Collected analytical sample LSSB1-1 (6'-8')
	10	18/24	14-19 19-17		
		18/24	24-29 46-50/0"		
	15	18/24	24-34 31-20	(Approx. 7' BGS) 15.0' FAT CLAY: Tan CLAY, trace sand, trace silt. Stiff, saturated, high plasticity.	
		12/24	23-26 39-50/4"	(Approx. 9' BGS) 17.0' WELL GRADED GRAVEL W/ SILT AND SAND: Blue-gray GRAVEL and f.-c. SAND, little silt.	Collected analytical sample LSSB1-2 (16'-18')
				(Approx. 9' BGS) 19.0'	
	20	–	50/0"	END OF BORING Sampler refusal on bedrock.	
	25				
	30				

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TEST BORING LOG
BORING NO. LSSB-2

PROJECT: MEFUDS – Nike LO-13 Launch Site	SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division	JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings RIG: B-51	ELEVATION (ground) 778.72 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE	
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS			DATE STARTED 9/24/96
				DIA.	4 1/4" ID	1 7/8" ID			DATE FINISHED 9/24/96
				WT.		150#			DRILLER D. McKeen
				FALL		30"			INSPECTOR R. Eichhorn

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0			Augered to approx. 4' angle depth (approx. 2' BGS). (Approx. 2' BGS) 4.0'	Depths reported as angled depths. Depths BGS are approx. 1/2 angled depth.
	5	12/24	7-13	FILL ELASTIC SILT W/ SAND: Brown SILT and CLAY, trace f.-c. sand, trace f.-c. gravel. Firm, dry, nonplastic.	
			13-10		
		0/24	9-10		
			8-10	(Approx. 4' BGS) 8.0'	
	10	18/24	18-21	TILL ELASTIC SILT: Brown SILT and CLAY, trace f.-c. sand, trace gravel. Firm, dry, nonplastic.	OVM = background Collected analytical sample LSSB2-1 (9'-11')
			23-20	(Approx. 5' BGS) 10.0'	
		14/24	12-13	SILTY SAND: Brown f. SAND, little silt. Firm, saturated, moderate plasticity.	
			19-19	(Approx. 6' BGS) 11.0'	
	15	18/24	117-90	LEAN CLAY: Brown CLAY, little silt, trace f. sand. Firm, saturated, moderate plasticity.	OVM = background Collected analytical sample LSSB2-2 (14'-15.5')
			106	(Approx. 7' BGS) 13.0'	
				ELASTIC SILT: Brown SILT, trace f.-c. sand, little clay. Firm, wet, slight plasticity. (Approx. 8' BGS) 15.5'	
				Spoon refusal. Augered through to 19' angle depth (approx. 9' BGS). (Approx. 9' BGS) 19.0'	Rock fragments in tip.
	20		50/0"	END OF BORING Sampler refusal on bedrock.	
	25				
	30				

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TEST BORING LOG
BORING NO. LSSB-3

PROJECT: MEFUDS – Nike LO-13 Launch Site | SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings | RIG: B-51 | ELEVATION (ground) 778.36 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4"ID	1 7/8"ID		
				WT.		150#		
				FALL		30"		

DATE STARTED 9/24/96
DATE FINISHED 9/24/96
DRILLER D. McKeen
INSPECTOR R. Eichhorn

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0			Augered to approx. 4' angle depth (approx. 2' BGS).	Depths reported as angled depths. Depths BGS are approx. 1/2 angled depth.
				(Approx. 2' BGS) 4.0'	Oily odor on auger on auger cuttings (approx. 3'-4' BGS).
	5	12/24	9-12	TILL SANDY ELASTIC SILT W/ GRAVEL: Brown-gray SILT and f.-c. SAND, little gravel. Loose, moist, nonplastic.	Oil odor. OVM = 116 units Collected analytical sample LSSB3-1 (4'-6')
		12/24	14-16		
			6-4	(Approx. 3' BGS) 6.0'	
		12/24	5-9	FAT CLAY: Olive CLAY, trace f. sand, little gravel w/ depth. High plasticity.	
	10	12/24	6-11		Slight oil odor. OVM = background (9'-11')
			16-11		
		12/24	16-15		
			23-30		
	15	12/24	15-21		Slight oil odor. OVM = background Collected analytical sample LSSB3-2 (14'-16')
			22-28	(Approx. 8' BGS) 16.0'	
		6/8	38-100/0.2"	WEATHERED BEDROCK GRAVELLY SAND: F.-c. SAND and GRAVEL, trace silt, trace clay. Loose, dry, nonplastic.	
	20	3/3	100/0.2"		
				(Approx. 11' BGS) 21.0'	
				END OF BORING Auger and sampler refusal on bedrock.	
	25				
	30				

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TEST BORING LOG
BORING NO. LSSB-4

WESTON MANAGERS DESIGNERS/CONSULTANTS

PROJECT: MEFUDS – Nike LO-13 Launch Site
CLIENT: US Army Corps of Engineers, New England Division
BORING CONTRACTOR: Maine Test Borings
RIG: B-51

SHEET NO. 1 OF 1
JOB NO. 10971-010-001
ELEVATION (ground) 778.15 ft
DATE STARTED 9/17/96
DATE FINISHED 9/17/96
DRILLER D. McKeen
INSPECTOR R. Eichhorn

GROUNDWATER			
DATE	TIME	WATER ELEVATION	DATUM

	CAS.	SAMP.	CORE	TUBE
TYPE	HSA	SS		
DIA.	4 1/4" ID	1 7/8" ID		
WT.		150#		
FALL		30"		

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (In.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0	12/24	1-4 3-2	FILL ELASTIC SILT: Dk. brown SILT and CLAY, trace sand. Firm, moist, mod. plasticity.	
		12/24	1-1 3-9	4.0'	
	5	19/24	9-18 22-19	TILL ELASTIC SILT W/ GRAVEL: Brown-gray SILT, little-some gravel, trace f.-c. sand. Stiff, dry, nonplastic.	
		19/24	15-14 12-15	6.0' LEAN CLAY: Olive-brown CLAY and SILT, trace f.-c. sand. Firm, moist, mod. plasticity.	
		22/24	6-14 18-32	8.0' ELASTIC SILT W/ GRAVEL: Brown-tan SILT, little gravel, trace clay. Stiff, wet, low plasticity.	
	10	22/24	10-13 10-8	10.0' FAT CLAY: Gray-brown CLAY, trace silt, trace gravel, trace sand. Stiff, wet, low plasticity.	
		12/24	9-8 13-20	12.0' GRAVELLY ELASTIC SILT: Brown SILT, some gravel, little clay. Firm, moist, nonplastic.	OVM = background Collected analytical sample LSSB4-1 (12'-14')
	15	12/24	6-8 25-25		
		12/24	40-50 51-80	18.0'	OVM = background Collected analytical sample LSSB4-2 (17')
	20			END OF BORING Auger and spoon refusal on bedrock.	
	25				
	30				

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WESTON MANAGERS ENGINEERS/CONSULTANTS

TEST BORING LOG
BORING NO. LSSB-5

PROJECT: MEFUDS – Nike LO-13 Launch Site
CLIENT: US Army Corps of Engineers, New England Division
BORING CONTRACTOR: Maine Test Borings
RIG: B-61

SHEET NO. 1 OF 1
JOB NO. 10971-010-001
ELEVATION (ground) 775.82 ft
DATE STARTED 9/17/96
DATE FINISHED 9/17/96
DRILLER J. Rudnicki
INSPECTOR T. Warr

GROUNDWATER								
DATE	TIME	WATER ELEVATION	DATUM		CAS.	SAMP.	CORE	TUBE
				TYPE	HSA	SS		
				DIA.	4 1/4" ID	1 7/8" ID		
				WT.		150#		
				FALL		30"		

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0	24/24	2-4	TOPSOIL 0.5'	
			5-4	FILL SANDY SILT W/ GRAVEL: Brown SILT, some f.-c. gravel, little f.-c. sand. Loose, moist. 2.0'	
		24/24	2-3		
			7-8	TILL SANDY SILT W/ GRAVEL: Brown SILT, some f.-c. gravel, little f.-c. sand. Stiff, moist. 4.0'	
	5	24/24	4-6		
			8-8	SILT W/ SAND: SILT, little f.-c. sand, trace f.-c. gravel. Stiff, moist. 6.0'	
		24/24	8-10	SANDY ELASTIC SILT: Brown SILT, some f.-c. sand, trace f.-c. gravel, trace clay. Stiff, wet, low plasticity.	OVM = background Collected analytical sample LSSB5-1 (7'-8')
			9-8		
		19/24	14-16		
	10		40-24	10.0'	
		20/24	12-12	GRAVELLY ELASTIC SILT: SILT, some f.-c. gravel, little f.-c. sand, trace clay. Stiff, moist, low plasticity. 12.0'	OVM = background Collected analytical sample LSSB5-2 (10'-12')
			14-10		
		23/24	12-13	SILTY GRAVEL W/ SAND: Brown, GRAVEL, some silt, little f.-c. sand, trace clay. Stiff, moist, low plasticity.	
			14-16		
	15	5/8	49-100/3"	14.7'	
				END OF BORING Auger refusal.	
	20				
	25				
	30				

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TEST BORING LOG
BORING NO. LSSB-6

PROJECT: MEFUDS – Nike LO-13 Launch Site | SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division | JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings | RIG: B-61 | ELEVATION (ground) 771.42 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE	
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS			DATE STARTED 9/24/96
				DIA.	4 1/4"ID	1 7/8"ID			DATE FINISHED 9/24/96
				WT.		150#			DRILLER J. Rudnicki
				FALL		30"			INSPECTOR T. Warr

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0	24/24	1-2	TOPSOIL 0.5'	
			3-8	FILL ELASTIC SILT W/ SAND: Brown SILT, little f.-c. sand, trace clay. Soft, moist, low plasticity. 2.0'	
		21/24	7-14		
			11-17	TILL SILTY SAND W/ GRAVEL: Gray-brown, f.-c. sand, little silt, little f.-c. gravel, trace clay. Stiff, moist, low plasticity.	
	5	19/24	13-14		
			15-14		
		14/24	4-5		OVM = background Collected analytical sample LSSB6-1 (6'-8')
			9-12		
		8/24	2-3		OVM = background Collected VOA analytical sample DUPS-7 (8'-10')
	10		3-4		
		15/24	9-11		OVM = background Collected TPH-DRO analytical sample DUPS-7 (10'-12')
			15-11	12.0'	
		20/24	11-22	SANDY ELASTIC SILT W/ GRAVEL: Gray SILT and f.-c. SAND, little f.-c. gravel, trace clay. Stiff, wet, low plasticity.	
			20-24		
	15	20/24	6-10		
			21-35	16.0'	OVM = background Collected analytical sample LSSB6-2 (16'-17.5')
		19/24	27-28	SILTY SAND W/ GRAVEL: Gray, f.-c. SAND and f.-c. GRAVEL, little silt. Stiff, moist.	
			21-19	18.0'	Bedrock at 17.8' BGS.
				END OF BORING	
	20				
	25				
	30				

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TEST BORING LOG
BORING NO. LSSB-7

PROJECT: MEFUDS – Nike LO-13 Launch Site	SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division	JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings RIG: B-51	ELEVATION (ground) 772.64 ft

GROUNDWATER					CAS.	SAMP.	CORE	TUBE	
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS			DATE STARTED 9/17/96
				DIA.	4 1/4"ID	1 7/8"ID			DATE FINISHED 9/17/96
				WT.		150#			DRILLER D. McKeen
				FALL		30"			INSPECTOR R. Eichhorn

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0	19/24	2-3	FILL SILT W/ GRAVEL: Lt. brown SILT, little f.-c. gravel, trace f.-c. sand. Firm, dry, nonplastic.	
			4-4	2.0'	
		22/24	3-3	TILL SILTY SAND: Dk. brown, f.-c. SAND and SILT, trace f.-c. gravel. Loose-firm, moist-saturated, nonplastic.	
			8-12		
	5	22/24	9-11		
			12-12		OVM = background Collected analytical sample LSSB7-1 (7'-9')
		22/24	8-12		
			11-13	8.0'	
		22/24	6-15	LEAN CLAY W/ SAND: Blue-gray to brown CLAY, trace-little sand, trace-some, silt. Firm, saturated, mod. plasticity. Unit become more gravelly w/ depth.	
			19-18		
	10	22/24	13-9		
			7-5		
		19/24	5-7		
			13-16		
		12/24	12-20		
	15		53-17		
		12/24	12-12		OVM = background Collected analytical sample LSSB7-2 (16'-18')
			15-18	18.0'	
		12/24	–	WEATHERED BEDROCK SANDY GRAVEL: Gray, f.-c. GRAVEL, trace f.-c. sand, trace silt. Loose, dry, nonplastic.	
			–	19.0'	
	20			END OF BORING Auger and sampler refusal.	
	25				
	30				

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TEST BORING LOG
BORING NO. LSANPB-1

PROJECT: MEFUDS – Nike LO-13 Launch Site
CLIENT: US Army Corps of Engineers, New England Division
BORING CONTRACTOR: Maine Test Borings
RIG: B-61

SHEET NO. 1 OF 1
JOB NO. 10971-010-001
ELEVATION (ground) ND
DATE STARTED 9/25/96
DATE FINISHED 9/25/96
DRILLER J. Rudnicki
INSPECTOR T. Warr

GROUNDWATER			
DATE	TIME	WATER ELEVATION	DATUM

	CAS.	SAMP.	CORE	TUBE
TYPE	HSA	SS		
DIA.	4 1/4" ID	1 7/8" ID		
WT.		150#		
FALL		30"		

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0			CONCRETE 0.9'	OVM = background Collected MS/MSD and analytical sample LSANPB1-1 (0.9'-2.9')
		13/24	5-7	FILL SILTY SAND W/ GRAVEL: Brown f.-c. SAND, little silt, little gravel. Loose moist.	
			7-9		
		6/24	6-3		OVM = background Collected VOA analytical sample DUPS-1 (2.9'-4.9')
			3-4	4.9'	
	5	22/24	9-16	TILL SILTY SAND W/ GRAVEL: Gray-brown f.-c. SAND and f.-c. GRAVEL, little silt. Stiff, moist.	OVM = background Collected SVOC, Metals, and P/PCB sample DUPS-1 (4.9'-6.9')
			9-10		
		19/24	9-17		OVM = background Collected analytical sample LSASPB1-2 (6.9'-8.9')
			8-9	8.9'	
	10			END OF BORING	
	15				
	20				
	25				
	30				

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WESTON
POWER&ENVIRONMENT

TEST BORING LOG
BORING NO. LSANPB-2

PROJECT: MEFUDS - Nike LO-13 Launch Site
SHEET NO. 1 OF 1
CLIENT: US Army Corps of Engineers, New England Division
JOB NO. 10971-010-001
BORING CONTRACTOR: Maine Test Borings
RIG: B-61
ELEVATION (ground) ND

GROUNDWATER					CAS.	SAMP.	CORE	TUBE
DATE	TIME	WATER ELEVATION	DATUM	TYPE	HSA	SS		
				DIA.	4 1/4"ID	1 7/8"ID		
				WT.		150#		
				FALL		30"		

DATE STARTED 9/25/96
DATE FINISHED 9/25/96
DRILLER J. Rudnicki
INSPECTOR T. Worr

WELL CONSTRUCTION	DEPTH (FEET)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS PER 6 INCHES	CLASSIFICATION	REMARKS
NO WELL INSTALLED	0			CONCRETE 0.9'	OVM = background Collected analytical sample LSANPB2-1 (0.9'-2.9')
		22/24	4-12	FILL SILTY SAND W/ GRAVEL: Brown f.-c. SAND, little silt, little gravel. Loose moist. 2.9'	
			11-14		
		23/24	13-11	TILL GRAVELLY SILT W/ SAND: Gray-brown SILT and f.-c. GRAVEL, ltlle f.-c. sand. Firm, moist, nonplastic.	
	5		11-17		OVM = background Collected analytical sample LSASPB2-2 (4.9'-6.9')
		22/24	17-21		
			20-15	6.9'	
				END OF BORING	
	10				
	15				
	20				
	25				
	30				

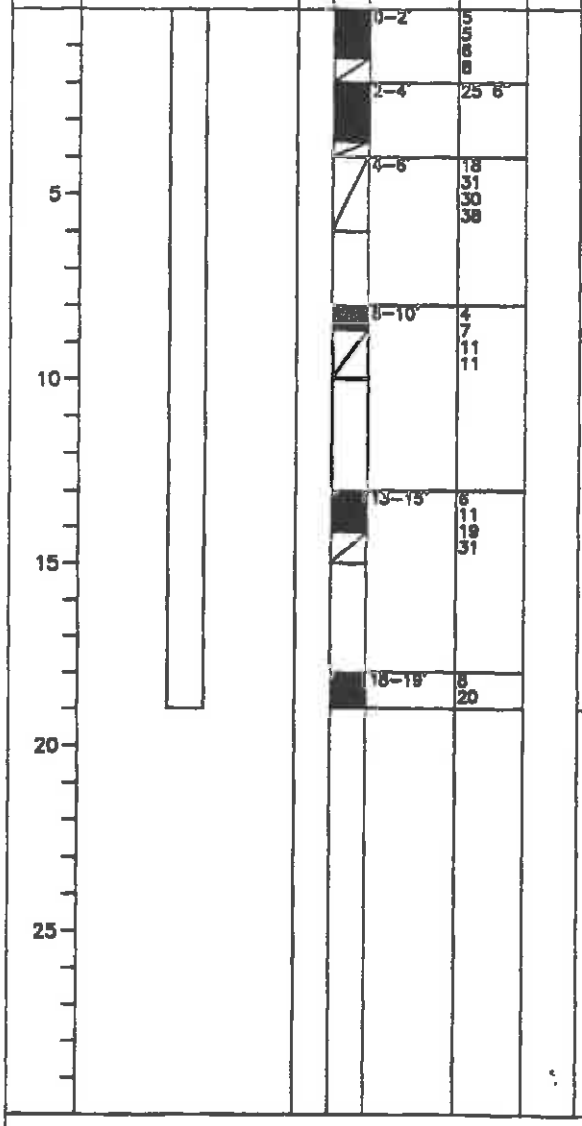
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WESTON
MANAGERS DESIGNERS/CONSULTANTS

Site Id: LSANPB4	Project Number: 10971.010.001
Project Name: MEFUDS	
Location: Launch Site, Caswell, Maine	
Ground Elev.: 0.00'	Datum:
Remarks: Drillers: Mel, Greg Rig Type: Mobile Drill B-53	

Date Drilled: 06/25/99 - 06/25/99	
Logged By: S.Combs	Project Manager:
Contractor: Maine Test Boring	
Drilling Method: HSA	
Total Depth: 19.00'	Completed Depth: 19.00'
Borehole Dia.: 4.00in	Static Water Level (bgs): 8.0'
Blank Casing: type: dia: 0.00in fm: 0.0' to: 19.00'	
Screens: type: size: dia: fm: to:	
Annular Fill: type: fm: to: type: fm: to: type: fm: to:	

Soil Boring



Material Description	Notes
TOPSOIL/FILL; Brown f-m-SAND, Silt, f-m-gravel, rootlets, some c-gravel, iron-staining. Dry, loose, no odor. (4')	OVM screening was not conducted.
TILL; Brown f-m-c-SAND, Silt, f-m-gravel, some c-gravel. Wet, loose, no odor. Groundwater encountered.	Soil sample LSANPB4-1 was collected at 1530 on 6/25/99 from the 2-4' interval. No recovery 4-6' interval. Refusal/Augered from 6-8' Groundwater encountered at 8'. Augered to 13' (5 foot split-spoons).
Brown-olive SILT, f-m-c-Sand, some m-c-gravel. Saturated, cohesive, no odor.	
Olive-brown SILT, f-m-c-Sand, some m-f-gravel, trace clay. Wet, cohesive, stiff, no odor.	Augered to 18' (5 foot split spoons). Refusal at 19' Soil sample LSANPB4-2 was collected at 1600 on 6/25/99 from the 18-19' interval.
Bottom of Boring 19'.	

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Site Id: LSANPB3	Project Number: 10971.010.001
Project Name: MEFUDS	
Location: Launch Site, Caswell, Maine	
Ground Elev.: 0.00'	Datum:

Remarks: Drillers: Mel, Greg
Rig Type: Mobile Drill B-53

Date Drilled: 06/25/99 - 06/25/99	
Logged By: S.Combs	Project Manager:
Contractor: Maine Test Boring	
Drilling Method: HSA	
Total Depth: 20.00'	Completed Depth: 20.00'
Borehole Dia.: 4.00in	Static Water Level (bgs): 8.0'
Blank Casing: type:	dia: 0.00in fm: 0.0' to: 20.00'
Screens: type:	size: dia: fm: to:
Annular Fill: type:	fm: to:
type:	fm: to:
type:	fm: to:

Depth (ft)	Soil Boring	Water Level	Recovery	Sample No.	Blow Count	Vapor	Material Description	Notes
				0-2'	8 12 6 4		TOPSOIL/FILL; Med-brown f-SAND, Silt, m-f-gravel (angular), some rootlets. Loose, dry, non-cohesive, no odor. (2')	OVM screening was not conducted.
				2-4'	3 4 6 7		TILL; Olive-gray-brown, SILT, some f-m-Sand and c-gravel (angular). Iron-staining throughout,no odor, wet, cohesive.	Soil sample LSANPB3-1 was collected at 1405 on 6/25/99 from the 4-6' interval.
5				4-6'	5 8 11 11			
				6-8'	15 15 16 19		Dark brown SILT, f-Sand, some m-gravel and m-c-sand, cohesive, moist, no odor.	No recovery 8-10' interval.
				8-10'	9 18 20 20			No recovery 10-12' interval.
10				10-12'	14 14 15 14			
				12-14'	12 9 9 12		Dark brown-olive SILT, c-m-gravel (angular), some f-m-sand, trace f-gravel (subrounded) Wet, cohesive, no odor.	
				14-16'	7 9 12 10		Brown-gray SILT with m-f-Sand, c-m-gravel, cohesive, wet, no odor.	
15				16-18'	5 3 8 9		Same as above, but saturated. Encountered groundwater.	Encountered groundwater at 16-18' interval.
				18-20'	7 5 11 11			Soil sample LSANPB3-2 was collected at 1500 on 6/25/99 from the 18-20' interval.
20							Bottom of Boring 20'.	
25								

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Soil Boring Log

LSSB-8

CLIENT USACE FUDS - Former Loring Air Force Base
PROJECT NAME LO-13 Launch Site
PROJECT # 15001301
PROJECT LOCATION Route 1A, Caswell, Maine
DATE STARTED 11/1/16 **LOGGED BY** M. Willis
DEPTH TO WATER* 12 feet bgs **DIAMETER** 2
CONTRACTOR County Environmental Engineering/Craig Brescia
WELL MATERIALS NA
DRILLING METHOD Direct Push
ANNULUS MATERIALS NA
DRILLING EQUIPMENT Geoprobe 540U Truck Rig w/ 2" macrocore
TOC ELEVATION _____ **GROUND ELEVATION** NA
NOTES 20 degree drilling angle from vertical, directionally beneath building, Sampled for EPH and VPH

Depth (ft)	Penetration/ Recovery (in)	Blow Counts	Field Screening (ppm)	Lab Analytical Sample	Graphic Log	LITHOLOGY	WELL DIAGRAM
0	48/39		0.0			0-12" Dry dark brown LOAM and URBAN FILL (ash, brick)	
						12-39" Dry brown SILT, some angular fine to medium Gravel (ML)	
	48/36		0.0			0-12" Dry brown SILT. some angular fine to medium Gravel (ML)	
5				LSSB-8-1 (4-8)		12-36" Dry brown SILT, some subangular fine to medium Gravel (ML)	
	48/48		0.0			0-48" Wet light brown SILT, some subrounded fine to medium Gravel, trace fine Sand (ML)	
10							
	12/12		0.0	LSSB-8-2 (12-13)		0-12" Wet light brown SILT and CLAY, some subrounded fine to medium Gravel (ML-CL)	
						Refusal @ 13 feet bgs	
15							
20							
25							

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Soil Boring Log

LSSB-9

CLIENT USACE FUDS - Former Loring Air Force Base
PROJECT NAME LO-13 Launch Site
PROJECT # 15001301
PROJECT LOCATION Route 1A, Caswell, Maine
DATE STARTED 11/1/16 **LOGGED BY** M. Willis
DEPTH TO WATER* 8 feet bgs **DIAMETER** 2
CONTRACTOR County Environmental Engineering/Craig Brescia
WELL MATERIALS NA
DRILLING METHOD Direct Push
ANNULUS MATERIALS NA
DRILLING EQUIPMENT Geoprobe 540U Truck Rig w/ 2" macrocore
TOC ELEVATION _____ **GROUND ELEVATION** NA
NOTES Sampled for EPH and VPH

Depth (ft)	Penetration/ Recovery (in)	Blow Counts	Field Screening (ppm)	Lab Analytical Sample	Graphic Log	LITHOLOGY	WELL DIAGRAM
0	48/36		0.1			0-12" Dry dark brown LOAM and URBAN FILL (ash, brick), some fine Gravel	
						12-36" Bry brown SILT, some subangular fine to medium Gravel (ML)	
	48/36		0.2			0-36" Dry light brown SILT, some subangular fine to medium Gravel, relatively dense (ML)	
5				LSSB-9-1 (6-8)			
	48/48		0.0			0-12" Wet light brown SILT, some coarse Sand, some subrounded fine Gravel, relatively loose (ML)	
						12-48" Dry light brown SILT, little subrounded fine to coarse Gravel (ML)	
10							
	48/48		0.0			0-12" Wet light brown SILT and CLAY, some subrounded fine Gravel, some coarse Sand (ML-CL)	
						12-48" Moist light brown SILT, some subrounded fine to medium Gravel, trace Shale/Bedrock (ML)	
15				LSSB-9-2 (14-16)			
						Refusal @ 16 feet bgs	
20							
25							

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LSSB-10
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CLIENT USACE FUDS - Former Loring Air Force Base
PROJECT NAME LO-13 Launch Site
PROJECT # 15001301
PROJECT LOCATION Route 1A, Caswell, Maine
DATE STARTED 11/1/16 **LOGGED BY** M. Willis
DEPTH TO WATER* 12 feet bgs **DIAMETER** 2
CONTRACTOR County Environmental Engineering/Craig Brescia
WELL MATERIALS NA
DRILLING METHOD Direct Push
ANNULUS MATERIALS NA
DRILLING EQUIPMENT Geoprobe 540U Truck Rig w/ 2" macrocore
TOC ELEVATION _____ **GROUND ELEVATION** NA
NOTES 30 degree drilling angle from vertical, directionally beneath building, Sampled for EPH and VPH

Depth (ft)	Penetration/ Recovery (in)	Blow Counts	Field Screening (ppm)	Lab Analytical Sample	Graphic Log	LITHOLOGY	WELL DIAGRAM
0	48/36		0.0			0-12" Dry FILL and TOPSOIL	
						12-36" Dry brown SILT, some subangular fine to medium Gravel (ML)	
	48/36		0.0			0-18" Moist light brown SILT, little subangular fine to coarse Gravel (ML)	
5			1.7			18-36" Moist gray-brown SILT, some coarse Sand, little subrounded fine to medium Gravel (ML)	
	48/48		3.0	LSSB-10-1 (8-10)		0-24" Wet gray-brown SILT and CLAY, little medium to coarse Sand, trace subrounded fine to coarse Gravel, slight petroleum odor (ML-CL)	
10			2.0			24-48" Moist brown SILT, some coarse Sand, some angular fine Gravel (ML)	
	12/12		0.1	LSSB-10-2 (12-13)		0-12" Moist brown SILT, some coarse Sand, some angular fine Gravel (ML)	
						Refusal @ 13 feet bgs	
15							
20							
25							

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CLIENT USACE FUDS - Former Loring Air Force Base
PROJECT NAME LO-13 Launch Site
PROJECT # 15001301
PROJECT LOCATION Route 1A, Caswell, Maine
DATE STARTED 11/1/16 **LOGGED BY** M. Willis
DEPTH TO WATER* 12 feet bgs **DIAMETER** 2
CONTRACTOR County Environmental Engineering/Craig Brescia
WELL MATERIALS NA
DRILLING METHOD Direct Push
ANNULUS MATERIALS NA
DRILLING EQUIPMENT Geoprobe 540U Truck Rig w/ 2" macrocore
TOC ELEVATION _____ **GROUND ELEVATION** NA
NOTES Sampled for EPH and VPH

Depth (ft)	Penetration/ Recovery (in)	Blow Counts	Field Screening (ppm)	Lab Analytical Sample	Graphic Log	LITHOLOGY	WELL DIAGRAM
0	48/34		0.0			0-12" Dry dark brown gravelly FILL	
						12-34" Dry brown SILT, some medium to coarse Gravel, relatively dense (ML)	
	48/38		0.0			0-22" Dry brown-red SILT, some subangular medium to coarse Gravel, relatively dense (ML)	
5				LSSB-11-1 (4-6)		22-38" Moist brown-gray SILT, little fine Sand, little subrounded fine to medium Gravel, trace Clay (ML)	
	48/30		0.1			0-30" Moist light brown SILT and CLAY, little subangular fine to coarseGravel, trace Shale/Bedrock (ML-CL)	
10							
	48/36		0.0			0-12" Wet light brown SILT and CLAY, some subrounded fine Gravel (ML-CL)	
						12-36" Dry brown-gray weathered BEDROCK	
15							
						Refusal @ 16 feet bgs	
20							
25							

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CLIENT USACE FUDS - Former Loring Air Force Base
PROJECT NAME LO-13 Launch Site
PROJECT # 15001301
PROJECT LOCATION Route 1A, Caswell, Maine
DATE STARTED 11/1/16 **LOGGED BY** M. Willis
DEPTH TO WATER* 10 feet bgs **DIAMETER** 2
CONTRACTOR County Environmental Engineering/Craig Brescia
WELL MATERIALS NA
DRILLING METHOD Direct Push
ANNULUS MATERIALS NA
DRILLING EQUIPMENT Geoprobe 540U Truck Rig w/ 2" macrocore
TOC ELEVATION _____ **GROUND ELEVATION** NA
NOTES Sampled for EPH and VPH

Depth (ft)	Penetration/ Recovery (in)	Blow Counts	Field Screening (ppm)	Lab Analytical Sample	Graphic Log	LITHOLOGY	WELL DIAGRAM
0	48/48		0.1			0-48" Dry red-brown SILT, trace angular fine to medium Gravel (ML)	
5	48/48		0.1	LSSB-12-1 (4-6)		0-24" Dry light brown SILT, little subangular fine to medium Gravel, trace coarse Sand (ML) 24-48" Moist brown-gray SILT, little subrounded fine Gravel (ML)	
10	36/36		0.0			0-24" Moist brown SILT and CLAY, little subrounded fine to medium Gravel (ML-CL) 24-36" Wet light brown SILT and CLAY, little subangular fine to medium Gravel (ML-CL) Refusal @ 11 feet bgs	
15							
20							
25							

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CLIENT USACE FUDS - Former Loring Air Force Base
PROJECT NAME LO-13 Launch Site
PROJECT # 15001301
PROJECT LOCATION Route 1A, Caswell, Maine
DATE STARTED 11/1/16 **LOGGED BY** M. Willis
DEPTH TO WATER* **DIAMETER** 2
CONTRACTOR County Environmental Engineering/Craig Brescia
WELL MATERIALS NA
DRILLING METHOD Direct Push
ANNULUS MATERIALS NA
DRILLING EQUIPMENT Geoprobe 540U Truck Rig w/ 2" macrocore
TOC ELEVATION **GROUND ELEVATION** NA
NOTES Sampled for EPH and VPH

Depth (ft)	Penetration/ Recovery (in)	Blow Counts	Field Screening (ppm)	Lab Analytical Sample	Graphic Log	LITHOLOGY	WELL DIAGRAM
0	48/48		0.0			0-48" Dry gray SILT, little coarse Sand, little angular fine Gravel, bands of red, bands of yellow (ML)	
	48/36		0.0	LSSB-13-1 (4-6)		0-36" Moist gray SILT, little coarse Sand, little angular fine Gravel, bands of crushed stone (ML)	
5							
	48/48		0.0			0-12" Moist gray SILT, little coarse Sand, little angular fine Gravel, bands of crushed stone (ML)	
						12-48" Moist light brown SILT and CLAY, trace coarse Sand, trace subrounded fine to medium Gravel (ML-CL)	
10							
	24/18		0.0			0-18" Moist light brown SILT and CLAY, some subangular fine to medium Gravel (ML-CL)	
						Refusal @ 14 feet bgs	
15							
20							
25							

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APPENDIX C

CERCLA RISK ASSESSMENT

Appendix C: Risk Assessment

DRAFT December 2025

TABLE OF CONTENTS

Acronyms v

1.0 INTRODUCTION 1

2.0 SITE SETTING AND BACKGROUND 1

2.1 Overview 1

2.2 Nike Missile LO-13 Launch Site 2

2.3 Nike Missile LO-13 Control Site 2

3.0 SITE ENVIRONMENTAL CONDITIONS 2

3.1 History of Releases and Investigations 3

3.1.1 Launch Site 3

3.1.2 Control Site 4

3.2 Summary of Site Data 6

3.2.1 Soil 6

3.2.1.1 Launch Site Soil 6

3.2.1.2 Control Site Soil 7

3.2.2 Groundwater 8

3.2.2.1 Launch Site Groundwater 9

3.2.2.2 Control Site Groundwater 9

3.2.3 Indoor and Outdoor Air 9

3.2.3.1 Launch Site Indoor Air 10

3.2.3.2 Launch Site Outdoor Air 10

3.3 Conceptual Site Model for Risk Assessment 10

3.3.1 Potential Sources, Nature and Extent, and Fate and Transport of Contamination 10

3.3.2 Human Receptors and Exposure Pathways 10

3.3.3 Ecological Receptors and Exposure Pathways 12

4.0 HUMAN HEALTH RISK ASSESSMENT 12

4.1 Hazard Identification 12

4.1.1 Data Summaries 12

4.1.2 Selection of COPCs 12

4.1.2.1 COPCs in Soil 12

4.1.2.2 COPCs in Groundwater 14

4.1.2.3 COPCs in Air 15

4.1.2.4 COPCs - Summary 15

4.2 Exposure Assessment 16

4.2.1 Identification of Potentially Exposed Human Receptor Groups 16

4.2.2 Exposure Scenarios 17

4.2.3 Exposure Point Concentrations 18

4.2.3.1 Soil Exposure Point Concentrations 18

4.2.3.2 Soil Particulates in Air Exposure Point Concentrations 18

4.2.3.3 Groundwater Exposure Point Concentrations 18

4.2.4 Quantification of Exposure 19

4.2.4.1 Incidental Ingestion of Soil 19

4.2.4.2 Dermal Contact with Soil 20

4.2.4.3 Inhalation of Fugitive Dust 21

4.2.4.3 Ingestion of Groundwater 21

4.2.4.4 Dermal Contact with Groundwater 22

4.2.4.5 Inhalation of Volatiles from Everyday Groundwater Use 22
4.2.4.6 Inhalation of Indoor Air Impacted by Vapor Intrusion 23
4.3 Toxicity Assessment 23
4.3.1 Non-cancer RfD and RfC 23
4.3.2 Cancer OSF and IUR 23
4.4 HHRA Results 24
4.4.1 Launch Site 25
4.4.1.1 Residents – Launch Site Groundwater 26
4.4.2 Control Site 26
4.4.2.1 Residents – Control Site Subarea 1 Soil and Groundwater 26
4.4.2.2 Commercial Workers – Control Site Subarea 1 - Soil 27
4.4.2.3 Construction/Utility Workers – Control Site Subarea 1 - Soil 27
4.4.2.4 Trespassers – Control Site Subarea 1 - Soil 27
4.5 Uncertainty Assessment 28
4.5.1 Uncertainties Associated with Site Data 28
4.5.2 Uncertainties Associated with the HHRA Toxicity Assessment 30
4.5.3 Uncertainties Associated with the HHRA Exposure Point Concentrations 30
4.5.4 Uncertainties in the HHRA Exposure Scenarios and Exposure Factors 30
4.5.5 Uncertainties Associated with the HHRA Approach 31
5.0 SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT 31
5.1 Introduction 31
5.2 Screening Level Problem Formulation 32
5.2.1 Environmental Setting and Contaminants at Site 32
5.2.2 Likely Categories of Potentially Affected Receptors 33
5.2.3 Potentially Complete Exposure Pathways 33
5.3 Comparison of Site Detections with Ecological Screening Benchmarks 33
5.3.1 Comparisons of Soil Detections to Ecological Benchmarks 33
5.3.2 Selection of COPECs in Soil 34
5.4 Screening Level Exposure Estimates and Risk Calculation 35
5.5 Uncertainties Associated with the SLERA Approach 36
5.6 SLERA Summary 37
6.0 HHRA AND SLERA SUMMARY AND CONCLUSIONS 38
7.0 REFERENCES 38

FIGURES

Figure 1 Aerial Site View of Launch and Control Sites.
Figure 2 Site Plan – Launch Site
Figure 3 Site Plan – Control Site
Figure 4 Water Resources and Riparian Habitat
Figure 5 Plant and Animal Habitat
Figure 6 Conserved Land and Undeveloped Habitat

TABLES

Table 1 Launch Site Soil Data
Table 2 Control Site Soil Data
Table 3 Launch Site Groundwater Data
Table 4 Control Site Groundwater Data

Table 5 Launch Site Indoor Air Data
Table 6 Launch Site Soil Data Summary
Table 7 Control Site Soil Data Summary
Table 8 Launch Site Groundwater Data Summary
Table 9 Control Site Groundwater Data Summary
Table 10 Human Health Risk Assessment Exposure Factors

ATTACHMENTS

Attachment A Toxicity Profiles
Attachment B Risk Assessment Tables

Acronyms

ADAF	Age-dependent adjustment factor for mutagens
ADD	Average daily or lifetime dose
ADE	Average daily or lifetime exposure
Bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and xylenes (total)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPECs	Constituents of potential ecological concern
COPCs	Constituents of potential concern
CSM	Conceptual site model
DERP-FUDs	Defense Environmental Restoration Program Formerly Used Defense Sites
EcoSSLs	EPA Ecological Soil Screening Levels
EPA	U.S. Environmental Protection Agency
EPC	Exposure point concentration
EPH	Extractable petroleum hydrocarbon
ERA	Ecological risk assessment
GSA	General Services Administration
HHRA	Human health risk assessment
HQ	Hazard quotient
HI	Hazard index
IUR	Inhalation unit risk
JP-4	Jet petroleum fuel #4
kVA	kilovolt-amps
Maine DEP	Maine Department of Environmental Protection
Mass DEP	Massachusetts Department of Environmental Protection
MCLs	EPA Maximum Contaminant Levels
m^3/kg	meters cubed per kilogram
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
NHL	Non-Hodgkin's lymphoma
OSF	Oral slope factor
ppbv	part-per-billion by volume
PAH	Polycyclic aromatic hydrocarbon
PCBs	Polychlorinated biphenyls
PEF	Particulate emission factor
RAF	Relative absorption frequency
RAGS	EPA Risk Assessment Guidance for Superfund
RfC	Reference concentration
RfD	Reference dose
RI	Remedial investigation
RSLs	EPA Regional Screening Levels
SLERA	Screening level ecological risk assessment
TCE	Trichloroethylene
THQ	Target non-cancer hazard quotient
TPH	Total petroleum hydrocarbon
TPH-DRO	Total petroleum hydrocarbons – diesel range organics
TPH-GRO	Total petroleum hydrocarbons – gasoline-range organics
TR	Target incremental cancer risk
USACE	U.S. Army Corps of Engineers
UST	Underground storage tank
VISL	Vapor intrusion screening level
VOC	Volatile organic compound
VPH	Volatile petroleum hydrocarbon

1.0 INTRODUCTION

This Appendix to the LO-13 Remedial Investigation (RI) Report presents a Human Health Risk Assessment (HHRA) and a screening level ecological risk assessment (SLERA) for the former Nike Missile LO-13 Launch and Control Sites in Caswell, Aroostook County, Maine (the Site). The HHRA evaluates the potential risk of harm to human health at the Site in accordance with risk assessment guidance applicable to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) program, as embodied in *Risk Assessment Guidance for Superfund – Part A: Human Health Evaluation Manual* [RAGS; U.S. Environmental Protection Agency (EPA), 1989] and *Risk Assessment Handbook Volume I: Human Health Evaluation* [U.S. Army Corps of Engineers (USACE), 1999]. The SLERA evaluates the potential risk to ecological receptors at the Site in accordance with ecological risk assessment guidance applicable to the CERCLA program, as embodied in *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (EPA 1997) and USACE (2016) *Standard Scopes of Work for Environmental Risk Assessments* (EP 200-1-15). The HHRA and SLERA are based on information and data in previous environmental reports for the former LO-13 Launch and Control Sites, as referenced in the RI. Petroleum results evaluated as total petroleum hydrocarbons – diesel range organics (TPH-DRO) and as volatile petroleum hydrocarbon (VPH) fractions and extractable petroleum hydrocarbon (EPH) fractions were assessed separately under Maine Department of Environmental Protection (Maine DEP) guidance in a *Petroleum Assessment Report* (**RI Appendix D**).

2.0 SITE SETTING AND BACKGROUND

The LO-13 Site comprises two parcels known as the Launch and Control Sites bordered by Route 1A/Route 165 to the east. The Control Site is located approximately 0.5 miles northwest of the Launch Site. The Site is surrounded by undeveloped land with areas for logging and/or recreational use.

The Site does not contain any surface water features and the closest water bodies are Lavoie Brook and Martin Brook located northeast and west of the Site, respectively. The topography at the Site is generally flat, and the local area slopes downward to the northeast and southeast from the Control Site and the north, east and southeast from the Launch Site. Groundwater generally flows to the south-southeast at the Launch Site and north-northwest at the Control Site. A Site Location Plan showing topography is provided as **Figure 1A**.

Following is a brief summary of Site background relevant to the risk assessments. Additional details may be found in the RI.

2.1 Overview

The former Nike Missile LO-13 Site was constructed between 1955 and 1957 on what is believed to be former farmland and was operated by the Army as a surface-to-air, anti-aircraft missile facility. The missile Site consisted of a former Launch Site, a former Control Site, and a former family housing area. In 1969, two years after the closing of the installation, the family housing

area was transferred to the Loring Air Force Base. The Launch and Control Sites were reported to the General Services Administration (GSA) as excess property in 1967 and sold to private individuals. An aerial view of these areas is presented in **Figure 1B**.

2.2 Nike Missile LO-13 Launch Site

The 17-acre Nike Missile LO-13 Launch Site is located west of Route 1A in Caswell, Maine. The former Launch Site contains several manmade structures from the former military installation, including three former underground missile silos, a former missile maintenance and acid neutralization pit area, a generator building, a water pump house, and the former barracks building (later used as apartments). The barracks/apartments are served by a private bedrock drinking water well located approximately 75 feet west of the barracks/apartments. Underground storage tanks (USTs) were located adjacent to the barracks/apartments and former generator buildings. The barracks were in use as of May 2021 as a residence, and it is expected that future use of the Site will remain the same. General features of the Launch Site are depicted on **Figure 2**.

The acid neutralization pit area of the Launch Site was reportedly used for the fueling and de-fueling of missiles prior to warhead maintenance and/or transportation to the launcher area. A concrete platform in the area was designed to collect discharged or spilled fuel mixtures, likely consisting of a blend of jet petroleum fuel #4 (JP-4), inhibited red fuming nitric acid, and unsymmetrical dimethylhydrazine. Runoff from the concrete pad was directed into catch basins and a nearby unlined drainage swale. Background information on the former operations of the acid neutralization pit area was presented in *Results of Acid Neutralization Pit Background Information Review* (Weston, 1999).

2.3 Nike Missile LO-13 Control Site

The 11-acre former Nike Missile LO-13 Control Site is also located on the western side of U.S Route 1A in Caswell, Maine and is approximately 0.5 miles northwest of the Launch Site. The Site was active from the mid-1950s to the 1970s and is occupied by several buildings, including a generator building, former barracks, a mess hall, and an administration building. All buildings were constructed on concrete slabs. Four former USTs were located at the facility and were associated with these buildings; a fifth former UST was located near the former radar towers. General features of the Control Site are depicted on **Figure 3**.

The property was most recently purchased by a private party who renovated the main administration building into a residence, which is, as of October 2023, occupied on a part-time basis. Remaining military structures are still in place in various stages of disrepair and are used for storage. A bedrock water supply well servicing the residence is located within 300 feet of the facility; however, no well construction information is available. Future use is expected to remain the same as current use.

3.0 SITE ENVIRONMENTAL CONDITIONS

Although petroleum results (evaluated as TPH-DRO and as VPH and EPH fractions) were assessed separately under Maine DEP guidance (and are detailed in RI **Appendix D**), these petroleum analyses are discussed in this section as part of the Site history. **Section 3.1** provides a history of releases and investigations, and **Section 3.2** provides a summary of all Site data and describes which data were used in the risk assessment. Additional discussion of the sampling and analysis done at the Launch and Control Sites, detected constituents, and fate and transport may be found in the RI.

3.1 History of Releases and Investigations

Data from the historical reports described in this section were used in the risk assessments and are described further in **Section 3.2**.

3.1.1 Launch Site

On August 23, 1994, an out-of-service, 2,000-gallon steel UST located near the former barracks building was removed. Prior to removal, 2,000 gallons of petroleum-contaminated water were pumped from the UST and filtered through activated carbon prior to discharge. Upon removal, the UST was observed to be intact, but an observed release in the subsurface after removal was postulated to have occurred from either the UST fill/vent pipes or feed/return lines. Approximately 90 cubic yards of petroleum-contaminated soil were excavated to facilitate removal of the UST, and stockpiled on polyethylene sheeting. Further removal of contaminated soil was not feasible without compromising the structural integrity of the building and a chimney located immediately adjacent to the excavation. Therefore, petroleum-contaminated soil remained under the concrete anchor slab used to hold the UST in place. After the UST removal, the excavated area was lined with 6 mil (0.006 inch thick) polyethylene sheeting and backfilled with unspecified material. Soil samples from the stockpile and a soil sample from the excavation sidewall were collected and analyzed for TPH-DRO.

Upon occupancy of the barracks building by new apartment residents, USACE authorized the collection of indoor air and tap water samples. In January 1995, indoor air samples were collected from each of the three apartments, and analyzed for benzene, toluene, ethylbenzene, and xylenes (total) (BTEX), as described in a letter report to Nancy Beardsley, Maine DEP Division of Federal Facilities Remediation (Maine DEP, 1995). Low concentrations of one or more BTEX constituents were detected in the indoor air of each apartment, particularly Apartment 3, potentially attributed to residential sources, such as smoking. A groundwater sample from the associated Launch Site groundwater drinking well was also collected and no BTEX compounds were detected. In addition, PCB-containing transformers were reportedly removed from inside the generator building at the former Launch Site in 1994; no post-removal soil sampling data were collected.

In September 1996, three areas of the former Launch Site (the former barracks, the generator building, and the acid neutralization pit) were investigated through the advancement of soil borings, installation of groundwater monitoring wells, and collection of soil and groundwater samples for analytical testing. Indoor air sampling was again performed within three apartments of the former barracks, as described in *Site Investigation Report, Initial Site Investigations at Four Defense Environmental Restoration Program Formerly Used Defense Sites (DERP-FUDS),*

Caswell, Perham, Presque Isle, Maine (Weston Inc., 1997). Benzene and xylenes were detected in Apartments 1 and 3 in both the living and bedrooms. Ethylbenzene was also detected in Apartment 3. Toluene was detected in all three apartments sampled. Benzene, ethylbenzene, and xylene concentration were highest in Apartment 3, which corresponds to elevated soil results in LSSB-3 (Weston, 1997a).

Additional soil samples were collected in June 1999 from near drainage system outfalls and a catch basin of the former acid neutralization pit area, as discussed in *Site Investigation Report Addendum, at Four Defense Environmental Restoration Program Formerly Used Defense Sites (DERP-FUDS), Caswell, Perham, Presque Isle, Maine* (Weston Inc., 2000).

In 2015, soil samples were collected from around the former generating building from 0-0.5 and 0.5-1 foot bgs and analyzed for polychlorinated biphenyls (PCBs); no PCBs were detected (AECOM, 2015).

In 2016, soil borings were advanced and soil samples collected from around the former barracks to update characterization of soil conditions in this area.

In August 2025, a downgradient residential drinking water well approximately 540 feet from LSMW-6 was sampled to document there is no offsite migration or exposure to adjoining residents. The drinking water sample was taken from the faucet in the residence, and there was no filtration system present. No VOCs were detected in the drinking water sample collected from the residence.

3.1.2 Control Site

In August 1994, five USTs were removed from the Control Site: one 6,000-gallon diesel UST from near the generator building, three 2,000-gallon No. 2 fuel oil USTs from near the mess hall, administration building, and barracks, and one 500-gallon No. 2 fuel oil UST near the radar tower generator building. Upon removal, indications of releases associated with overfills and ancillary piping were identified at each UST location except at the 500-gallon UST (Mason, 1995). A summary of each UST is provided below.

- **6,000-gallon diesel UST from near the generator building:** Approximately 840 cubic yards of contaminated soil and the underlying concrete pad were excavated during the UST removal. In October 1994, two soil samples were collected from test pits representing the bottom of the excavation and submitted for fuel oil analyses. Total petroleum hydrocarbon (TPH) concentrations of 180 milligrams per kilogram (mg/kg) and 250 mg/kg were detected. The area was subsequently backfilled with unknown material.
- **2,000-gallon No. 2 fuel oil UST from near barracks:** Approximately 70 tons of contaminated soil and the underlying concrete pad were excavated during the UST removal. Contaminated soil was observed beneath the foundation wall; further soil removal was determined to be infeasible, and the excavation area was backfilled. In October 1994, three soil samples (one base and two sidewall samples) were collected from test pits in the former excavation area and submitted for analyses. TPH concentrations from below detectable concentrations to 170 mg/kg were detected.

- **2,000-gallon No. 2 fuel oil UST from near the mess hall:** Approximately 150 tons of contaminated soil and the underlying concrete pad were excavated during the UST removal. Additional contaminated soil was observed adjacent to and under the building. In October 1994, two soil samples were collected from test pits representing the bottom of the excavation and one from beneath the building foundation, and submitted for analyses. TPH concentrations from 27 mg/kg to 180 mg/kg were detected.
- **2,000-gallon No. 2 fuel oil UST from near former administration building:** Approximately 150 tons of contaminated soil and the underlying concrete pad were excavated during the UST removal. Extensive soil contamination was visually observed throughout the excavation and along the tank's supply and return lines, suggesting further contamination existed under the building foundation. Further soil removal was not conducted due to concerns about the building stability. In October 1994, a soil sample was collected from a test pit extending beneath the building foundation and submitted for analyses. TPH was detected at a concentration of 320 mg/kg.
- **500-gallon UST area near the former radar towers:** While no contaminated soil was removed from the 500-gallon UST area near the former radar tower generator building, the two soil samples collected after the UST removal contained no detectable TPH quantified as fuel oil, but contained 20 and 24 mg/kg of TPH quantified as "other hydrocarbons."

In addition to the USTs, Site activities in 1994 included the removal of five pole-mounted transformers [three 50 kilovolt-amps (kVA), one 5 kVA, one 10 kVA] and an oil switch along the access road to the property. The contents of the transformers were analyzed. All three 50 kVA transformers contained concentrations of the PCB Aroclor 1254 (up to 11 mg/kg) and Aroclor 1260 (up to 46 mg/kg) with higher concentrations detected in the 10 kVA transformer (19 mg/kg of Aroclor 1254 and 79 mg/kg of Aroclor 1260). No PCBs were detected in the 5 kVA transformer or oil switch. Evidence of releases was visually observed near three of the transformers. Subsequently, approximately 20 tons of contaminated soil was removed from beneath the transformers. Confirmation soil sampling identified no residual PCBs in soil beneath the former transformers, but did detect TPH as "other" petroleum hydrocarbons (up to 84 mg/kg).

In 1996-1997, additional investigations were conducted to delineate the extent of petroleum contamination and other possible contaminants at the generator building, barracks building, mess hall, and administration building USTs with limited additional assessment at the radar tower generator building. A total of 55 subsurface soil samples from 25 locations at the Control Site were collected for analysis. Sampling identified the presence of nine volatile organic compounds (VOCs, including chlorinated VOCs) and TPH-DRO. Groundwater was also sampled and found to contain similar constituents. Additional soil sampling was conducted in 2017 for VPH, EPH, and VOCs to update information on the nature and extent of contamination.

3.2 Summary of Site Data

This section provides a summary of Site data and outlines which data are used in the risk assessments. Comparisons of detected concentrations of non-petroleum constituents to screening levels may be found in **Section 4.1** of the HHRA and **Section 5.3** of the SLERA. It is noted that historical analytical laboratory reports were not available for most sampling events, so data were obtained from summary tables presented in previous Site documents. Although petroleum results evaluated as TPH-DRO and as VPH and EPH fractions were assessed separately for risk under Maine DEP guidance in **RI Appendix D**, the results for these analyses are also included in the data tables cited below, but are not discussed herein.

3.2.1 Soil

A total of 129 soil samples collected at the Site (54 samples from Launch Site and 75 samples from Control Site) during the various investigations in 1994, 1996, 1999, 2015, 2016, and 2017 were compiled and considered for the risk assessment. In addition, 8 field duplicate samples were collected and averaged with their pair sample (3 samples from Launch Site and 5 samples from Control Site).

Original laboratory reports were not available for soil samples collected in 1996 and 1999, but rather these older data were obtained from summary tables included in prior reports. Summaries of the results by area (Launch Site and Control Site) are presented below.

3.2.1.1 Launch Site Soil

Table 1 shows available analytical results for soil samples from the former Launch area; only constituents detected in one or more soil samples are presented. Sample locations are presented in **Figure 2**. Because the potential source areas are closely located, the Launch Site is evaluated as one area in the risk assessments. A total of 54 soil samples were collected from various depths between the ground surface to 20 feet below the ground surface (bgs) during the various investigations in 1994, 1996, 1999, 2015, and 2016. Samples were analyzed for TPH-DRO, VPH and EPH fractions by the Massachusetts Department of Environmental Protection (Mass DEP, 2002) method, and VPH/EPH target compounds (select VOCs and polycyclic aromatic hydrocarbons [PAHs]) chlorinated herbicides/pesticides, PCBs, and metals; however, each sample was not necessarily analyzed for all constituents.

Soil data applied to the HHRA and SLERA are shown in the top portion of **Table 1** for Launch Site soil. Data excluded from the risk assessments are shown in the grey-highlighted, bottom portion of **Table 1** because they do not represent soils where exposures can occur, as follows:

- Deep soils: Seven samples (LSSB4-2, LSSB7-2, LSSB1-2, LSSB6-2, LSMW1-2, LSMW4-2, and LSMW5-2) were collected at various depths 16-20 ft bgs. Current and future human and ecological receptors are not expected to be exposed to soils at depths greater than 15 ft bgs. Samples collected from depths of 14-16 ft bgs were assumed to represent concentrations at 15 ft bgs and included in the risk assessments. All other samples collected at depths greater than 15 ft bgs were excluded from the risk assessments.

- Unknown sample: A soil sample (LSCB-1) was collected in 1999 with missing information regarding the sample depth. In addition, the sample ID does not follow the naming convention of other soil samples collected at the same time. Due to the uncertainty of this sample, it was excluded from the risk assessment.
- Soil samples collected from stockpiles: Three samples (LO-13 L CSP1, CSP1 GEN and CSP2 GEN) have presumably been removed and are not representative of current conditions. Therefore, these samples were excluded from further analysis.
- Acid Neutralization Pits and related sediment samples: Eight soil samples (LSANPB-1, LSANPB1-2, LSANPB2-1, LSANPB2-2, LSANPB3-1, LSANPB3-2, LSANPB4-1, and LSANPB4-2) and one sediment sample (LSCB-1) from former waste management structures such as the acid neutralization pit and associated catch basins and drainage swales were analyzed for VOCs, SVOCs, pesticides/PCBs, and metals. Only some of these samples were taken at depths relevant for the risk assessments, including the shallow intervals from two soil borings in the drainage swales (LSANPB-3 and LSANPB-4) and one sample from the sediment at the bottom of a catch basin (LSCB-1) within the acid neutralization pit. These data were excluded from the HHRA for several reasons:
    - The results from these samples showed that there were no SVOCs and limited pesticides, and metals were detected below Maine DEP RAGS (current in 1997). Thus, no additional soil sampling was recommended based on the lack of identified contamination.
    - In 1999, additional investigation of the acid pit area indicated elevated DRO was present in a catch basin; however, similar concentrations were not identified in the swales that received the discharge (LSANPB-3 and LSANPB-4). Therefore, it appears the DRO was confined to the catch basins within the former building.
    - Note that the exclusion of these data points means there are no metals analyses available for consideration in the risk assessments for the Launch Site soils. However, none of the metals detected in these excluded samples exceed the current Maine RAGs, except for arsenic, which is detected at concentrations (maximum detection of 9.97 mg/kg) above the lowest current Maine RAG of 0.l83 mg/kg, based on leaching potential, but below the soil RAG for the commercial worker of 41 mg/kg and below the Maine background value (28 mg/kg).

A total of 35 soil samples (both surface and subsurface) collected from surface to 16 ft bgs were included in the Launch Site soils risk assessments (**Table 1**, top). Note that 18 of the 35 soil samples were collected during or prior to 1996 and may not be representative of current Site conditions. In particular, since several former UST areas of the Site have been excavated and backfilled, and the source of the backfill material is not known, the available soil data may or may not be fully representative of current conditions. While newer soil data were collected in the general vicinity of the older data, samples were not collected from the same depth. Therefore, both the older and the newer data are included in the HHRA and SLERA.

3.2.1.2 Control Site Soil

Table 2 shows analytical results for soil samples from the former Control Site. The only soil data available at the Control Site were from subsurface samples at depths of 4 to 16 ft bgs. Although the lack of surface soil data at the Control Site limits the completeness of this analysis, the likely

contaminants due to USTs would primarily be found in the subsurface soils and fill was placed where the USTs were removed. Only constituents detected in one or more soil samples are presented. Sample locations are presented in **Figure 3**.

Based on the identified USTs removed from the Site (**Section 3.1.2**), and differences in the presence and concentrations of COPCs, soil results for the Control Site were divided into the following five subareas for the risk assessments. Given the spatial differences between the five subareas, this approach was taken both to avoid "diluting" exposure point concentrations (EPCs) by including samples between these subareas where no constituents were detected and to allow evaluation of separate areas for risk in case remediation is necessary:

- *Subarea 1 – Former Radar Tower Generator Building* – an area surrounding the location of a former 500-gallon UST that was removed.
- *Subarea 2 – Former Generator Building* – an area near the locations where former 6,000-gallon and 2,000-gallon USTs were removed.
- *Subarea 3 – Former Mess Hall* – an area where a former 2,000-gallon UST was removed.
- *Subarea 4 – Former Administration Building* – an area surrounding the location of a former 2,000-gallon UST that was removed.
- *Subarea 5 – Northeast of Administration Building* – an area northeast of the administrative building where TCE was detected in soil and groundwater.

Soil samples were collected from 4 to 40 feet bgs in the five subareas of the Control Site from the various investigations in 1996, 1999, and 2017. Soil samples were analyzed for TPH-DRO, VPH fractions, VPH VOCs, additional VOCs, EPH fractions, and EPH target PAHs. No metals analyses were found for soil samples from the Control Site.

Subsurface soil data applied to the HHRA and SLERA are shown on the top portion of **Table 2** for Control Site soil**.** Data excluded from the risk assessments are shown in the grey-highlighted, bottom portion of **Table 2**, and include:

- Deeper soils: Thirty-nine soil samples were collected from between 18 and 40 ft bgs (i.e., greater than 15 feet bgs). Receptors are not expected to be exposed to soils at these depths; therefore, these samples were not included in the risk assessments.

Newer subsurface soil data were collected only in Subarea 2; remaining subareas have data only from 1996 or 1999. These older data may not be representative of current Site conditions but are included in the risk assessments because of the absence of newer data in other Subareas (**Table 2**).

3.2.2 Groundwater

All groundwater samples collected at the Site during the various investigations and long-term monitoring (LTM) in 1996, 1997, 1999, 2000, 2002-2004, 2008-2010, and one sample from August 2025 for an adjoining residence were compiled and considered for the risk assessment. In addition, 5 field duplicate samples were collected from the Control Site and averaged with their parent sample.

Original laboratory reports were not available for all groundwater data, but were obtained from summary tables. While reporting limits were not presented for some sample results presented as "non-detected", all samples were considered for the risk assessments. Summaries of the results by area (Launch Site and Control Site) are presented below.

3.2.2.1 Launch Site Groundwater

Table 3 shows all available individual analytical results for groundwater samples from six groundwater monitoring or drinking water wells located throughout the former Launch Site, collected between 1996 and 2010. All data were included in the risk assessment. Four of these monitoring wells (LSMW-1, LSMW-3, LSMW-6, and LSMW-8) were sampled twice only, in November 1996 and May 1997 during the initial Site Investigation. Monitoring well LSMW-7, located near a former UST area, was sampled eight times between 1996 and 2004 during the LTM program. Well LSDW-1, the on-Site drinking water well for the apartments/barracks, was sampled seven times between November 1996 and May 2010 during the LTM program. Samples were analyzed for TPH (TPH-GRO and TPH-DRO) and VOCs, although not all samples were analyzed for all constituents. One sample was collected from the downgradient residence faucet and analyzed for chlorinated VOCs only (PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride). Other than this more recent sample, data were collated from the historical reports, as described in **Section 3.1**, and therefore, the analytical results available for groundwater were limited to those available in the reports.

3.2.2.2 Control Site Groundwater

Table 4 shows all available individual analytical results for groundwater samples collected from six monitoring wells, one drinking water well, and from the tap between November 1996 and July 2017. Two wells (CSMW-3 and CSMW-10) were only sampled once each during this time period during the initial Site Investigation; wells CSMW-5, CSMW-9, and CSMW-11 were sampled and analyzed multiple times as part of the LTM program. Samples were analyzed for TPH (TPH-GRO and TPH-DRO), PAHs, and VOCs. For samples not analyzed for the individual VPH analytes, C9-C18 aliphatic hydrocarbons and C11-C22 aromatic hydrocarbons were estimated based the TPH-DRO results. Analyses in 2017 only consisted of VPH and target analytes. The presence of chlorinated VOCs from earlier sampling rounds, although detected above comparison values in some wells, was not reassessed 2017.

3.2.3 Indoor and Outdoor Air

Indoor air samples were collected from three different apartments at the residence on the Launch Site. In addition, outdoor air samples were collected to represent background concentrations. Original laboratory reports were not available for many of these indoor air samples. Therefore, these results were obtained from summary tables and may not include reporting limits for analytes that were not detected. No indoor air samples were collected from the Control Site because the buildings were vacant and not considered occupiable at the time due to their condition. All samples were presented in parts per billion by volume and converted to $\mu g/m^3$. Summaries of the Launch Site air results by sample type are presented below.

3.2.3.1 Launch Site Indoor Air

Table 5 shows the analytical results for indoor air samples collected from the three apartments/former barracks in January 1995 and September 1996. Indoor air samples were analyzed only for BTEX. Two of the apartments (Apartment 1 and 3) were occupied at the time by tobacco smokers; however, the highest results were consistently in Apartment 3.

3.2.3.2 Launch Site Outdoor Air

Two outdoor background air samples were collected in 1996 near the apartments on the Launch Site (**Table 5**). These samples were analyzed for BTEX and used to identify potential background source of BTEX that could be contributing to indoor air concentrations. No outdoor sources were identified as the outdoor samples did not detect BTEX.

3.3 Conceptual Site Model for Risk Assessment

Based on the information provided above and in the RI report text, a conceptual site model (CSM) for the risk assessments is described in this section. The CSM defines potential sources, migration, exposure pathways and receptors and evaluates whether exposure pathways are complete, thereby informing the human health and ecological risk assessments. It is noted that historical data records were used to compile the data set for the risk assessments, and some information on the analytical results may be incomplete.

3.3.1 Potential Sources, Nature and Extent, and Fate and Transport of Contamination

Past Site uses have resulted in contamination at the LO-13 Site. As noted in the previous sections and the RI report, the primary source of contamination at the Site are the former USTs. In addition, two areas of TCE contamination are present near the radar towers and northeast of the administration building, but the source of TCE in these areas is unknown. The majority of the contamination is in the subsurface soils (> 4 ft bgs), consistent with releases from USTs.

3.3.2 Human Receptors and Exposure Pathways

Potentially exposed human receptors and exposure pathways are also described in **Sections 4.2.1 and 4.2.2**. Both the Launch and the Control Sites are currently used by individual residents, and each contain a single residential building (apartments on the Launch Site and a part-time summer residence on the Control Site). The water supply wells are in use for these residences. This current use is expected to continue into the future, and there are no local limitations or ordinances on potential Site uses.

The potential human receptors considered for the CSM were as follows:

- **Residents.** There are currently residences present at both the Launch and Control Sites. Residents can be exposed to soils via incidental ingestion, dermal contact, and inhalation of particulates. Residents using potable water wells on the two Sites could be exposed via ingestion, dermal contact, or inhalation of volatiles. In addition, the potential for vapor intrusion into residential indoor air from groundwater exists, as volatile chlorinated compounds have been detected in groundwater from monitoring wells (although these were

not detected in the drinking water). Migration to adjoining residences does not appear to have occurred.

- **Commercial Workers.** Neither Site is currently commercially nor industrially used, but there is no prohibition on such use. Therefore, potential future hypothetical commercial adult workers, who primarily work indoors but could be exposed to soils outdoors during breaks, are quantitatively assessed. Soil exposure pathways for these workers could include incidental ingestion, dermal contact, and inhalation of particulates. Groundwater exposures are not quantitatively evaluated for this receptor, as the exposures for residents would be greater.
- **Construction/Utility Workers.** The potential for construction or utility worker exposure exists under current and future land uses at both Sites. Adult construction workers are quantitatively assessed assuming exposures to surface and subsurface soils via incidental ingestion, dermal contact, and inhalation of particulates during construction activities. Risks for utility workers were not quantified but evaluated qualitatively based on the results of the construction worker risk assessment.
- **Trespassers.** Trespassing may occur under current and future land use at both Sites, so trespassers are assessed as an older child/youth. Trespassers can be exposed to surface soils from incidental ingestion, dermal contact and inhalation of particulates while trespassing at the Site.

The following receptor groups were not quantitatively assessed for the reasons provided:

- **Recreational Receptors.** The Sites are not intentionally used for recreational purposes on a regular basis. Such similar incidental use would be considered trespassing, which is evaluated quantitatively in the HHRA; therefore, recreational receptors are not specifically assessed.
- **Landscape workers.** The Sites are not known to be formally landscaped beyond surface mowing in select areas; however, if landscaped areas were developed in the future, landscapers could be exposed. Direct soil contact by landscapers is anticipated to be moderate to intense, intermittent, and of a short to moderate, seasonal duration. Landscape worker exposure is not assessed, as the assessment of commercial workers is a conservative representation of potential soil exposures. While the incidental soil ingestion rate for the commercial worker (50 mg/day) is less than an outdoor worker like a landscaper (100 mg/day), the exposure frequency to soil is expected to be lower for landscapers. It is anticipated that landscapers are handling Site soils 1-2 days a week only during the warmer months out of the year when the soil is not frozen or covered by leaves or snow, based on professional judgment. Therefore, the overall mass of soil incidentally ingested during the 25 year occupational tenure for the commercial worker (50 mg/day x 225 d/y x 25 yr = 74,250 mg) is conservative estimate for the landscaper (100 mg/day x 48 d/y x 25 yr = 120,000 mg).

Residents, commercial workers, and trespassers are most likely exposed to surface soils. However, given that the contaminants are primarily found in the subsurface soils at these Sites and future construction activities could move subsurface soils to the surface where exposures could occur, risks were evaluated for all receptors assuming exposure to surface and subsurface soils up to 15 feet in depth.

3.3.3 Ecological Receptors and Exposure Pathways

Only terrestrial habitats are present at the Site and ecological receptors are not expected to be exposed to groundwater. In addition, risks were not evaluated for aquatic receptors in the absence of aquatic habitats. Therefore, potentially exposed ecological receptors are limited to terrestrial plant, mammalian, bird, and insect species that would normally be present in this part of Maine. While ecological receptors are typically exposed to surface soils, risks were evaluated assuming exposures to surface and subsurface soils at the Launch Site and subsurface soils at the Control Site, given that future construction could move subsurface soils to the surface where exposures could occur. Ecological risks are evaluated in the SLERA in **Section 5.0**.

4.0 HUMAN HEALTH RISK ASSESSMENT

4.1 Hazard Identification

Hazard identification in a HHRA consists of summarizing the Site data and selecting COPCs to be carried through the quantitative HHRA based on comparisons to human health protective screening levels and background concentrations (as available). As previously mentioned, only the individual detected compounds are evaluated in this HHRA; grouped petroleum compounds (although shown in the data tables) are evaluated separately in RI **Appendix D** under the Maine DEP Remedial Action Guidelines (RAGs).

4.1.1 Data Summaries

Summaries of the data used in the HHRA and the selection of COPCs may be found in **Tables 6** through **9**, and are discussed further in the sections below.

4.1.2 Selection of COPCs

To select the COPCs to be evaluated in the quantitative risk assessment, the maximum detected concentrations were compared to health protective risk-based screening levels and available Maine DEP background levels.

Chemicals with concentrations below their respective screening criteria and/or below background do not warrant further evaluation in the quantitative risk assessment. Exceedance of screening levels does not indicate risk but identifies chemicals that warrant further evaluation.

4.1.2.1 COPCs in Soil

Detected soil constituent concentrations were compared with the following screening levels, as available. Chemicals were identified as COPCs in soil if the maximum concentration exceeded both:

- EPA Regional Screening Levels (RSLs) protective of residential soil exposures, May 2023 (EPA, 2023c); RSLs associated with a $1x10^{-6}$ target incremental cancer risk (TR) level and a non-cancer target hazard quotient (THQ) of 0.1 were applied as human health screening values. These RSLs are based on direct soil contact scenarios.
- Maine DEP soil background concentrations, if available (Maine DEP, 2023).

Volatile contaminants in soil can result in potential vapor intrusion and subsequent inhalation exposures. However, the soil results were not evaluated for volatilization potential because EPA does not have any Vapor Intrusion Screening Levels (VISLs) for soil or soil benchmarks protective of this exposure pathway from vapor intrusion. Rather, potential exposures from vapor intrusion were evaluated using groundwater data and VISLs for groundwater. In addition, indoor and outdoor air samples collected from the Site residences were used to evaluate potential inhalation exposures from Site COPCs.

Launch Site Soil

Because the assessed potential source areas at the Launch Site are closely located and have similar potential sources of contamination, the Launch Site is evaluated as one potential exposure area in the HHRA.

As shown in **Table 6**, only benzo(a)pyrene was detected at a concentration exceeding its human health soil screening level:

- Benzo(a)pyrene was detected in 6 of 9 samples with a maximum detected concentration of 0.3 mg/kg (LSSB-13-1), exceeding the residential soil RSL of 0.11 mg/kg. However, this concentration is less than the Maine "rural developed" background value of 5.4 mg/kg and will not be considered a COPC.

Therefore, none of the individual chemicals detected in Launch Site soil were identified as COPCs and Launch Site soil is not further evaluated in a quantitative HHRA.

Control Site Soil

As shown in **Table 7**, all individual constituent concentrations in soil from the Control Site were below soil screening levels, except for trichloroethene (TCE) in Subarea 1 and naphthalene in Subarea 2:

- TCE was detected in 1 of 5 samples in Subarea 1 (reported as CSSB-22-1 and its duplicate) at a depth of 4 to 6 feet bgs with the parent having a concentration of 0.44 mg/kg and its duplicate having a concentration of 0.505 mg/kg, exceeding the residential soil RSL of 0.41 mg/kg.
- Naphthalene was detected in 1 of 13 samples in Subarea 2 (reported as CSSB-27-1 and its duplicate). The concentration of 2.7 mg/kg from the 5 to 7 feet bgs sample is greater than the RSL of 2 mg/kg, but less than the Maine "rural developed" background value of 5 mg/kg. Therefore, naphthalene was not identified as a COPC.

It is noted that acenaphthene, benzo(g,h,i)perylene, and phenanthrene do not have established soil RSLs; however, the maximum detected concentrations for these analytes are below the RSLs for similar PAHs/SVOCs. Therefore, TCE in soil at Subarea 1 at the Control Site was the only chemical selected as a COPC in Control Site soil and was carried through the quantitative HHRA.

4.1.2.2 COPCs in Groundwater

Concentrations of constituents detected in groundwater were compared to the following screening levels, as available. Chemicals were identified as COPCs in groundwater if the maximum concentration exceeded at least one the following screening levels:

- EPA Maximum Contaminant Levels (MCLs), which are the enforceable drinking water standards (EPA, undated, accessed on-line 2023)
- EPA Regional Screening Levels (RSLs) ($1x10^{-6}$ TR and THQ of 0.1) for tap water exposures (May 2023) (EPA, 2023c).
- To evaluate the potential vapor intrusion exposure pathway, vapor intrusion screening levels (VISLs) calculated using the EPA's on-line VISL calculator are applied to groundwater (EPA, 2015a; EPA, 2023b). These values were based on a $1x10^{-6}$ TR and THQ of 0.1, default attenuation factors and chemical properties, and a default residential exposure scenario. VISLs are calculated by the EPA VISL Calculator only when a chemical is of sufficient volatility and has inhalation toxicity data. The VISL calculator assumes an attenuation factor for vapors to indoor air through a foundation, based on parameters including the chemical's Henry's Law Constant, soil type, and depth to groundwater (EPA, 2015a; EPA 2023b). Note that some of the groundwater sampling depths are unknown. Default parameters such as temperature (25°C) are consistent with those employed by Maine DEP for the State of Maine and were not adjusted.

Launch Site Groundwater

As shown in **Table 8**, all detected constituent concentrations in Launch Site groundwater were below the drinking water regulatory level, the EPA MCLs. However, TCE was detected in 2 of 10 samples at concentrations of 0.8 and 2.0 µg/L, exceeding the EPA RSL for TCE in tap water of 0.28 µg/L, although these concentrations do not exceed the EPA MCL for drinking water of 5 µg/L. These detections were from one monitoring well at depth (LSMW-6 at 17 and 18 feet below surface) in 1996 and 1997 and were not detected in the drinking water well and were not detected in 2025 in a downgradient residential drinking water well. In addition, both TCE detections in groundwater that are greater than the tapwater RSLs are greater than the calculated groundwater VISL of 0.518 µg/L.

Although the detected TCE concentrations in groundwater do not exceed the enforceable regulatory level (the EPA MCL) for drinking water, and thus would not be actionable for remediation, TCE is included in this quantitative HHRA, based on the exceedance of the tapwater RSL and the VISL.

Control Site Groundwater

As shown in **Table 9**, all detected constituent concentrations in Control Site groundwater were below the drinking water regulatory level, the EPA MCLs. However, TCE was detected in 4 of 11 samples above the tapwater RSL at concentrations of 0.8, 0.8, 1.4, and 1.6 µg/L. These samples were taken in 1999 and 2000 from monitoring wells (depths unknown). It is noted, however, that water from the potable water well (CSDW1) was not analyzed for TCE. In addition, the four TCE

detections in groundwater that are greater than the tapwater RSLs are greater than the calculated groundwater VISL of 0.518 µg/L.

Although the detected TCE concentrations in groundwater do not exceed the enforceable regulatory level (the EPA MCL) for drinking water, and thus would not be actionable for remediation, TCE in Control Site groundwater is included in the quantitative HHRA, based on the exceedance of the tapwater RSL and the VISL.

4.1.2.3 COPCs in Air

Indoor air data were available only for the Launch Site (**Table 5**) and only BTEX was analyzed. The measured indoor air concentrations were identified as COPCs in indoor air if the maximum concentration exceeded the following screening level:

- EPA Regional Screening Levels (RSLs) ($1x10^{-6}$ TR and THQ of 0.1) for residential indoor air exposures (May 2023) (EPA, 2023c).

The following constituents were detected in indoor air at concentrations above indoor air screening levels (**Table 5**):

- In Apartment 1, benzene was detected at concentrations above screening levels in 1996 in both the living room and bedroom. Apartment 1 was occupied by smokers at the time of sampling.
- In Apartment 3, benzene, ethylbenzene, and xylenes were detected at concentrations above screening levels in both 1995 and 1996 in the living room and bedroom. Apartment 3 was occupied by smokers at the time of sampling.
- Apartment 2 was vacant and had no detected constituents at concentrations above screening levels.

Comparing the indoor air quality in the two apartments occupied by smokers with the unoccupied apartment, it is reasonable to conclude that the screening level exceedances could be due to chemical contributions from tobacco smoke. For this reason, and because the data are 20+ years old, these indoor air results are likely not representative of current Site indoor air conditions and are not considered in the quantitative HHRA, although potential indoor air risks are evaluated for vapor intrusion from groundwater.

4.1.2.4 COPCs - Summary

To summarize, the following constituents were selected as COPCs for quantitative assessment in the HHRA, based on the data available:

- Soil
  - Launch Site soil – none
  - Control Site Subarea 1 soil – TCE
- Groundwater
  - Launch Site groundwater – TCE

  - Control Site groundwater – TCE
- Air
  - Launch Site air – none
  - Control Site air – no data available

4.2 Exposure Assessment

This section identifies human receptor groups potentially exposed to COPCs, identifies exposure pathways by which these receptor groups may be exposed, calculates EPCs for the selected COPCs, and quantifies the potential exposures of each receptor group.

4.2.1 Identification of Potentially Exposed Human Receptor Groups

Based on current and reasonably foreseeable future Site uses, the following human receptor groups were quantitatively assessed in the HHRA for both the Launch and Control Sites, as also described in the CSM (**Section 3.3** and in the RI):

Residents. The are currently residences at both the Launch Site and the Control Site, and this land use is likely to continue into the future. Therefore, residents are assessed. Two age groups are evaluated: a child assessed for a 6-year exposure and an adult assessed for a 20-year exposure, as well as a combined age groups to assess cancer risks over a 26-year period.

Commercial Workers. Neither Site is currently commercially nor industrially used, but there is no prohibition on such use. Therefore, potential future hypothetical commercial adult workers, who primarily work indoors but could be exposed to soils outdoors during breaks, are assessed. Groundwater exposures are not quantitatively evaluated for this receptor, as the exposures for residents would be greater.

Construction/Utility Workers. The potential for construction or utility worker exposure exists under current and future land uses at both Sites. Adult construction workers are assessed.

Trespassers. Trespassing may occur under current and future land use at both Sites, so trespassers are assessed as an older child/youth.

The following receptor groups are not quantitatively assessed for the reasons provided:

Recreational Receptors. The Sites are not intentionally used for recreational purposes on a regular basis; such similar incidental use would be considered trespassing.

Landscape workers. The Sites are not known to be formally landscaped beyond surface mowing in some areas; however, if landscaped areas were developed in the future, landscapers could be exposed. Direct soil contact by landscapers is anticipated to be moderate to intense, intermittent, and of a short to moderate, seasonal duration. Landscape worker exposure is not assessed, as the assessment of construction/utility workers conservatively represents potential landscape worker exposure.

4.2.2 Exposure Scenarios

Human receptor groups were assessed for exposure to soil COPCs via the following pathways:

POTENTIALLY EXPOSED RECEPTORS AND EXPOSURE PATHWAYS-SOIL				
Exposure Pathway-Soil	**Residents**	**Commercial Workers**	**Construction/ Utility Workers**	**Trespassers**
Soil ingestion	✓	✓	✓	✓
Soil dermal contact	✓	✓	✓	✓
Outdoor inhalation of entrained soil particles	✓	✓	✓	✓

All receptor groups were assessed for exposure to soil through soil ingestion, soil dermal contact, and outdoor inhalation of entrained soil particles (dust). The assessment of potential soil exposure risks assumes impacted subsurface soil may be brought to the surface during potential future excavation activities and that, subsequently, all receptors could potentially contact these soils. Therefore, soil from 0 to 15 feet bgs from the Launch Site, and available subsurface soil data from the Control Site (4 to 16 feet bgs) is evaluated in the HHRA.

Human receptor groups were assessed for exposure to groundwater COPCs via the following pathways:

POTENTIALLY EXPOSED RECEPTORS AND EXPOSURE PATHWAYS-GROUNDWATER				
Exposure Pathway-Groundwater	**Residents**	**Commercial Workers**	**Construction/ Utility Workers**	**Trespassers**
Ingestion	✓			
Dermal contact during household use	✓			
Indoor inhalation of volatile groundwater COPCs during household use	✓			
Indoor inhalation of volatile groundwater COPCs via vapor intrusion	✓			

Residents were assessed for exposure to groundwater COPCs via ingestion of potable water, along with dermal contact and inhalation during household use of groundwater. Residents were additionally assessed for exposure to groundwater COPCs that could potentially migrate via vapor intrusion to indoor air of a slab-on-grade building constructed over impacted areas. Inclusion of this potential future exposure pathway is consistent with EPA guidance (EPA, 2015a) because there are current residences on the Site, and vapor could migrate from groundwater into these structures and/or to future habitable buildings if they are constructed over the impacted areas.

Since residents would have the greatest potential exposures to groundwater through use of potable water, the groundwater exposure routes were not evaluated for the future hypothetical commercial workers. It is further assumed that construction works and trespassers would not have contact with

groundwater due to depth to groundwater, thus these receptors were not evaluated quantitatively in the HHRA.

4.2.3 Exposure Point Concentrations

This section describes the derivation of EPCs for TCE, the only COPC in soil and groundwater.

4.2.3.1 Soil Exposure Point Concentrations

No COPCs were selected in soil at the Launch Site.

At the Control Site, as described in **Section 3.2.1.2**, five subareas of the Site were assessed separately because of differences in the presence and concentrations of COPCs, and because of their distance from one another. Only one COPC was selected at the Control Site in Subarea 1 - TCE. TCE was detected at the Control Site Subarea 1 in 1 of 5 samples at a concentration of 0.505 mg/kg, and this concentration was used as the EPC for soil in the HHRA. As previously discussed, the HHRA considers soil samples collected from depths of 0 to 15 feet bgs; deeper soil samples are not likely to be accessible and were not included in the HHRA.

4.2.3.2 Soil Particulates in Air Exposure Point Concentrations

EPCs in air related to particulate constituents in soil were derived from approaches recommended by EPA. For the entrained soil particle pathway, air EPCs were estimated using a particulate emission factor (PEF) and the following equation:

$$C_{air} = \frac{C_{soil}}{PEF}$$

where:

C_{air} = Concentration of substance in air (mg/m^3)
C_{soil} = Concentration of the chemical in soil (mg/kg)
PEF = Particulate Emissions Factor (m^3 air/kg soil)

A site-specific dispersion factor (Q/C) and PEF were calculated to reflect the site location and climate. Because meteorological conditions (i.e., the intensity and frequency of wind) affect both dispersion and emissions of particulate matter, the PEF of 5.20×10^9 cubic meters per kilogram (m^3/kg) was calculated for the 17-acre site based on EPA recommended meteorological conditions for Portland, ME and EPA's default assumptions (50% vegetative cover, mean annual wind speed of 3.89 m/s). An additional adjustment factor of 100 was applied to the construction/utility worker assessment to account for the increased entrainment of soil that may occur under unspecified construction/excavation activities.

4.2.3.3 Groundwater Exposure Point Concentrations

Groundwater EPCs were the maximum detected concentrations of TCE in groundwater at the Launch Site and the Control Site. These concentrations were used in the ingestion and dermal contact exposure pathways.

Some organic compounds in the groundwater can volatilize into indoor air for inhalation exposure from everyday household uses of water. To quantify inhalation exposures of volatiles from groundwater during everyday residential use, the volatilized air EPC is estimated using the groundwater EPC with Andelman's coefficient. Andelman applied a default volatilization factor (K) of 0.5 L/m^3 (0.0005 x 1,000 L/m^3) when defining the relationship between concentrations of volatile organics in household water and the average concentration of the volatilized chemical in air in one day (EPA, 1991), accounting for all uses of household water (e.g., showering, laundering, washing dishes). The author also made additional assumptions regarding the volume of water used in a day and the air exchange rate in a home (EPA, 1991). EPA uses this factor when calculating preliminary remediation goals to evaluate inhalation exposures to chemicals that volatilize from groundwater (EPA, 1991) and in their RSL calculations for tapwater exposures (EPA, 2023).

Indoor air concentrations and risks resulting from vapor intrusion through a basement were calculated using the on-line EPA VISL calculator (EPA, 2023b). Calculations of indoor air EPCs and risks are presented in the HHRA tables in **Attachment B**.

4.2.4 Quantification of Exposure

COPC exposure is quantified by combining exposure factors with EPCs to derive an average daily or lifetime exposure (ADE) or average daily or lifetime dose (ADD). Exposure factors used to quantify the magnitude, frequency, and duration of exposure for each receptor group are summarized in **Table 10**.

HHRA equations as outlined in EPA's RAGS guidance documents were used to quantify exposures and are presented in the HHRA tables in **Attachment B**. TCE, the only COPC, is identified as having a mutagenic mode of action for carcinogenesis. Consequently, early-life exposure may result in an occurrence of cancer during childhood or contribute to cancers later in life. Therefore, intakes for early childhood exposures (<16 years old) were calculated for the resident and adolescent trespasser using exposure parameters specific to each age group (0-2 years old, 2-6 years old, and 6-16 years old).

4.2.4.1 Incidental Ingestion of Soil

For the incidental soil ingestion pathway, conservative EPA- or Maine DEP-recommended values were used for each of the input parameters. The basis for each value used is detailed below.

TCE Concentration in Soil (C_{soil}). The maximum detected TCE concentration from the Control Site is used as the EPC (See **Section 4.2.3.1**).

Relative Absorption Factor (RAF). To accurately quantify potential exposures from incidental ingestion of soil, it is important to consider the amount of a chemical that is solubilized in gastrointestinal (GI) fluids and absorbed across the GI tract into the bloodstream. A chemical present in soil may be absorbed less completely than the same dose of the chemical administered in toxicity studies used to evaluate safe dose levels. A relative absorption factor for a specific compound represents the absorption fraction from soil (the exposure route of concern) relative to the absorption fraction from food or water (in most toxicity studies, chemical doses are

administered in food or water). A relative bioavailability of 100% is used, similar to EPA's approach in developing their RSLs (EPA, 2023).

Soil Ingestion Rate (IR_{soil}). EPA's default daily soil ingestion rates were used for the child resident (200 mg/day), adult resident (100 mg/day), commercial worker (50 mg/day), and construction worker (330 mg/day). The adult resident (6+ years old) soil ingestion rate is used for the adolescent trespasser (100 mg/day). These rates represent the upper-bound value for soil and dust ingestion (EPA, 2014). For assessment of mutagenic cancer risks for TCE, a soil ingestion rate of 200 mg/day is used for the 0-2 years old and 2-6 years old age groups, and a rate of 100 mg/day is used for the 6-16 years old age group.

Fraction of Soil from the Site (FS). While it is likely that only a portion of an individual's daily incidental soil ingestion occurs at the site, to be conservative, an assumption that 100% of the individual's daily soil exposure occurs at the site is used for all receptors.

Exposure Frequency (EF) and Exposure Duration (ED). For the resident, an EF of 350 days/year for 26 years (6 years as a child <6 years old and 20 years as an adult 6+ years old), based on EPA's recommended value for a resident, is used (EPA, 2014). Commercial and construction workers were assumed to be exposed to soil onsite 225 days a year for 25 years for a commercial worker and assuming 1 year for a construction worker. Adolescent trespassers (6-16 years old) were assumed to be exposed to soils for 52 days a year based on Maine DEP's assumption for exposure frequency, and for 10 years between the ages of 6-16 years old. For assessment of mutagenic cancer risks, exposure durations of 2, 4, and 10 years were used for the 0-2 years old, 2-6 years old, and 6-16 years old age groups, respectively.

Body Weight (BW). Based on EPA guidance (EPA, 2014), a mean adult body weight of 80 kg (EPA, 2011) is used for adult receptors in the HHRA. For adolescent receptors, the age-weighted mean body weight of 44 kg for an adolescent aged 6-16 years is used (EPA, 2011). For child receptors, a body weight of 15 kg for a child aged 0-6 years is used (EPA, 2011). For assessment of mutagenic compounds, the body weight is the age-weighted average body weight for each age group (EPA, 2011): 9 kg (0-2 years old), 17 kg (2-6 years old), and 44 kg (6-16 years old).

Averaging Time (AT). For non-cancer hazards, the averaging time is equal to the exposure duration multiplied by 365 days/year. For cancer risks, exposures were averaged over a 70-year (25,550 days) average lifetime, consistent with EPA guidance (EPA, 2014).

4.2.4.2 Dermal Contact with Soil

For dermal exposure to contaminants in soil, dermal intake (the amount absorbed into the body) is calculated using three parameters unique to the dermal exposure equation, as described below. The values used for other parameters are the same as discussed in **Section 4.2.4.1**.

Skin Surface Area Exposed (SA). This parameter reflects the amount of skin that is available for exposure to soil. EPA's recommended exposed skin surfaces were used for the child resident (2,373 cm^2), adult resident (6,032 cm^2), and commercial and construction workers (3,527 cm^2). The skin surface area is 4,639 cm^2 for the adolescent trespasser, assuming skin exposure is similar

to a resident (limited to the head, hands, forearms, lower legs, and feet) (EPA, 2014). For trespasser exposure to soil, this assumption likely overestimates exposure, because it is likely that the recreator would wear shoes when walking on the site. For assessment of mutagenic cancer risks, the following skin surface area values are used: 1,954 cm^2 (0-2 years old), 2,591 cm^2 (2-6 years old), and 4,639 cm^2 (6-16 years old).

Soil to Skin Adherence Factor (AF). The adherence factor represents the amount of soil that adheres to the skin per unit of skin surface area (EPA, 2004). Adherence factors vary depending on the properties of the soil, the part of the body, and the type of activity. EPA's recommended soil to skin adherence factors were used for the residential adult (0.07 mg/cm^2), residential child (0.2 mg/cm^2), commercial worker (0.12 mg/cm^2), and construction worker (0.3 mg/cm^2) (EPA, 2014). In the absence of a recommended value for a trespasser, the adherence factor for the commercial worker (0.12 mg/cm^2) was applied.

4.2.4.3 Inhalation of Fugitive Dust

For inhalation of fugitive dust generated from soil, the exposure parameters unique to the inhalation exposure equation are discussed in this section. The values for other parameters are the same as discussed in **Section 4.2.4.1**.

TCE Concentration in Air from Fugitive Dust (C_{air}). The fugitive dust TCE concentration was estimated using the maximum detected TCE soil concentration from the Control Site and a PEF (**Section 4.2.3.2**).

Exposure Time (ET). Exposure time is the amount of time a receptor is exposed to soil particulates in the air. EPA's default assumptions were used for child and adult residents (24 hours/day) and commercial and construction workers (8 hours/day). Adolescent trespassers were assumed to be exposed to soil particulates while on-site for 3 hours/day, based on Maine DEP (2021) assumptions.

4.2.4.3 Ingestion of Groundwater

For residents exposed to groundwater via ingestion, exposure parameters are discussed in this section. The values for other parameters are the same as discussed in **Section 4.2.4.1**.

TCE Concentration in Groundwater (C_{gw}). The maximum detected concentrations of TCE in groundwater at the Launch Site and the Control Site were used as the EPCs (see **Section 4.2.3.3**).

Groundwater Ingestion Rate (IR_{gw}). EPA's default daily groundwater ingestion rates were used for the child resident (0.78 L/day) and adult resident (2.5 L/day) (EPA, 2014). For assessment of mutagenic cancer risks for TCE, a groundwater ingestion rate of 0.78 L/day is used for the 0-2 years old and 2-6 years old age groups, and a rate of 2.5 L/day is used for the 6-16 years old age group.

4.2.4.4 Dermal Contact with Groundwater

For dermal exposure to contaminants in groundwater, the exposure parameters include absorbed dose per event (DA_{event}) which incorporates exposure time (ET) and skin surface area exposed (SA), as discussed in this section. The values for other parameters are the same as discussed in **Section 4.2.4.1**.

Absorbed Dose per Event (DA_{event}). The DA_{event} from groundwater dermal contact was calculated using the equations detailed in EPA's *Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004a). For organics in water, EPA uses a mathematical model to predict absorption from exposures to water. Compounds for which there are sufficient data to predict dermal absorption with acceptable confidence are said to be within the model's effective predictive domain. The DA_{event} was calculated using EPA's recommended equations and the assumption that TCE reaches steady state in 1.39 hours (EPA, 2004). DA_{event} includes a factor for exposure time (ET), in which residents were assumed to contact groundwater while bathing for 0.54 hours for a child and 0.71 hours for an adult (EPA, 2014). For assessment of mutagenic cancer risks for TCE, the child exposure time (0.54 hour) was used for the 0-2 years old and 2-6 years old age groups, and the adult exposure time (0.71 hour) was used for the 6-16 year old age group.

Skin Surface Area Exposed (SA). This parameter reflects the amount of skin that is available for exposure to groundwater while bathing. EPA's recommended whole body skin surfaces were used for the child resident (6,365 cm^2) and adult resident (19,652 cm^2). For assessment of mutagenic cancer risks, the following whole body skin surface area values were used: 4,463 cm^2 (0-2 years old), 7,225 cm^2 (2-6 years old), and 13,350 cm^2 (6-16 years old).

4.2.4.5 Inhalation of Volatiles from Everyday Groundwater Use

TCE can volatilize into indoor air for inhalation exposure from everyday household uses of water, such as showering, bathing, and washing dishes. The exposure parameters unique to the inhalation exposure equation, concentration of chemical in air from groundwater use (C_{air}), exposure time (ET), and exposure frequency (EF), are discussed in this section. The values used for other parameters are the same as discussed in **Section 4.2.4.1**.

- *TCE Concentration in Air from Groundwater Use (C_{air}):* TCE concentrations in the air from everyday groundwater use inside a home were estimated using the maximum TCE groundwater concentrations and Andelman's default volatilization factor (K) of 0.5 L/m^3 (0.0005 x 1,000 L/m^3) (**Section 4.2.3.3**).

- *Exposure Time (ET):* Residents were assumed to be exposed to volatiles from groundwater throughout the entire day (24 hours/day) (Andelman calculates an average air concentration within one day).

- *Exposure Frequency (EF):* Residents were assumed to be exposed to volatiles in the water during household uses everyday (350 days/year), accounting for 15 days/year spent away from home (EPA, 2014).

4.2.4.6 Inhalation of Indoor Air Impacted by Vapor Intrusion

TCE in shallow groundwater underlying the residences on Site can volatilize into indoor air via vapor intrusion. The following exposure parameter is discussed in this section, while the values used for other parameters are the same as discussed in **Section 4.2.4.1** and **Section 4.2.4.5**.

- *TCE Concentration in Indoor Air from Vapor Intrusion (C_{air}):* TCE concentrations in indoor air from vapor intrusion were estimated using the maximum TCE groundwater concentrations and EPA's VISL calculator (**Section 4.2.3.3**).

4.3 Toxicity Assessment

Toxicity values used to quantify the potential cancer risks and non-carcinogenic health hazards associated with the COPCs were obtained from EPA's IRIS (2023a).

Toxicity values used to assess non-carcinogenic health hazards are chronic reference doses (RfDs) for ingestion and dermal exposures and chronic reference concentrations (RfCs) for inhalation exposures. Although sub-chronic RfDs or RfCs may be used to assess shorter-term exposures to non-carcinogens, no sub-chronic toxicity value was available for TCE, therefore its chronic toxicity values were applied. Toxicity values used to assess excess lifetime cancer risks are oral slope factors (OSF) for ingestion and dermal exposures and inhalation unit risk values (IUR) for inhalation exposures.

A toxicity profile for TCE for both human health and ecological risks is presented in **Attachment A**.

4.3.1 Non-cancer RfD and RfC

EPA's selected chronic oral RfD for TCE ($5x10^{-4}$ mg/kg-day) is the midpoint of three similar studies based on immunotoxicity (4.8×10^{-4} and 3.7×10^{-4} mg/kg-day) and developmental effects ($5.1x10^{-4}$ mg/kg-day) (EPA, 2011). In the absence of a dermal RfD, the oral RfD was used to quantify non-cancer hazards from dermal exposures. Similarly, the EPA RfC for TCE (0.002 mg/m^3) is the midpoint of two similar RfCs based on immunotoxicity and developmental effects (0.0019 mg/m^3 and 0.0021 mg/m^3, respectively) (EPA, 2011).

4.3.2 Cancer OSF and IUR

EPA has classified TCE as carcinogenic to humans by all routes of exposure (EPA, 2011b). EPA (2011b) identified the carcinogenic endpoints as kidney cancer, non-Hodgkin's lymphoma (NHL) and liver cancer, with kidney cancer having a mutagenic mode of action. For this mode of action, exposures in earlier age groups are more important. Thus, to account for the sensitivity of early-life exposures that may result in an occurrence of kidney cancer during childhood or contribute to cancers later in life, risks were evaluated separately for the endpoints of kidney cancer and liver/NHL cancer and toxicity adjustment factors (age-dependent adjustment factor for mutagens (ADAF)) were applied to the intake for each age group, based on EPA's cancer guidelines (EPA, 2005).

EPA's OSF is 4.6 x 10^{-2} per mg/kg-day for all cancers potentially related to TCE. Since there is a mutagenic mode of action for induction of kidney tumors following TCE exposure, but not the other endpoints, EPA calculated two separate OSFs reflecting the incidence risks for kidney cancer (9.3 x 10^{-3} per mg/kg-day) and NHL and liver cancers (3.7 x 10^{-2} per mg/kg-day). These two separate values are used to calculate estimated cancer risks in this HHRA.

Similarly, EPA's IUR is 4.1 x 10^{-6} per µg/m^3 for all cancer risks. EPA calculated two separate IURs reflecting the incidence risks for kidney cancer via mutagenic mode of action (1 x 10^{-6} per µg/m^3), and NHL and liver cancer (3.1 x 10^{-6} per µg/m^3). These two separate values are used to calculate estimated cancer risks in this HHRA.

In the absence of a dermal cancer slope factor, the OSF were used to quantify dermal cancer risks.

4.4 HHRA Results

Potential cancer risks and non-cancer health hazards were quantified separately for the Launch Site and for the Control Site for each receptor group by combining estimated COPC intake with the appropriate toxicity value.

The HHRA procedure for non-carcinogenic COPCs derives a Hazard Quotient (HQ), which is the ratio of an estimated exposure or intake to an exposure or intake that poses no health hazard (e.g., the RfD or RfC). The HQ for oral and dermal intakes was calculated based on the RfD, as shown in EPA (1989):

$$HazardQuotient = \frac{Intake\left(\frac{mg}{kg \cdot day}\right)}{RfD\left(\frac{mg}{kg \cdot day}\right)}$$

For the inhalation pathway, the HQ is calculated as the inhalation exposure concentration (in mg/m^3) divided by the inhalation RfC:

$$HazardQuotient = \frac{EC\left(\frac{mg}{m^3}\right)}{RfC\left(\frac{mg}{m^3}\right)}$$

For each receptor and age group, HQs for each exposure pathway are summed to derive a total Hazard Index (HI), which is compared with the maximum acceptable HI of one (1) specified in the CERCLA program. A total HI equal to or below one represents no unacceptable non-cancer health hazard. If an HI of greater than one is calculated, the HI can be segregated by target organ or toxic effect (EPA 1989).

The HHRA procedure for carcinogenic COPCs derives an estimated excess lifetime cancer risk, which is the extra lifetime risk (i.e., over background risk levels) of incurring cancer from exposure to COPCs. Excess (incremental) cancer risks for the ingestion and dermal exposure pathways were calculated using intake estimates (lifetime average daily doses, calculated as part of the exposure assessment) and CSFs (summarized as part of the toxicity assessment) as follows (EPA, 1989):

$$CancerRisk = Intake\left(\frac{mg}{kg \cdot day}\right) \times SF\left(\frac{mg}{kg \cdot day}\right)^{-1}$$

For the inhalation pathway, the cancer risk was calculated as the inhalation exposure concentration (in $\mu g/m^3$) multiplied by the IUR:

$$CancerRisk = EC\left(\frac{\mu g}{m^3}\right) \times IUR\left(\frac{\mu g}{m^3}\right)^{-1}$$

For each receptor and age group, estimated cancer risks for each carcinogenic COPC for each exposure pathway are summed to derive a total excess lifetime cancer risk. For residents, the risks for children and adults are additionally summed to derive a total excess lifetime cancer risk for a 26-year residential exposure. As noted in **Section 4.3.2**, kidney cancers are induced by a mutagenic mode of action, while the other cancers related to TCE exposure (NHL and liver cancer) are not. To account for the sensitivity of early-life exposures that may result in an occurrence of kidney cancer during childhood or contribute to cancers later in life, risks were evaluated separately for the endpoints of kidney cancer and liver/NHL cancer and the following toxicity ADAFs for mutagens were applied to the intake for each age group, based on EPA's cancer guidelines (EPA, 2005):

- Exposure before 2 years of age, a 10-fold adjustment;
- Exposure between 2 and < 16 years of age, a 3-fold adjustment; and
- Exposure after turning 16 years of age, no adjustment.

Risks from TCE were calculated as the sum of the risks from both kidney cancer and liver/NHL cancer.

Calculated estimated cancer risks are compared with the maximum acceptable cancer risk specified in the CERLCA program: a risk of 1 in 10,000, denoted as $1x10^{-4}$ (the acceptable risk range under the CERCLA program is 10^{-4} to 10^{-6}). A total cancer risk equal to or below $1x10^{-4}$ represents no unacceptable incremental cancer risk.

4.4.1 Launch Site

This section contains the HHRA results for all receptor groups potentially exposed at the Launch Site. The only selected COPC at the Launch Site was TCE in groundwater. There were no COPCs selected in soil for the Launch Site.

4.4.1.1 Residents – Launch Site Groundwater

HHRA calculations for residents using the groundwater at the Launch Site for potable uses are presented in **Attachment B-1** and the results are summarized below:

Exposure Pathway	Non-Carcinogenic Hazard Index		Incremental Cancer Risk
	Child	Adult	Sum of child + adult =
Groundwater Ingestion	0.2	0.1	2E-06
Groundwater Dermal Contact during Showering	0.03	0.02	3E-07
Groundwater Inhalation of Volatiles during Residential Water Use	0.5	0.5	2E-06
Indoor Inhalation - Vapor Intrusion through Basement - Groundwater	0.4	0.4	2E-06
Total (All Pathways)	**1**	**1**	**6.E-06**
Maximum Acceptable Level	**1**		**1.E-04**

The total HI for each age group is equal to the CERCLA maximum acceptable HI of one, and the estimated lifetime cancer risk is below the CERCLA maximum acceptable incremental cancer risk level of $1x10^{-4}$. These results indicate that the Launch Site groundwater poses no unacceptable risks or health hazards to residents.

4.4.2 Control Site

This section contains the HHRA results for all receptors potentially exposed at the Control Site to groundwater and to soil in Subarea 1 (the only Subarea with a selected COPC).

4.4.2.1 Residents – Control Site Subarea 1 Soil and Groundwater

HHRA calculations for resident exposures to groundwater and to soil at Subarea 1 of the Control Site are presented in **Attachment B-2** and summarized below:

Exposure Pathway	Non-Carcinogenic Hazard Index		Incremental Cancer Risk
	Child	Adult	Sum of child + adult =
Soil Incidental Ingestion	0.01	0.001	7E-08
Soil Dermal Contact	0.002	0.0003	1E-08
Inhalation of Entrained Soil Particles Outdoors	0.00000005	0.00000005	2E-13
Groundwater Ingestion	0.3	0.1	2E-06
Groundwater Dermal Contact during bathing	0.03	0.02	2E-07
Groundwater Inhalation of Volatiles for Residential Water Use	0.4	0.4	2E-06
Indoor Inhalation - Vapor Intrusion through Basement - Groundwater	0.3	0.3	1E-06
Total (All Pathways)	**1**	**0.8**	**5E-06**
Maximum Acceptable Level	**1**		**1.E-04**

Total non-carcinogenic HIs for both child and adult are equal to or below the CERCLA maximum acceptable HI of 1, while the combined age estimated lifetime cancer risk is below the CERCLA maximum acceptable incremental cancer risk level of $1x10^{-4}$. Therefore, soil and groundwater at Subarea 1 of the Control Site pose no unacceptable health risks to residents.

4.4.2.2 Commercial Workers – Control Site Subarea 1 - Soil

Risk assessment calculations for commercial workers at Subarea 1 of the Control Site are presented in **Attachment B-3** and summarized below:

Exposure Pathway	Non-Carcinogenic Hazard Index	Incremental Cancer Risk
Soil Ingestion	0.0004	3E-09
Soil Dermal Contact	0.0002	3E-09
Inhalation of Entrained Soil Particles	0.0000002	3E-14
Total (All Pathways)	**0.0006**	**6E-09**
Maximum Acceptable Level	**1**	**1.E-04**

The total non-carcinogenic HI is below the CERCLA maximum acceptable HI of 1, and the estimated lifetime cancer risk is below the CERCLA maximum acceptable incremental cancer risk level of $1x10^{-4}$.Therefore, Subarea 1 of the Control Site poses no unacceptable health risks to future commercial workers potentially exposed to soil.

4.4.2.3 Construction/Utility Workers – Control Site Subarea 1 - Soil

Risk assessment calculations for construction/utility workers at Subarea 1 of the Control Site are presented in **Attachment B-4** and summarized below:

Exposure Pathway	Non-Carcinogenic Hazard Index	Incremental Cancer Risk
Soil Ingestion	0.003	8E-10
Soil Dermal Contact	0.0004	3E-19
Inhalation of Entrained Soil Particles	0.0000002	1E-13
Total (All Pathways)	**0.003**	**1E-09**
Maximum Acceptable Level	**1**	**1.E-04**

The total non-carcinogenic HI is below the CERCLA maximum acceptable HI of 1 and the estimated lifetime cancer risk is below the CERCLA maximum acceptable incremental cancer risk level of $1x10^{-4}$. Therefore, soil at Subarea 1 of the Control Site does not pose an unacceptable health risk to construction/utility workers.

4.4.2.4 Trespassers – Control Site Subarea 1 - Soil

Risk assessment calculations for trespassers at Subarea 1 of the Control Site are presented in **Attachment B-5** and summarized below:

Exposure Pathway	Non-Carcinogenic Hazard Index	Incremental Cancer Risk
Soil Ingestion	0.0003	2E-09
Soil Dermal Contact	0.00009	8E-10
Inhalation of Entrained Soil Particles	0.0000002	6E-15
Total (All Pathways)	**0.0004**	**2E-09**
Maximum Acceptable Level	**1**	**1E-04**

The total non-carcinogenic HI is below the CERCLA maximum acceptable HI of 1 and the estimated lifetime cancer risk is below the CERCLA maximum acceptable incremental cancer risk level of $1x10^{-4}$. Therefore, soil at Subarea 1 of the Control Site poses no unacceptable health risks to trespassers.

4.5 Uncertainty Assessment

The HHRA and the SLERA applied site-specific data, risk assessment approaches recommended by EPA, and reasonable assumptions to assess Site risks. Nonetheless, uncertainties in these factors can contribute to uncertainty in the overall quantitative risk estimates. This section identifies some uncertainties in the quantitative risk assessment and discusses the potential impact of these uncertainties on the HHRA results.

4.5.1 Uncertainties Associated with Site Data

It is noted that historical analytical laboratory reports (dating back to the mid-1990s) were not available for some sampling events, so, in some cases, data were obtained from summary tables presented in previous Site documents. In addition, in some cases, the detection limits for historical data were not available.

Launch Site Soil: Surface and subsurface soil samples applied to the risk assessments for the Launch Site were collected in 1994, 1996, 2015 or 2016. These older samples may not be representative of current Site conditions. Some of the more recent samples were collected in similar areas as older samples; however, samples were not collected from the same depth. Therefore, both the older and the newer data were included in the HHRA and SLERA.

Not all samples were analyzed for all analytes, potentially limiting the analytical results in some samples/locations.

While a total of 35 surface and subsurface soil samples were used in the risk assessments at the Launch Site, the number of samples per analytical groups was less: nine to fifteen for EPH fractions (including the extrapolation of TPH data), nine for VPH fractions, 17 to 26 for VOCs, nine for PAHs, and eight for PCBs (which were not detected). Metals were not analyzed in the samples used in the Launch Site soils data used in the risk assessments; therefore, the soil data used in the risk assessments may not be fully representative of Site exposures. The number of soil samples is generally low to adequate given the size of the known release area, and the scope of chemical analysis is generally appropriate to the known or suspected types of releases identified.

Soil collected from the Launch Site acid neutralization pit and associated catch basins and drainage swales were not applied to the risk assessments because these locations are not representative of the Site as a whole and some of these locations (e.g., catch basins) are not considered viable exposure points. Constituents detected in these samples included limited to low level pesticides and metals, and all detections were below human health screening values and/or soil background concentrations, except for nickel. One detection of nickel at 40.9 mg/kg at a depth of 18-20 ft bgs was slightly above the ecological screening level of 38 mg/kg and soil background concentration of 35 mg/kg, but below the screening level protective of human health (140 mg/kg).

Control Site Soil: A total of 36 subsurface soil samples were evaluated in the risk assessments for the Control Site.

No surface soil data was collected at the Control Site; therefore, subsurface soil results were used to assess the surface soil exposure pathway, and are assumed to be representative of all soil exposures. Although the lack of surface soil data at the Control Site limits the completeness of this analysis, the likely contaminants due to USTs would primarily be found in the subsurface soils; in addition, fill was placed where the USTs were removed. Therefore, the EPCs used for the Site may over- or under-estimate exposure concentrations for receptors potentially exposed to Site soils.

The subsurface soil data were segregated into five subareas, reducing the number of samples applied to each subarea to between five and thirteen. Subareas 1, 3, 4 and 5 had data from collected from 1996 or 1999 only. Since no more recent soil data were collected in these areas, the soil results for these areas are potentially unrepresentative. In Subarea 2, seven of the thirteen soil samples were collected in 2017; remaining samples data were collected in 1996 or 1999 and may no longer represent current Site conditions considering natural attenuation of organic compounds. For Subarea 1, the only Subarea with a detected soil concentration greater than screening levels and therefore carried through the quantitative HHRA, there were only five available samples to evaluate the TCE, three of which had unknown detection limits.

Groundwater: For the Launch Site, the most recently collected groundwater sample occurred in 2010 (in a drinking water well only); monitoring wells were last sampled in 2004. Offsite, one residence was sampled in August 2025. TCE, a COPC, was detected above screening levels in one well in 1996 and 1997, but this HHRA shows that risks associated with these levels of COPCs in onsite groundwater are below actionable levels; in addition, no VOCs were detected in the August 2025 sample taken offsite at a downgradient residential drinking water well. This media was determined not to require further investigation.

For the Control Site, of the six monitoring wells sampled, more recent data (2017) were collected in two wells only, CSMW-100 and CSMW-101, which were analyzed for VPH fractions and target analytes (none detected), EPH fractions (none detected) and PAHs by low detection limit methods (8270-SIM). All other groundwater data were collected between 1996 and 2012 (in one well). TCE was detected above screening levels in 1999 and 2000, but estimated risks were below actionable risk levels.

Air: At the Launch Site, air measurements collected in 1996 were applied to the HHRA despite the age of the data. In addition, analysis was done only for BTEX compounds, and there was probable interference by cigarette smoke during the indoor air sampling event. Furthermore, measured VOC concentrations in groundwater were below target groundwater levels protective of vapor intrusion (**Table 8**), indicating measured indoor air concentrations are not representative of a complete vapor intrusion pathway.

4.5.2 Uncertainties Associated with the HHRA Toxicity Assessment

The toxicity assessment identifies potential adverse health effects from COPCs, and estimates the relationship between the dose or level of exposure and the potential for or magnitude of an adverse effect (response). Toxicity assessments have many sources of uncertainty, such as the assumptions involved in animal to human extrapolations, high to low dose extrapolations, and the specific models used to develop toxicity values. To compensate for these uncertainties, toxicity values established by EPA are generally adjusted to over- rather than under-estimate risks.

4.5.3 Uncertainties Associated with the HHRA Exposure Point Concentrations

EPCs for the Launch and Control Sites are the maximum detected concentration in the Site/subarea being assessed. The use of maximum detected concentrations may bias the HHRA results high. In addition, for the receptors that are likely to contact only surface soils, the soil concentrations are biased high because the HHRA assumes trespassers and residents are also exposed to deep soils, the data do not account for backfilled areas, and it is uncertain whether the samples collected were evenly distributed or were focused in areas where contamination occurred. In addition, there were no surface soil data available for the Control Site.

EPCs for the soil particle inhalation pathway are based on soil EPCs and an EPA-recommended PEF. An adjustment factor of 100 (increasing the exposure) was applied to the construction/utility worker assessment to account for the increase entrainment of soil that may occur from unspecified soil disturbance activities. This approach may underestimate or overestimate outdoor air concentrations and contributes a moderate degree of uncertainty to construction/utility worker assessments.

Indoor air EPCs are based on a screening level model for exposures to volatiles during household water use, and a screening level VI model incorporated into the VISL calculator, assuming that habitable structures currently exist and may also exist in the future over the subject area. Each of these approaches are inherently uncertain, as the models incorporate various assumptions based on professional judgment.

4.5.4 Uncertainties in the HHRA Exposure Scenarios and Exposure Factors

Four human receptor groups were assessed for exposures and risks related to the COPCs: residents, commercial workers, construction/utility workers, and trespassers. Other receptor groups that may potentially be exposed, but their exposures would be similar to or less than the receptors assessed. The uncertainty associated with the selection of receptors assessed is low, based on current knowledge of Site use and expected future use.

Exposure factors used to quantify exposures are generally from EPA guidance, and are anticipated to conservatively estimate COPC intake and risk. These exposure factors generally represent high-end or upper percentile (e.g., 90th or 95th percentile) values. For example, high-end ingestion rates (100 mg/day for adults and 200 mg/day for children, representing the 90th percentile) are applied for year-round exposure (350 days/year). However, soil ingestion rates will likely be lower in winter months when people spend less time outdoors. Therefore, the estimated risks evaluated using these high-end soil ingestion rates for year-round exposure may over-estimate risks. There is also some uncertainty associated with dermal exposure factors, such as the soil adherence factor, which ranges from 0.07 mg/cm^2 for a resident adult to 0.3 mg/cm^2 for a construction worker. In the absence of a recommended value for a trespasser, the adherence factor for the commercial worker (0.12 mg/cm^2) was applied; actual soil adherence factors could differ depending on the characteristics of the soil contacted. The uncertainty associated with exposure factors is moderate.

Assessment of all receptors assumes that contaminated subsurface soil becomes accessible in the future due to construction at the sites, and, for the Control Site, that subsurface soil is representative of all Site soils. If subsurface soil does not become accessible to receptors in the future, EPCs and associated health risks could differ from those presented herein . The uncertainty associated with this assumption is moderate.

4.5.5 Uncertainties Associated with the HHRA Approach

By combining conservative estimates of exposure and toxicity, results of the HHRA reflect conservative conditions that may not represent typical exposures. Health risks, particularly to an average exposed individual at these sites, are likely to be overestimated.

5.0 SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT

5.1 Introduction

According to the EPA's *Ecological Risk Assessment Guidance for Superfund (ERAGS*; EPA, 1997), an ecological risk assessment (ERA) refers to a qualitative and/or quantitative appraisal of the actual or potential impacts of contaminants from a hazardous waste site on plants and animals other than humans and domesticated species. A risk does not exist unless: (1) the stressor has the ability to cause one or more adverse effects, and (2) it co-occurs with or contacts an ecological component long enough and at a sufficient intensity to elicit the identified adverse effects.

The eight steps in an ERA identified in the guidance are the following:

Step 1: Screening Level – Problem Formulation and Ecological Effects Evaluation
Step 2: Screening Level – Preliminary Exposure Estimates and Risk Calculations
Step 3: Baseline Problem Formulation
Step 4: Study Design and Data Quality Objective Process
Step 5: Verification of Field Sampling Design
Step 6: Site Investigation and Data Analysis
Step 7: Risk Characterization
Step 8: Risk Management

The Screening Level Ecological Risk Assessment (SLERA) is presented below, which includes Step 1 and Step 2 of the ERAGS process.

5.2 Screening Level Problem Formulation

Components of the screening level problem formulation, as described in EPA (1997) are as follows:

- Description of the environmental setting and the contaminants known or suspected to exist at the Site;
- Contaminant fate and transport mechanisms that might exist at the Site;
- Mechanisms of ecotoxicity associated with contaminants and likely categories of receptors that could be affected;
- Identification of complete exposure pathways might exist at the Site; and,
- Selection of endpoints to screen for ecological risk.

5.2.1 Environmental Setting and Contaminants at Site

The former Loring LO-13 Control and Launch Sites are located in Caswell, Maine, and are currently privately owned. The Sites and surrounding locales are a mixture of developed land, open grass areas and forested areas. **Figures 2** and **3** illustrate features of these two Sites.

Environmental features present on the Site were identified through maps available on the Maine DEP website. The maps are depicted in **Figure 4** – *Water Resources and Riparian Habitat*, **Figure 5** – *Plant and Animal Habitat*, and **Figure 6** – *Conserved Land and Undeveloped Habitat*. The Sites are disturbed from historical development and thus may not provide significant habitat, but do provide some value as open grassy space. No wetlands, waterbodies, or endangered/threatened species habitat were identified on the Property.

As shown on **Figure 4**, there are no surface water or riparian habitats in the vicinity of either the Launch or Control Sites.

As shown on **Figure 5**, no wetland areas or specifically protected wildlife habitats are located on or near either the Launch or Control Sites.

As shown on **Figure 6**, the Control Site is fully located in, and the Launch Site is partially located in, an "undeveloped habitat" area.

The site history is described in **Section 3.1** of this Appendix and in the RI. Contaminant fate and transport is discussed in the RI. As described in the HHRA (**Section 3.2.1**), soil data applied to the risk assessments are shown in the top portion of **Table 1** (Launch Site soils) and **Table 2** (Control Site soils). Data excluded from the risk assessments include:

- Soil samples collected from a depth greater than 15 feet bgs.
- Samples containing no organic constituents and metals at or below background levels.
- Soil samples collected from stockpiles (presumably removed).

- Samples from former waste management structures such as the acid neutralization pit and associated catch basins and drainage swale.

It is noted that since several UST areas of the Sites have been excavated and backfilled, and the source of the backfill material is not known, the available soil data may or may be not fully representative of current conditions at the Sites.

The toxicity of selected constituents of potential ecological concern (COPECs) (i.e., those constituents detected at concentrations exceeding ecological screening levels) is discussed in **Section 5.3.2**.

5.2.2 Likely Categories of Potentially Affected Receptors

For the Launch and Control Site soils, potentially exposed ecological receptors are limited to terrestrial plants, mammalian, bird, and insect species that would normally be present in this part of Maine. Since there is no surface water or sediment in proximity to either Site, effects upon aquatic organisms or other species that use water bodies are not expected.

5.2.3 Potentially Complete Exposure Pathways

Although potentially complete ecological exposure pathways are most likely for surface or shallow soil, in this SLERA exposures were evaluated for available soil data from 0 to 15 ft bgs for the Launch Site and at the Control Site were from subsurface samples at depths of 4 to 16 ft bgs due to limited available data and based on the assumption that future construction on-site could mix soils to that depth. According to EPA (2015b), the average biologically relevant soil sampling depth is between 0 and 30 cm (0-12 inches), depending on soil type, for the purposes of conducting a terrestrial risk assessment. Exposure pathways for ecological receptors could include: direct contact with contaminated surface soils; incidental ingestion of soils during feeding or grooming; and/or uptake and bioaccumulation of contaminants through dietary ingestion of prey or forage.

5.3 Comparison of Site Detections with Ecological Screening Benchmarks

A comparison of detected non-petroleum constituents in soil with ecological screening benchmarks is presented in this section.

5.3.1 Comparisons of Soil Detections to Ecological Benchmarks

Tables 6 and **7** present both soil data summaries and comparisons of soil detections to ecological benchmarks for the Launch and Control Sites. The following ecological screening benchmarks were used:

- EPA Ecological Soil Screening Levels (EPA EcoSSLs) (various dates);
- EPA Region 4 Ecological Soil Screening Values (EPA, 2018); and,
- Soil background concentrations in Maine (Maine DEP, 2023).

Soil background concentrations were considered as a screening tool because some of the soil screening levels are below typical background levels, and thus, concentrations detected above these screening levels would not necessarily require remediation.

The following soil samples contained constituents exceeding ecological soil screening benchmarks (**Table 6** and **Table 7**):

SOIL SAMPLES EXCEEDING ECOLOGICAL SOIL SCREENING VALUES			
Constituent	**Sample Exceeding Ecological Soil Screening Benchmark (depth)**	**Maximum Detected Concentration mg/kg**	**Ecological Soil Screening Benchmark mg/kg**
Launch Site			
2-Butanone	LSSB3-1 (4-6')	3.1	1.0 [1]
Xylenes	LSSB3-1 (4-6')	0.16 J	0.10 [1]
Total High Molecular Weight (HMW) PAHs	LSSB13-1 (4-6')	1.78 J	1.1 [1,2]
Control Site			
Trichloroethene	CSSB22-1 (4-6')	0.505	0.06 [1]

mg/kg Milligrams per kilogram
J Estimated concentration.
[1] EPA Region 4 ecological soil screening value.
[2] EPA Ecological soil screening level (EcoSSL).

All constituents identified as exceeding their ecological soil screening benchmarks were obtained from depths of 4 to 6 feet bgs, which is below the EPA-identified biologically relevant depth. However, if soil is brought to the surface in the future, exposure of ecological receptors to these concentrations could occur; however, the constituent concentrations then present for exposure would likely differ from those analyzed in situ.

5.3.2 Selection of COPECs in Soil

Both 2-butanone (detected in 1 of 5 samples) and xylenes (detected in 1 of 14 samples) were detected infrequently in soil at the Launch Site. 2-Butanone is also a common laboratory/sampling artifact. These exceedances are judged not to represent a potential ecological hazard due to the infrequent detections and the depths of the samples, and thus, these constituents are not carried forward in the SLERA as COPECs.

Only one detection of total HMW PAHs (at 1.78 mg/kg) exceeded its ecological screening benchmark of 1.1 mg/kg in 1 of 9 samples used in the risk assessments in Launch Site soils. This sample (with a concentration of 1.78 mg/kg) was collected from a depth of 4 to 6 feet bgs and therefore, may not represent a potential ecological hazard for many of the ecological receptors that only contact surface soil. However, due to lack of surface soil data and since the soil may be mixed in the future during construction activities, this one detection could present an ecological risk in the future, and this constituent is considered a COPEC.

The Control Site Subarea 1 had one detection of TCE at a depth of 4 to 6 feet bgs (0.505 mg/kg) that exceeded its ecological soil screening benchmark (0.06 mg/kg). Based on the depth of the sample, this concentration is not likely to represent a potential ecological risk. However, due to lack of surface soil data and since the soil may be mixed in the future during construction activities, this detection could present an ecological risk in the future, and this constituent is considered a COPEC.

A toxicity profile for HMW PAHs for ecological risk and one for TCE for both human health and ecological risks is presented in **Attachment A**.

5.4 Screening Level Exposure Estimates and Risk Calculation

The only medium that ecological receptors are potentially exposed under current LO-13 Site uses is surface soil. Constituents that were detected above ecological screening criteria or background were below the biologically relevant zone at depths of 4 to 6 feet bgs. However, due to lack of surface soil data and since future construction activities could mix the soil and bring these concentrations to the surface, screening level ecological risk calculations are performed for the selected COPECs (HMW TPH and TCE).

EPCs used in the screening level calculations are the average concentration for each COPEC. For the Launch Site soils up to 15 ft bgs, non-detects were considered to be present at their detection limit:

Total HMW PAHs in Launch Site Soils up to 15 ft bgs (mg/kg)		
0.12	U	U=not detected
0.036	**J**	J=estimated
0.040	**J**	
0.034	**J**	
0.11	U	
0.035	**J**	
0.11	U	
0.034	**J**	
1.78	**J**	
0.26		Average concentration
0.23		HQ

For Control Site Subarea 1 soils up to 15 ft bgs, the unknown detection limits were assumed to be the same as the one available detection limit of 0.006 mg/kg:

TCE in Subarea 1 Soil up to 15 ft bgs (mg/kg)		
0.006	U	U=not detected
0.006	U	
0.006	U	
0.006	U	
0.505		
0.11		Average concentration
1.8		HQ

EPCs were compared to screening benchmarks to calculate a HQ:

$$HQ = \frac{EPC}{Benchmark}$$

An HQ less than or equal to 1 indicates that the constituent in soil is unlikely to cause adverse ecological effects. As shown above, the average TCE concentration, based on a single detected concentration of 0.505 mg/kg at the Control Site, is related to a potential ecological risk, based on an HQ greater than 1. However, given the depth of the sample, the limited detections, and the large area of the Site, the single detected concentration of TCE in soil is not considered a significant ecological risk.

5.5 Uncertainties Associated with the SLERA Approach

Uncertainties associated with the SLERA are similar to those of the HHRA (**Section 4.5**), and may include data and toxicity evaluations. Generally, data uncertainties are similar to those described for the HHRA. In particular, it is noted that some of the data are from 1996 or 1997, and thus may not represent current Site conditions. In addition, the highest concentrations occur in soil occur at depths that may not be ecologically relevant. While ecological receptors are not in contact with these deeper soils under current exposure scenarios, there is the possibility that construction at the

LO-13 Sites could occur and move that soil to the surface. The use of subsurface soil in the SLERA is an uncertainty, given that ecological receptors generally contact soil at the surface. However, the subsurface soils at these Sites are more likely to have been impacted by past DoD activities and it is possible the soil could be re-worked in the future.

With regard to uncertainty in the toxicity evaluation, the SLERA uses EPA Region 4 ecological soil screening values and EPA Ecological soil screening levels (EcoSSLs) as screening benchmarks and to evaluate ecological toxicity. This approach is likely to be conservative, since these screening levels are generally based on the most sensitive ecological receptors and conservative exposure parameters.

Bio-accumulative effects of Site constituents on receptors that have contact with soils are not directly evaluated, however, the conservative nature of the ecological soil screening levels likely accounts for this uncertainty, since these levels are based on conservative endpoints and sensitive ecological effects data.

Finally, the HQ screening level risk calculations assume analytes are 100% bioavailable, which is a conservative assumption that likely overestimates risks. The bioavailability of constituents in soil for ecological receptors varies based on their chemical properties, and properties of the soil such as organic carbon content. Bioavailability adjustments to exposure concentrations or benchmarks are not made for this SLERA.

By combining conservative estimates of exposure and toxicity, results of the SLERA reflect conservative conditions that may not represent typical exposures. Ecological risks, particularly to an average exposed ecological receptor at these sites, are likely to be overestimated.

5.6 SLERA Summary

The SLERA concludes that the Launch and Control Sites do not pose unacceptable risks to ecological receptors and that a full baseline ecological assessment is not required. In addition, the lack of significant habitat within the footprint of the Launch and Control Sites, the disturbance of the areas by the current human activity, and the presence of more significant habitat in the surrounding forested land indicate ecological risks, if they did exist, would be minimal. Finally, some of the soil samples at depth used to assess potential ecological risks at this Site are not within the typical exposure depth for ecological receptors, and thus are not currently associated with complete ecological exposure pathways, although the soils could be re-worked and brought to the surface in the future.

6.0 HHRA AND SLERA SUMMARY AND CONCLUSIONS

An HHRA and SLERA were conducted for the former Nike Missile LO-13 Launch Site and Control Site in Caswell, Maine, using site-specific data, current and reasonably foreseeable future uses of the Site, screening-level fate and transport models, and Maine DEP risk assessment guidance. Human health risks associated with petroleum constituents are evaluated separately under Maine DEP guidance in **Appendix D**.

The HHRA assessed potential health risks posed to four receptor groups: residents, commercial workers, construction/utility workers, and trespassers. Each receptor group was assessed for exposure to COPCs on the two Sites through soil ingestion, soil dermal contact, and outdoor inhalation of entrained soil particles (dust). Onsite residents were additionally assessed for exposures to potable groundwater through ingestion, dermal contact while showering, inhalation of water during household use, and inhalation via vapor intrusion. COPCs were selected based on detections above applicable screening levels: the only COPC for human health was TCE in soil and groundwater. Risk assessment equations, exposure factors, and toxicity values were obtained from EPA or other generally recognized sources. The results of the HHRA indicate there are no unacceptable human health risks at either the Launch Site or the Control Site. In addition, the detected TCE concentrations in groundwater do not exceed the enforceable regulatory level (the EPA MCL) for drinking water, and thus would not be actionable for remediation. Offsite, no VOCs were detected in the August 2025 sample taken at a downgradient residential drinking water well.

The results of the SLERA indicate the two constituents in soil that exceeded ecological screening levels were detections at depth. However, these soils at depth are not within the typical exposure depth for ecological receptors, and thus are not currently associated with complete ecological exposure pathways, although the soils could be re-worked and brought to the surface in the future. For Launch Site soils, a calculation of an HQ using the average Site concentration of HMW PAHs resulted in an HQ less than one, indicating no ecological risk is expected from this constituent detected in soil at depth. For the Control Site Subarea 1, the HQ calculated using the average TCE concentration (based on one detection at depth out of five) did exceed one. However, given the depth of the sample, the limited detections, and the large area of the Site, the single detected concentration of TCE in soil is not considered a significant ecological risk. Thus, this SLERA concludes that the Launch and Control Sites do not pose any unacceptable risks to ecological receptors.

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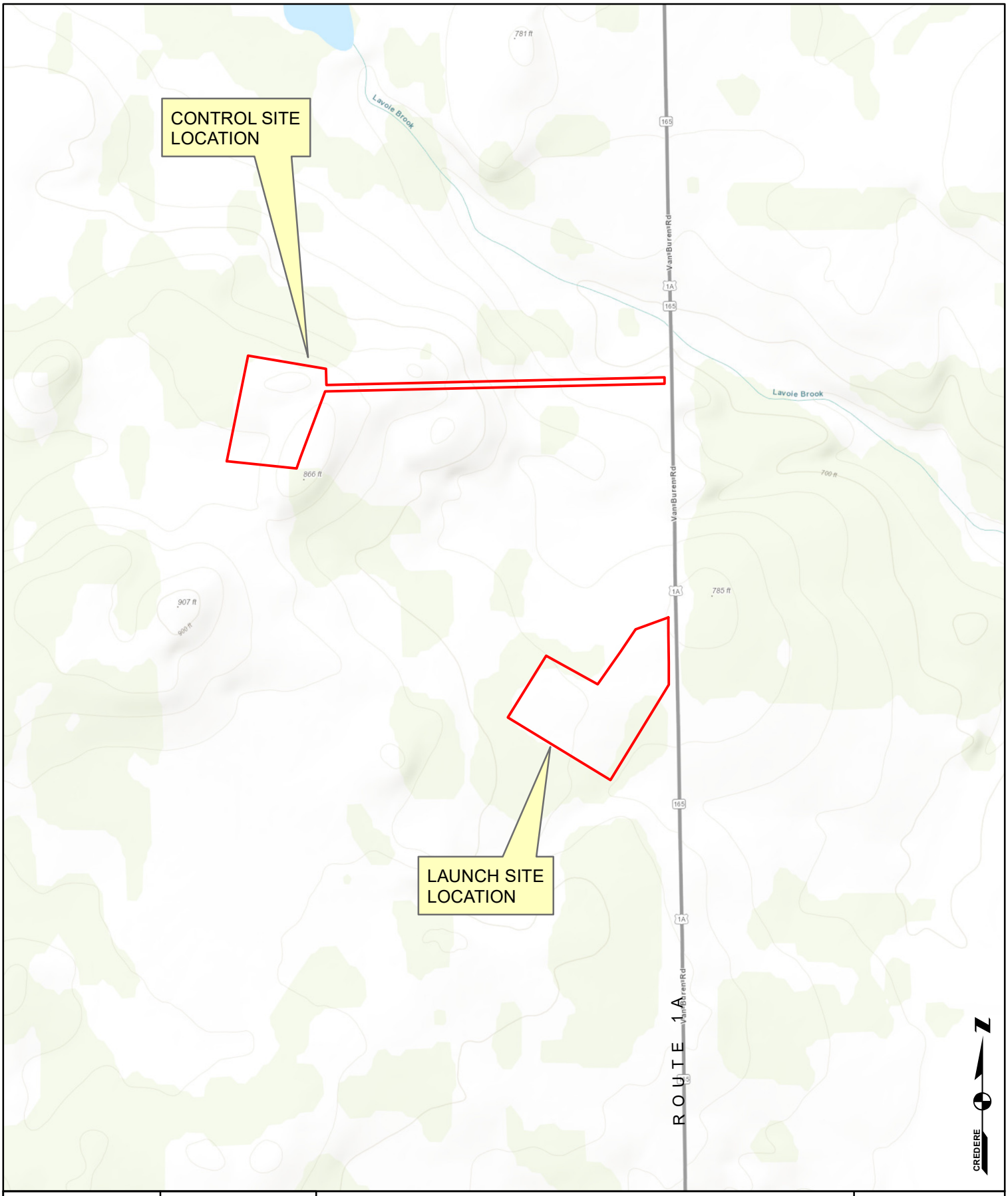
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FIGURES



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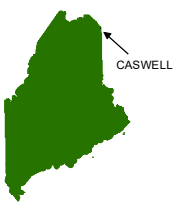
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FIGURE 1A
LO-13 LAUNCH AND CONTROL SITES
LOCATION PLAN - TOPOGRAPHIC

FORMER LORING AFB
LO-13 LAUNCH AND CONTROL SITES
ROUTE 1A
CASWELL, MAINE

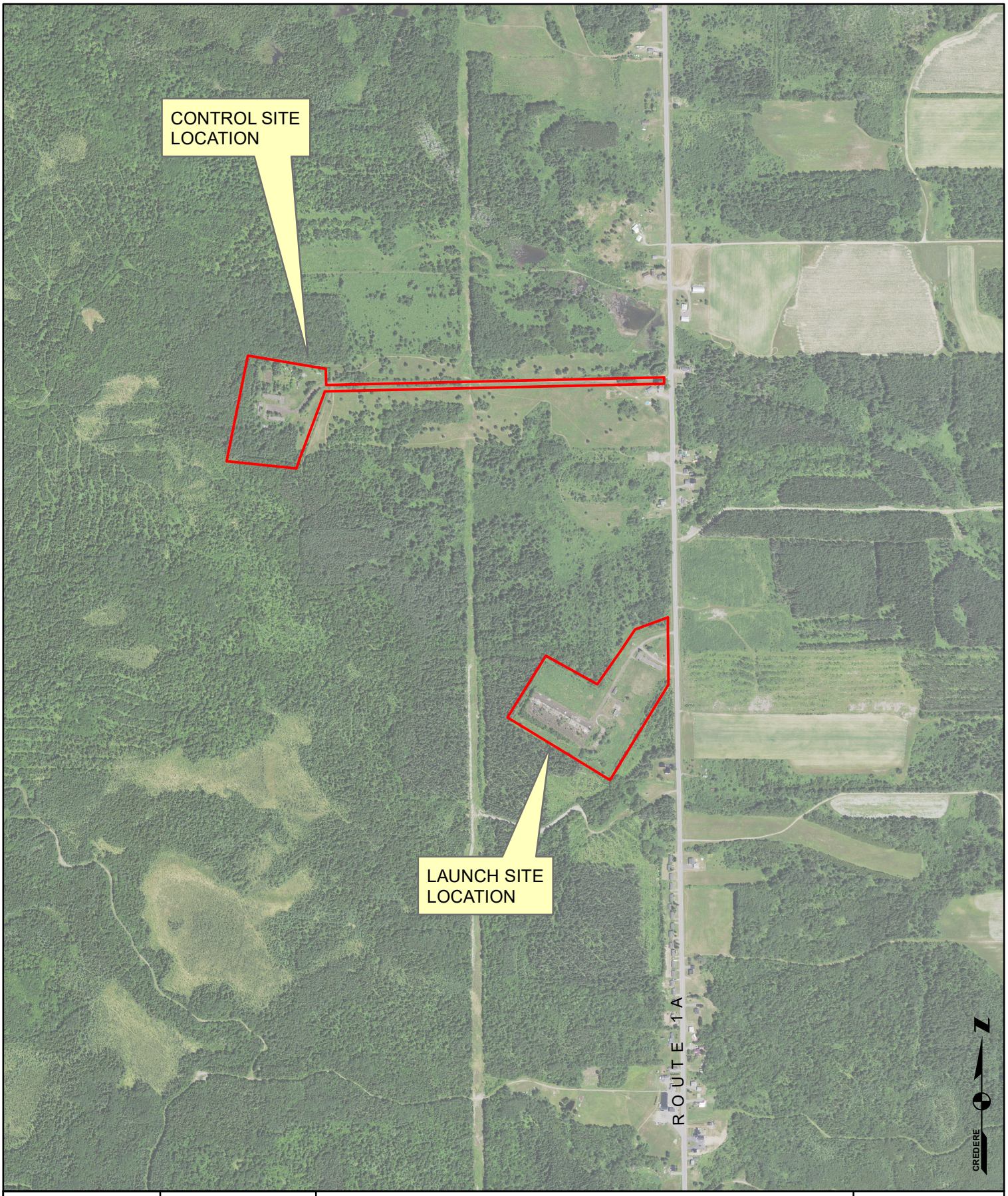
500 0 1,000 Feet

1 inch = 1,000 feet



Topographic Map Data Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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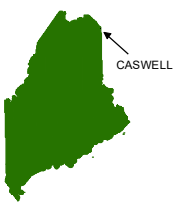
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FIGURE 1B
LO-13 LAUNCH AND CONTROL SITES
LOCATION PLAN - AERIAL VIEW

FORMER LORING AFB
LO-13 LAUNCH AND CONTROL SITES
ROUTE 1A
CASWELL, MAINE

500 0 1,000 Feet

1 inch = 1,000 feet



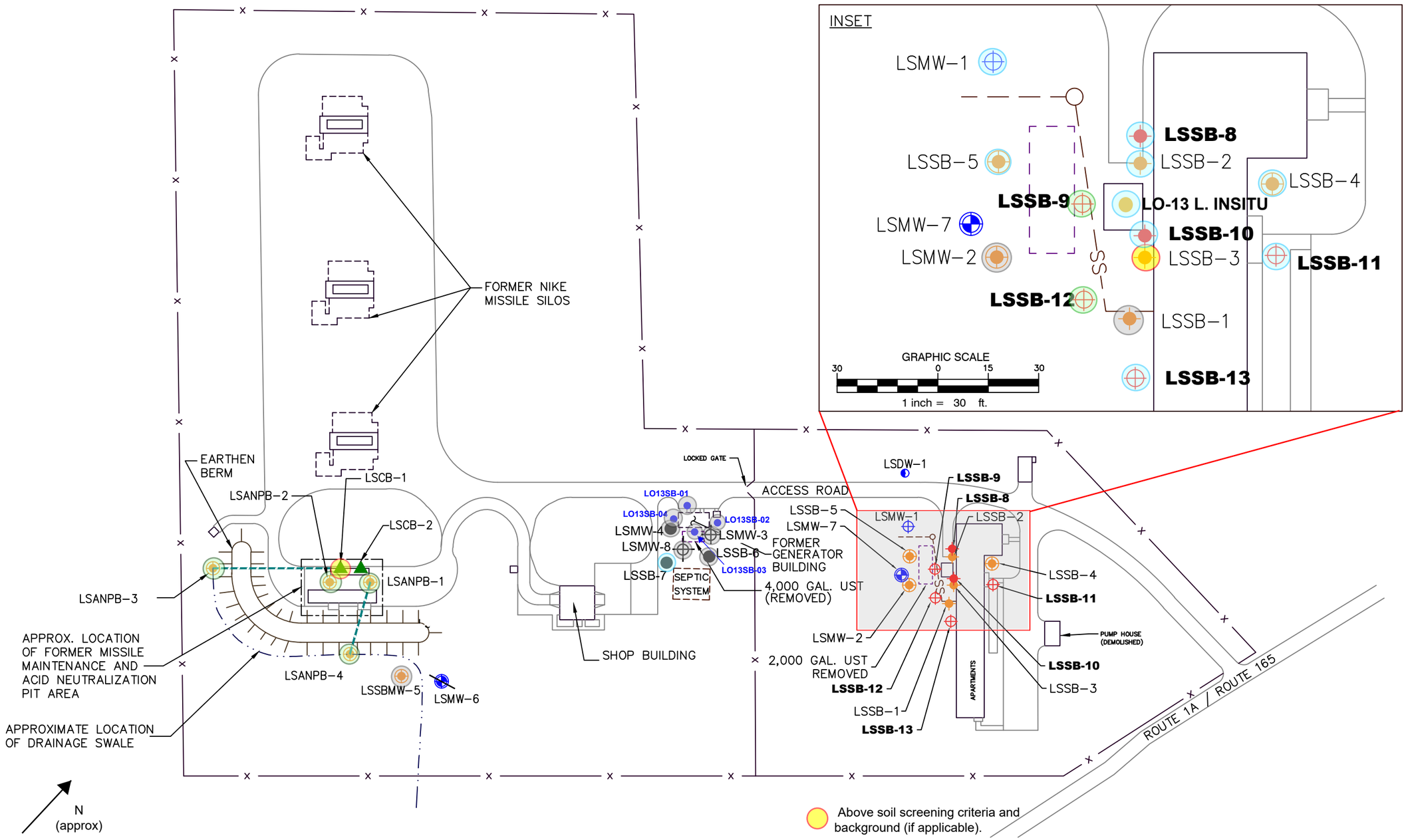
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FIGURE 2
SITE PLAN - LAUNCH SITE

FORMER NIKE LO-13 LAUNCH SITE
ROUTE 1A
CASWELL, MAINE

GRAPHIC SCALE
100 50 0 100
1 inch = 100 ft.



LEGEND

- **PROPOSED ANGLE SOIL BORING**
- **PROPOSED STRAIGHT SOIL BORING**
- FORMER ANGLE SOIL BORING
- FORMER STRAIGHT SOIL BORING
- FORMER BEDROCK MONITORING WELL
- FORMER OVERBURDEN MONITORING WELL
- FORMER RESIDENTIAL WATER SUPPLY WELL
- SEDIMENT SAMPLE FROM CATCH BASIN
- ACID NEUTRALIZATION PIT DRAINAGE PIPE
- —x— CHAIN LINK FENCE WITH BARB WIRE
- —SS— SANITARY SEWER

- Above soil screening criteria and background (if applicable).
- Above soil screening criteria but below background
- Below Soil Screening Criteria and background (if applicable).
- No detections in soil
- Soil not analyzed

NOTES:

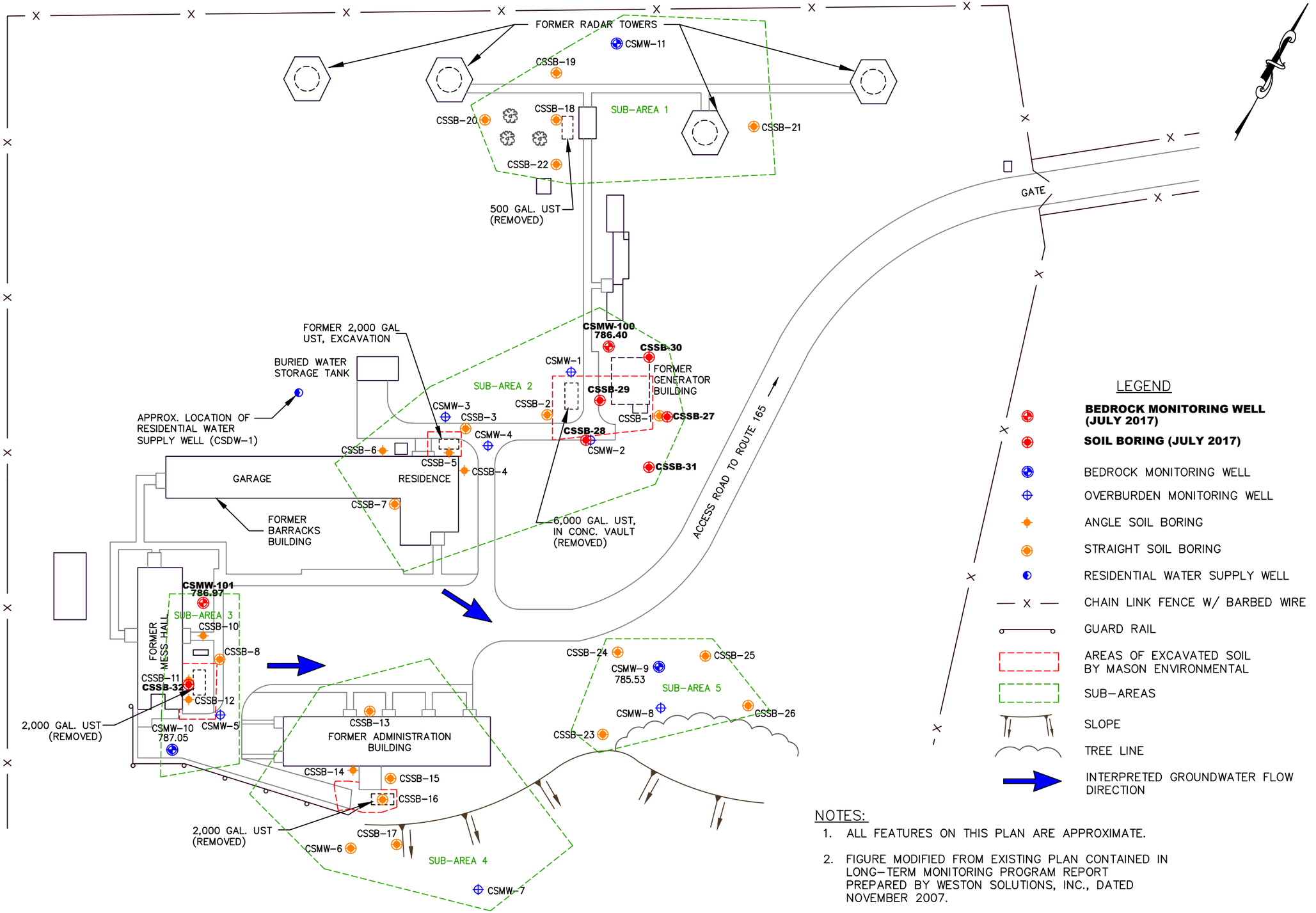
1. ALL FEATURES ON THIS PLAN ARE APPROXIMATE.
2. FIGURE MODIFIED FROM EXISTING PLAN CONTAINED IN LONG-TERM MONITORING PROGRAM REPORT PREPARED BY WESTON SOLUTIONS, INC., DATED NOVEMBER 2007.
3. RED OUTLINE REPRESENTS INSET AREA.

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J:\CREDERE\15001301 USACE Loring FUDS RI-RA\FIGURE 3B - LO-13 LAUNCH SITE SAMPLE LOCATION PLAN_MAK2.dwg plot date: 9/6/2016 11:29 AM



LEGEND

- **BEDROCK MONITORING WELL (JULY 2017)**
- **SOIL BORING (JULY 2017)**
- BEDROCK MONITORING WELL
- OVERBURDEN MONITORING WELL
- ANGLE SOIL BORING
- STRAIGHT SOIL BORING
- RESIDENTIAL WATER SUPPLY WELL
- CHAIN LINK FENCE W/ BARBED WIRE
- GUARD RAIL
- AREAS OF EXCAVATED SOIL BY MASON ENVIRONMENTAL
- SUB-AREAS
- SLOPE
- TREE LINE
- INTERPRETED GROUNDWATER FLOW DIRECTION

NOTES:

1. ALL FEATURES ON THIS PLAN ARE APPROXIMATE.
2. FIGURE MODIFIED FROM EXISTING PLAN CONTAINED IN LONG-TERM MONITORING PROGRAM REPORT PREPARED BY WESTON SOLUTIONS, INC., DATED NOVEMBER 2007.

FIGURE 3
SITE PLAN - CONTROL SITE

GRAPHIC SCALE
60 30 0 60
1 inch = 60 ft.

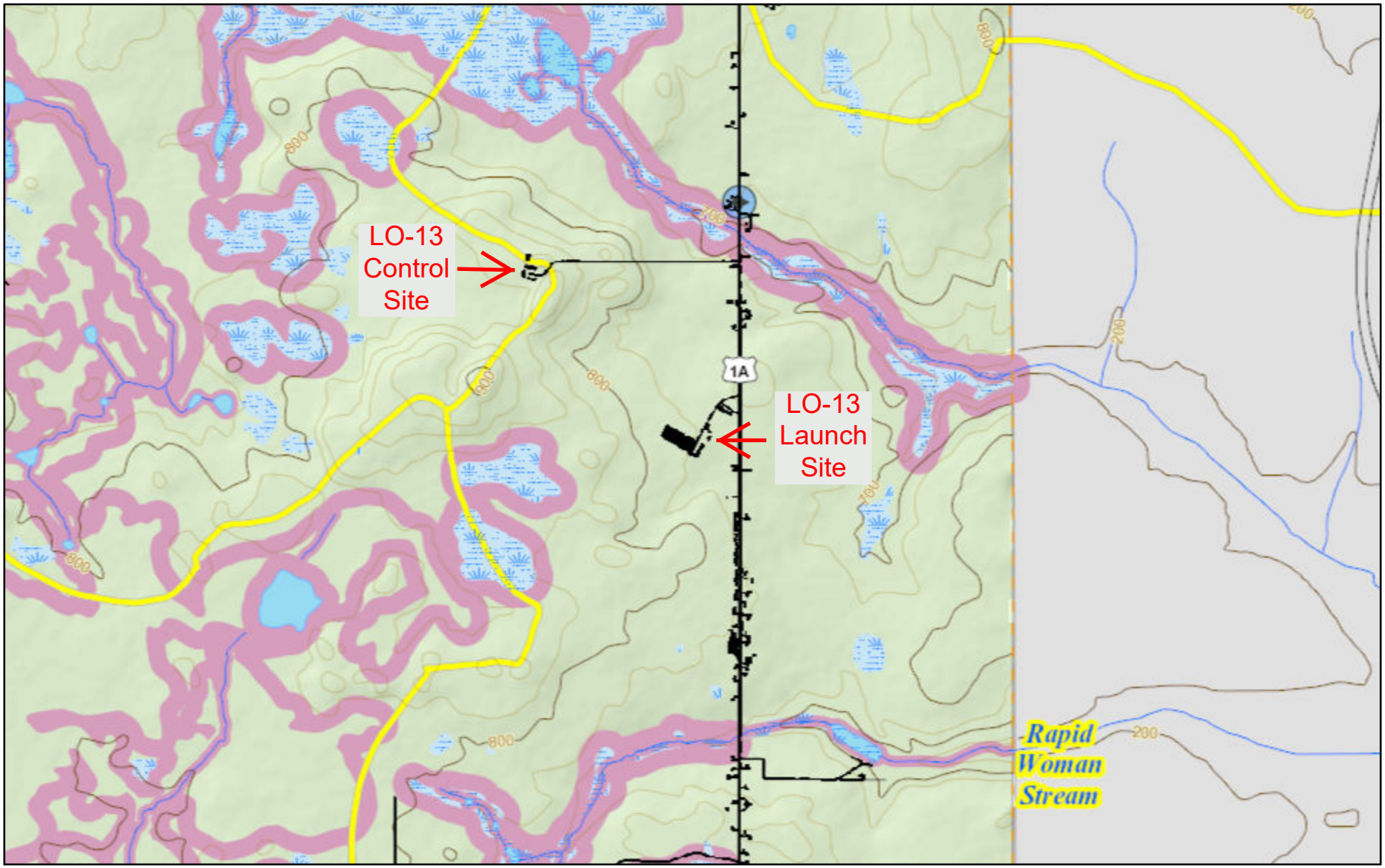
LO-13 CONTROL SITE
ROUTE 1A
CASWELL, MAINE

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PROJECT: 15001301

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J:\1. Credere Projects\15001301 USACE Loring FUDS RI-RA\Old versions\FIGURE 2B - LO-13 CONTROL SITE SAMPLE LOCATION PLAN_SAF.dwg plot date: 2/28/2024 9:37 AM



July 13, 2018

Watershed Divide (HUC 12)

1:36,000

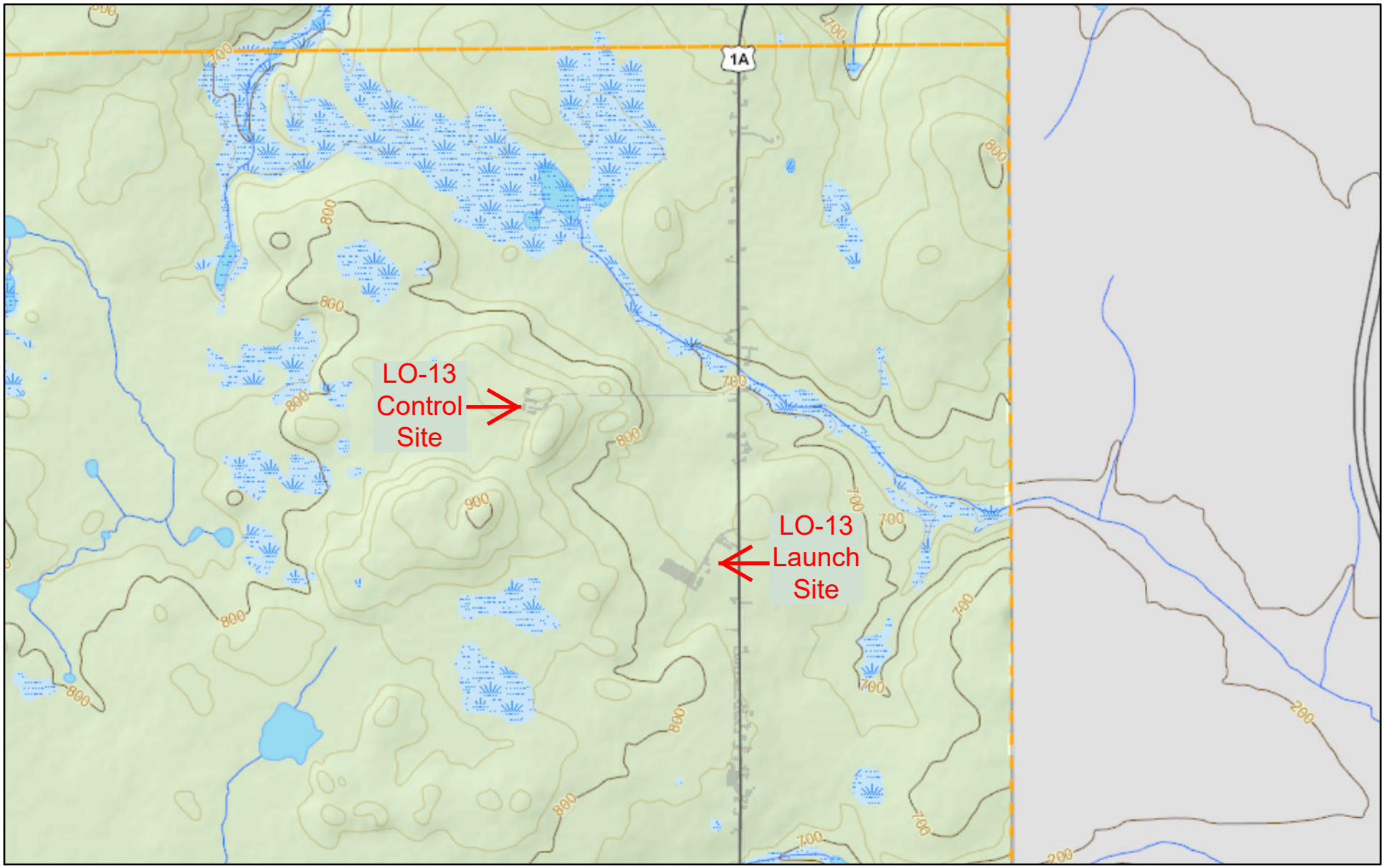
0 0.2 0.4 0.8 mi

0 0.33 0.65 1.3 km

FIGURE 4

Water Resources and Riparian Habitats

Former LO-13 Missile Site, Caswell, Maine



July 13, 2018

1:36,112

0 0.2 0.4 0.8 mi

0 0.33 0.65 1.3 km

FIGURE 5
Plant and Animal Habitat
Former LO-13 Missile Site, Caswell, Maine

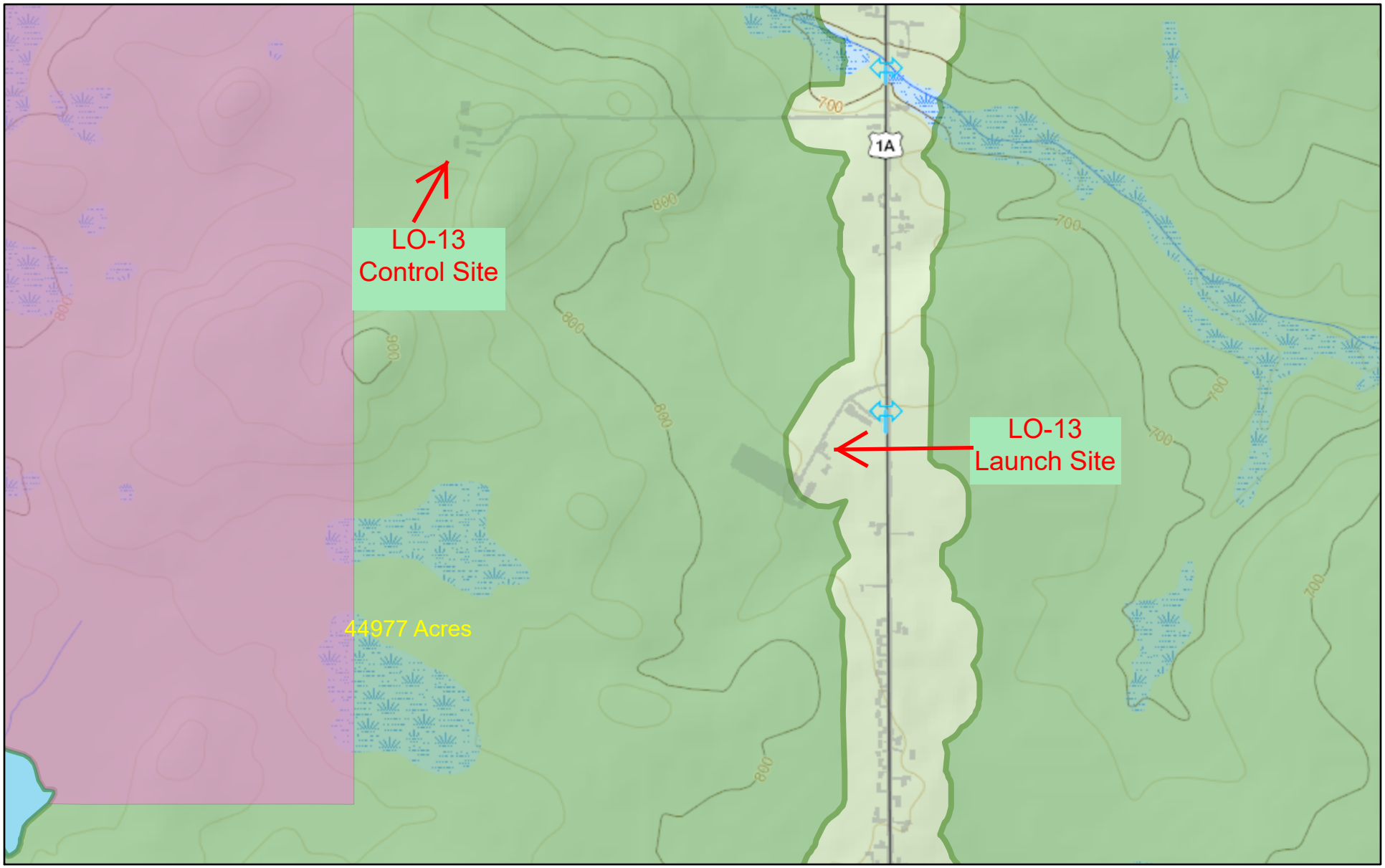


FIGURE 6
Conserved Land and Undeveloped Habitat Map
Former LO-13 Missile Site, Caswell, Maine

TABLES

Appendix C
TABLE 1
Soil Analytical Data - Launch Site

Sample ID	Sample Depth	Sampling Date	TPH as Diesel Range Organics mg/kg	C_9-C_{12} Aliphatic Hydrocarbons mg/kg	C_9-C_{10} Aromatic Hydrocarbons mg/kg	C_9-C_{18} Aliphatic Hydrocarbons mg/kg	C_{19}-C_{36} Aliphatic Hydrocarbons mg/kg	C_{11}-C_{22} Aromatic Hydrocarbons mg/kg	Acetone mg/kg	2-Butanone mg/kg	Ethylbenzene mg/kg
LO-13 L. INSITU	Sidewall	09/14/94	**457** [1]	-	-	**356** [2]	**101** [2]	-	-	-	-
LSSB2-1	9-11'	09/24/96	5.8 U	-	-	4.5 U[2]	1.3 U[2]	-	**0.029**	0.006 U	0.006 U
LSSB3-1	4-6'	09/24/96	**2,300 J**	-	-	**1,794 J** [2]	**506 J** [2]	-	0.740 U	**3.10**	**0.085 J**
LSSB3-2	14-16'	09/24/96	**22 J**	-	-	**17.2 J** [2]	**4.8 J** [2]	-	0.006 U	0.006 U	0.006 U
LSSB5-2	10-12'	09/17/96	5.8 U	-	-	4.5 U[2]	1.3 U[2]	-	**0.010**	0.006 U	0.006 U
LSMW1-1	8-10'	09/17/96	5.8 U	-	-	4.5 U[2]	1.3 U[2]	-	0.006 U	0.006 U	0.006 U
L013SB-01A/Duplicate	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-
L013SB-01B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-02A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-02B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-03A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-03B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-04A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-04B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-
LSSB-8-1	4-8'	11/01/16	-	3.2 U	0.40 U	7.3 U	12 U	**11 J**	-	-	0.050 U
LSSB-8-2	12-13'	11/01/16	-	2.3 U	0.29 U	6.5 U	11 U	6.5 U	-	-	0.037 U
LSSB-9-1/ Duplicate	6-8'	11/01/16	-	2.2 U	0.27 U	6.3 U	11 U	6.3 U	-	-	0.034 U
LSSB-9-2	14-16'	11/01/16	-	3.7 U	0.46 U	6.5 U	11 U	6.5 U	-	-	0.058 U
LSSB-10-1	8-10'	11/01/16	**-**	**41**	**17**	**71 J**	11 UJ	**28**	**-**	**-**	0.038 U
LSSB-10-2	12-13'	11/01/16	-	2.4 U	**1.0 J**	6.2 U	10 U	6.2 U	-	-	0.038 U
LSSB-11-1	4-6'	11/01/16	-	2.2 UJ	0.28 UJ	6.5 U	11 U	**6.7 J**	-	-	0.034 U
LSSB-12-1	4-6'	11/01/16	-	2.5 U	0.31 U	6.5 U	11 U	6.5 U	-	-	0.038 U
LSSB-13-1	4-6'	11/01/16	-	2.5 U	0.31 U	6.9 U	**11 J**	**26**	-	-	0.039 U
Included - No detections											
LSSB1-1	6-8'	09/24/96	5.4 U	-	-	-	-	-	0.005 U	0.005 U	0.005 U
LSSB2-2	14-15.5'	09/24/96	5.7 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSSB4-1	12-14'	09/17/96	5.7 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSSB5-1	7-8'	09/17/96	5.6 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSSB6-1	6-8'	09/24/96	5.6 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSSB7-1	7-9'	09/17/96	5.5 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSMW2-1	6-8'	09/25/96	5.5 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSMW2-2	12-14'	09/25/96	5.5 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSMW3-1	6-8'	09/24/96	5.5 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSMW3-2	14-16'	09/24/96	5.7 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSMW4-1	6-8'	09/24/96	5.5 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSMW5-1	8-10'	09/24/96	6.4 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
Excluded: > 15 feet deep or former waste management structures											
LSSB1-2	16-18'	09/24/96	5.4 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSSB6-2	16-17.5'	09/24/96	5.2 U	-	-	-	-	-	0.005 U	0.005 U	0.005 U
LSSB4-2	17'	09/17/96	5.4 U	-	-	-	-	-	0.005 U	0.005 U	0.005 U
LSSB7-2	16-18'	09/17/96	5.6 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSMW1-2	18-18.3'	09/17/96	5.7 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSMW4-2	18-19.6'	09/24/96	5.1 U	-	-	-	-	-	0.005 U	0.005 U	0.005 U
LSMW5-2	18-18.8'	09/24/96	5.9 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSANPB1-1 (Acid pit)	0.9-2.9'	09/25/96	-	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSANPB1-2 (Acid pit)	6.9-8.9'	09/25/96	-	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSANPB2-1 (Acid pit)	0.9-2.9'	09/25/96	-	-	-	-	-	-	0.005 U	0.005 U	0.005 U
LSANPB2-2 (Acid pit)	4.9-6.9'	09/25/96	-	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSANPB3-1 (Acid pit)	4-6'	06/25/99	-	-	-	-	-	-	-	-	-
LSANPB3-2 (Acid pit)	18-20'	06/25/99	-	-	-	-	-	-	-	-	-
LSANPB4-2 (Acid pit)	18-19'	06/25/99	-	-	-	-	-	-	-	-	-
LSANPB4-1 /Duplicate (AP)	2-4'	06/25/99	-	-	-	-	-	-	-	-	-
LSCB-1	n/a	06/25/99	**289**	-	-	-	-	-	-	-	-
Excluded: Assumed removed and disposed											
LO-13 L. CSP1	Stockpile composite	09/14/94	**90.5** [1]	-	-	-	-	-	-	-	-
LO-13 L. CSP1 GEN	Assumed stockpile	09/14/94	**511** [1]	-	-	-	-	-	-	-	-
LO-13 L. CSP2 GEN	Assumed stockpile	09/14/94	**1,500** [1]	-	-	-	-	-	-	-	-

Appendix C
TABLE 1
Soil Analytical Data - Launch Site

Sample ID	Sample Depth	Sampling Date	1,1,1-Trichloro-ethane mg/kg	Trichloroethene mg/kg	Xylenes (total) mg/kg	Naphthalene (VPH) mg/kg	Naphthalene (EPH) mg/kg	Acenaphthene mg/kg	Anthracene mg/kg	Benzo(a)-anthracene mg/kg	Benzo(b)-fluoranthene mg/kg
LO-13 L. INSITU	Sidewall	09/14/94	-	-	-	-	-	-	-	-	-
LSSB2-1	9-11'	09/24/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSSB3-1	4-6'	09/24/96	0.740 U	0.740 U	**0.160 J**	-	-	-	-	-	-
LSSB3-2	14-16'	09/24/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSSB5-2	10-12'	09/17/96	**0.005 J**	0.006 U	0.006 U	-	-	-	-	-	-
LSMW1-1	8-10'	09/17/96	**0.004 J**	0.006 U	0.006 U	-	-	-	-	-	-
L013SB-01A/Duplicate	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-
L013SB-01B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-02A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-02B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-03A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-03B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-04A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-04B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-
LSSB-8-1	4-8'	11/01/16	-	-	0.100 U	0.050 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
LSSB-8-2	12-13'	11/01/16	-	-	0.074 U	0.037 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-9-1/ Duplicate	6-8'	11/01/16	-	-	0.068 U	0.034 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-9-2	14-16'	11/01/16	-	-	0.116 U	0.058 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-10-1	8-10'	11/01/16	-	-	0.076 U	**0.15 J**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-10-2	12-13'	11/01/16	-	-	0.076 U	0.038 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
LSSB-11-1	4-6'	11/01/16	-	-	0.076 U	0.034 UB	0.11 UJ	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-12-1	4-6'	11/01/16	-	-	0.076 U	0.038 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-13-1	4-6'	11/01/16	-	-	0.078 U	0.039 U	0.12 U	**0.050 J**	**0.11 J**	**0.3**	**0.3**
Included - No detections											
LSSB1-1	6-8'	09/24/96	0.005 U	0.005 U	0.005 U	-	-	-	-	-	-
LSSB2-2	14-15.5'	09/24/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSSB4-1	12-14'	09/17/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSSB5-1	7-8'	09/17/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSSB6-1	6-8'	09/24/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSSB7-1	7-9'	09/17/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSMW2-1	6-8'	09/25/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSMW2-2	12-14'	09/25/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSMW3-1	6-8'	09/24/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSMW3-2	14-16'	09/24/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSMW4-1	6-8'	09/24/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSMW5-1	8-10'	09/24/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
Excluded: > 15 feet deep or former waste management structures											
LSSB1-2	16-18'	09/24/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSSB6-2	16-17.5'	09/24/96	0.005 U	0.005 U	0.005 U	-	-	-	-	-	-
LSSB4-2	17'	09/17/96	0.005 U	**0.003 J**	0.005 U	-	-	-	-	-	-
LSSB7-2	16-18'	09/17/96	**0.004 J**	**0.003 J**	0.006 U	-	-	-	-	-	-
LSMW1-2	18-18.3'	09/17/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSMW4-2	18-19.6'	09/24/96	0.005 U	0.005 U	0.005 U	-	-	-	-	-	-
LSMW5-2	18-18.8'	09/24/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSANPB1-1 (Acid pit)	0.9-2.9'	09/25/96	0.006 U	0.006 U	0.006 U	-	/ U	/ U	/ U	/ U	/ U
LSANPB1-2 (Acid pit)	6.9-8.9'	09/25/96	0.006 U	0.006 U	0.006 U	-	/ U	/ U	/ U	/ U	/ U
LSANPB2-1 (Acid pit)	0.9-2.9'	09/25/96	0.005 U	0.005 U	0.005 U	-	/ U	/ U	/ U	/ U	/ U
LSANPB2-2 (Acid pit)	4.9-6.9'	09/25/96	0.006 U	0.006 U	0.006 U	-	/ U	/ U	/ U	/ U	/ U
LSANPB3-1 (Acid pit)	4-6'	06/25/99	-	-	-	-	/ U	/ U	/ U	/ U	/ U
LSANPB3-2 (Acid pit)	18-20'	06/25/99	-	-	-	-	/ U	/ U	/ U	/ U	/ U
LSANPB4-2 (Acid pit)	18-19'	06/25/99	-	-	-	-	/ U	/ U	/ U	/ U	/ U
LSANPB4-1 /Duplicate (AP)	2-4'	06/25/99	-	-	-	-	/ U	/ U	/ U	/ U	/ U
LSCB-1	n/a	06/25/99	-	-	-	-	-	-	-	-	-
Excluded: Assumed removed and disposed											
LO-13 L. CSP1	Stockpile composite	09/14/94	-	-	-	-	-	-	-	-	-
LO-13 L. CSP1 GEN	Assumed stockpile	09/14/94	-	-	-	-	-	-	-	-	-
LO-13 L. CSP2 GEN	Assumed stockpile	09/14/94	-	-	-	-	-	-	-	-	-

Appendix C
TABLE 1
Soil Analytical Data - Launch Site

Sample ID	Sample Depth	Sampling Date	Benzo(k)-fluoranthene mg/kg	Benzo(g,h,i)-perylene mg/kg	Benzo(a)pyrene mg/kg	Chrysene mg/kg	Dibenzo(a,h)-anthracene mg/kg	Fluoranthene mg/kg	Fluorene mg/kg	Indeno(1,2,3-cd)-pyrene mg/kg	Phenanthrene mg/kg
LO-13 L. INSITU	Sidewall	09/14/94	-	-	-	-	-	-	-	-	-
LSSB2-1	9-11'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB3-1	4-6'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB3-2	14-16'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB5-2	10-12'	09/17/96	-	-	-	-	-	-	-	-	-
LSMW1-1	8-10'	09/17/96	-	-	-	-	-	-	-	-	-
L013SB-01A/Duplicate	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-
L013SB-01B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-02A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-02B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-03A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-03B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-04A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-04B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-
LSSB-8-1	4-8'	11/01/16	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
LSSB-8-2	12-13'	11/01/16	0.11 U	0.11 U	**0.036 J**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-9-1/ Duplicate	6-8'	11/01/16	0.11 U	0.11 U	**0.040 J**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-9-2	14-16'	11/01/16	0.11 U	0.11 U	**0.034 J**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-10-1	8-10'	11/01/16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-10-2	12-13'	11/01/16	0.10 U	0.10 U	**0.035 J**	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
LSSB-11-1	4-6'	11/01/16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-12-1	4-6'	11/01/16	0.11 U	0.11 U	**0.034 J**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-13-1	4-6'	11/01/16	**0.2**	**0.19 J**	**0.3**	**0.4**	**0.10 J**	**0.7**	**0.043 J**	**0.18 J**	**0.5**
Included - No detections											
LSSB1-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB2-2	14-15.5'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB4-1	12-14'	09/17/96	-	-	-	-	-	-	-	-	-
LSSB5-1	7-8'	09/17/96	-	-	-	-	-	-	-	-	-
LSSB6-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB7-1	7-9'	09/17/96	-	-	-	-	-	-	-	-	-
LSMW2-1	6-8'	09/25/96	-	-	-	-	-	-	-	-	-
LSMW2-2	12-14'	09/25/96	-	-	-	-	-	-	-	-	-
LSMW3-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-
LSMW3-2	14-16'	09/24/96	-	-	-	-	-	-	-	-	-
LSMW4-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-
LSMW5-1	8-10'	09/24/96	-	-	-	-	-	-	-	-	-
Excluded: > 15 feet deep or former waste management structures											
LSSB1-2	16-18'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB6-2	16-17.5'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB4-2	17'	09/17/96	-	-	-	-	-	-	-	-	-
LSSB7-2	16-18'	09/17/96	-	-	-	-	-	-	-	-	-
LSMW1-2	18-18.3'	09/17/96	-	-	-	-	-	-	-	-	-
LSMW4-2	18-19.6'	09/24/96	-	-	-	-	-	-	-	-	-
LSMW5-2	18-18.8'	09/24/96	-	-	-	-	-	-	-	-	-
LSANPB1-1 (Acid pit)	0.9-2.9'	09/25/96	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U
LSANPB1-2 (Acid pit)	6.9-8.9'	09/25/96	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U
LSANPB2-1 (Acid pit)	0.9-2.9'	09/25/96	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U
LSANPB2-2 (Acid pit)	4.9-6.9'	09/25/96	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U
LSANPB3-1 (Acid pit)	4-6'	06/25/99	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U
LSANPB3-2 (Acid pit)	18-20'	06/25/99	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U
LSANPB4-2 (Acid pit)	18-19'	06/25/99	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U
LSANPB4-1 /Duplicate (AP)	2-4'	06/25/99	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U
LSCB-1	n/a	06/25/99	-	-	-	-	-	-	-	-	-
Excluded: Assumed removed and disposed											
LO-13 L. CSP1	Stockpile composite	09/14/94	-	-	-	-	-	-	-	-	-
LO-13 L. CSP1 GEN	Assumed stockpile	09/14/94	-	-	-	-	-	-	-	-	-
LO-13 L. CSP2 GEN	Assumed stockpile	09/14/94	-	-	-	-	-	-	-	-	-

Appendix C
TABLE 1
Soil Analytical Data - Launch Site

Sample ID	Sample Depth	Sampling Date	Pyrene mg/kg	Total Low Molecular Weight PAHs mg/kg	Total High Molecular Weight PAHs mg/kg	delta-BHC mg/kg	4,4'-DDE mg/kg	4.4'-DDD mg/kg	4.4'-DDT mg/kg	Total DDT and Metabolites mg/kg	Polychlorinated Biphenyls (PCBs) mg/kg
LO-13 L. INSITU	Sidewall	09/14/94	-	-	-	-	-	-	-	-	-
LSSB2-1	9-11'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB3-1	4-6'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB3-2	14-16'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB5-2	10-12'	09/17/96	-	-	-	-	-	-	-	-	-
LSMW1-1	8-10'	09/17/96	-	-	-	-	-	-	-	-	-
L013SB-01A/Duplicate	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	0.011 U
L013SB-01B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	0.011 U
LO13SB-02A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	0.01 U
LO13SB-02B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	0.012 U
LO13SB-03A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	0.012 U
LO13SB-03B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	0.012 U
LO13SB-04A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	0.014 U
LO13SB-04B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	0.012 U
LSSB-8-1	4-8'	11/01/16	0.12 U	0.12 U	0.12 U	-	-	-	-	-	-
LSSB-8-2	12-13'	11/01/16	0.11 U	0.11 U	**0.036 J**	-	-	-	-	-	-
LSSB-9-1/ Duplicate	6-8'	11/01/16	0.11 U	0.11 U	**0.040 J**	-	-	-	-	-	-
LSSB-9-2	14-16'	11/01/16	0.11 U	0.11 U	**0.034 J**	-	-	-	-	-	-
LSSB-10-1	8-10'	11/01/16	0.11 U	**0.15 J**	0.11 U	-	-	-	-	-	-
LSSB-10-2	12-13'	11/01/16	0.10 U	0.10 U	**0.035 J**	-	-	-	-	-	-
LSSB-11-1	4-6'	11/01/16	0.11 U	0.11 U	0.11 U	-	-	-	-	-	-
LSSB-12-1	4-6'	11/01/16	0.11 U	0.11 U	**0.034 J**	-	-	-	-	-	-
LSSB-13-1	4-6'	11/01/16	**0.6**	**2.19 J**	**1.78 J**	-	-	-	-	-	-
Included - No detections											
LSSB1-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB2-2	14-15.5'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB4-1	12-14'	09/17/96	-	-	-	-	-	-	-	-	-
LSSB5-1	7-8'	09/17/96	-	-	-	-	-	-	-	-	-
LSSB6-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB7-1	7-9'	09/17/96	-	-	-	-	-	-	-	-	-
LSMW2-1	6-8'	09/25/96	-	-	-	-	-	-	-	-	-
LSMW2-2	12-14'	09/25/96	-	-	-	-	-	-	-	-	-
LSMW3-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-
LSMW3-2	14-16'	09/24/96	-	-	-	-	-	-	-	-	-
LSMW4-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-
LSMW5-1	8-10'	09/24/96	-	-	-	-	-	-	-	-	-
Excluded: > 15 feet deep or former waste management structures											
LSSB1-2	16-18'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB6-2	16-17.5'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB4-2	17'	09/17/96	-	-	-	-	-	-	-	-	-
LSSB7-2	16-18'	09/17/96	-	-	-	-	-	-	-	-	-
LSMW1-2	18-18.3'	09/17/96	-	-	-	-	-	-	-	-	-
LSMW4-2	18-19.6'	09/24/96	-	-	-	-	-	-	-	-	-
LSMW5-2	18-18.8'	09/24/96	-	-	-	-	-	-	-	-	-
LSANPB1-1 (Acid pit)	0.9-2.9'	09/25/96	/ U	/ U	/ U	**0.0018**	**0.011 J**	**0.058 J**	**0.0092 J**	**0.0782 J**	-
LSANPB1-2 (Acid pit)	6.9-8.9'	09/25/96	/ U	/ U	/ U	0.0045 U	0.0090 U	0.0090 U	0.0090 U	0.0090 U	-
LSANPB2-1 (Acid pit)	0.9-2.9'	09/25/96	/ U	/ U	/ U	0.0042 U	0.0085 U	**0.0014 J**	**0.0007 J**	**0.0021 J**	-
LSANPB2-2 (Acid pit)	4.9-6.9'	09/25/96	/ U	/ U	/ U	0.0044 U	0.0088 U	0.0088 U	0.0088 U	0.0088 U	-
LSANPB3-1 (Acid pit)	4-6'	06/25/99	/ U	/ U	/ U	0.015 U	0.0031 U	0.0031 U	0.0031 U	0.0031 U	-
LSANPB3-2 (Acid pit)	18-20'	06/25/99	/ U	/ U	/ U	0.015 U	0.0031 U	0.0031 U	0.0031 U	0.0031 U	-
LSANPB4-2 (Acid pit)	18-19'	06/25/99	/ U	/ U	/ U	0.015 U	0.0031 U	0.0031 U	0.0031 U	0.0031 U	-
LSANPB4-1 /Duplicate (AP)	2-4'	06/25/99	/ U	/ U	/ U	0.015 U	0.003 U	0.003 U	**0.0040**	**0.0040**	-
LSCB-1	n/a	06/25/99	-	-	-	0.017 U	0.034 U	**0.004**	**0.0390**	**0.0430**	-
Excluded: Assumed removed and disposed											
LO-13 L. CSP1	Stockpile composite	09/14/94	-	-	-	-	-	-	-	-	-
LO-13 L. CSP1 GEN	Assumed stockpile	09/14/94	-	-	-	-	-	-	-	-	-
LO-13 L. CSP2 GEN	Assumed stockpile	09/14/94	-	-	-	-	-	-	-	-	-

Appendix C
TABLE 1
Soil Analytical Data - Launch Site

Sample ID	Sample Depth	Sampling Date	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Cadmium mg/kg	Chromium (total) mg/kg	Copper mg/kg	Lead mg/kg	Mercury mg/kg	Nickel mg/kg	Selenium mg/kg	Zinc mg/kg
LO-13 L. INSITU	Sidewall	09/14/94	-	-	-	-	-	-	-	-	-	-	-
LSSB2-1	9-11'	09/24/96	-	-	-	-	-	-	-	-	-	-	-
LSSB3-1	4-6'	09/24/96	-	-	-	-	-	-	-	-	-	-	-
LSSB3-2	14-16'	09/24/96	-	-	-	-	-	-	-	-	-	-	-
LSSB5-2	10-12'	09/17/96	-	-	-	-	-	-	-	-	-	-	-
LSMW1-1	8-10'	09/17/96	-	-	-	-	-	-	-	-	-	-	-
L013SB-01A/Duplicate	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-	-	-
L013SB-01B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-	-	-
LO13SB-02A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-	-	-
LO13SB-02B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-	-	-
LO13SB-03A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-	-	-
LO13SB-03B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-	-	-
LO13SB-04A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-	-	-
LO13SB-04B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-	-	-
LSSB-8-1	4-8'	11/01/16	-	-	-	-	-	-	-	-	-	-	-
LSSB-8-2	12-13'	11/01/16	-	-	-	-	-	-	-	-	-	-	-
LSSB-9-1/ Duplicate	6-8'	11/01/16	-	-	-	-	-	-	-	-	-	-	-
LSSB-9-2	14-16'	11/01/16	-	-	-	-	-	-	-	-	-	-	-
LSSB-10-1	8-10'	11/01/16	-	-	-	-	-	-	-	-	-	-	-
LSSB-10-2	12-13'	11/01/16	-	-	-	-	-	-	-	-	-	-	-
LSSB-11-1	4-6'	11/01/16	-	-	-	-	-	-	-	-	-	-	-
LSSB-12-1	4-6'	11/01/16	-	-	-	-	-	-	-	-	-	-	-
LSSB-13-1	4-6'	11/01/16	-	-	-	-	-	-	-	-	-	-	-
Included - No detections													
LSSB1-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-	-	-
LSSB2-2	14-15.5'	09/24/96	-	-	-	-	-	-	-	-	-	-	-
LSSB4-1	12-14'	09/17/96	-	-	-	-	-	-	-	-	-	-	-
LSSB5-1	7-8'	09/17/96	-	-	-	-	-	-	-	-	-	-	-
LSSB6-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-	-	-
LSSB7-1	7-9'	09/17/96	-	-	-	-	-	-	-	-	-	-	-
LSMW2-1	6-8'	09/25/96	-	-	-	-	-	-	-	-	-	-	-
LSMW2-2	12-14'	09/25/96	-	-	-	-	-	-	-	-	-	-	-
LSMW3-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-	-	-
LSMW3-2	14-16'	09/24/96	-	-	-	-	-	-	-	-	-	-	-
LSMW4-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-	-	-
LSMW5-1	8-10'	09/24/96	-	-	-	-	-	-	-	-	-	-	-
Excluded: > 15 feet deep or former waste management structures													
LSSB1-2	16-18'	09/24/96	-	-	-	-	-	-	-	-	-	-	-
LSSB6-2	16-17.5'	09/24/96	-	-	-	-	-	-	-	-	-	-	-
LSSB4-2	17'	09/17/96	-	-	-	-	-	-	-	-	-	-	-
LSSB7-2	16-18'	09/17/96	-	-	-	-	-	-	-	-	-	-	-
LSMW1-2	18-18.3'	09/17/96	-	-	-	-	-	-	-	-	-	-	-
LSMW4-2	18-19.6'	09/24/96	-	-	-	-	-	-	-	-	-	-	-
LSMW5-2	18-18.8'	09/24/96	-	-	-	-	-	-	-	-	-	-	-
LSANPB1-1 (Acid pit)	0.9-2.9'	09/25/96	**7.7**	**30.7**	-	-	**31.2**	-	**11.4**	**0.06**	-	0.19 U	-
LSANPB1-2 (Acid pit)	6.9-8.9'	09/25/96	**4.0**	**39.8** J	-	-	**33.0**	-	**11.8**	0.05 U	-	**0.38**	-
LSANPB2-1 (Acid pit)	0.9-2.9'	09/25/96	**6.9**	**32.1**	-	-	**30.9**	-	**11.6**	0.05 U	-	**0.35**	-
LSANPB2-2 (Acid pit)	4.9-6.9'	09/25/96	**8.4**	**39.6**	-	-	**41.8**	-	**15**	0.04 U	-	**0.55**	-
LSANPB3-1 (Acid pit)	4-6'	06/25/99	**9.97**	-	**0.399**	0.75 U	**22.0**	**14.5**	**7.8**	0.0659 U	**31.3**	1.88 U	**46.3**
LSANPB3-2 (Acid pit)	18-20'	06/25/99	**6.03**	-	**0.421**	0.77 U	**27.3**	**17.0**	7.7 U	0.069 U	**40.9**	1.91 U	**53.6**
LSANPB4-2 (Acid pit)	18-19'	06/25/99	**5.5**	-	**0.343**	0.71 U	**17.7**	**13.7**	7.1 U	0.0657 U	**25.8**	1.78 U	**47.3**
LSANPB4-1 /Duplicate (AP)	2-4'	06/25/99	**6.15**	-	**0.410**	**0.74**	**29.0**	**15.3**	**8.0**	0.0654 U	**36.6**	1.77 U	**52.8**
LSCB-1	n/a	06/25/99	**5.28**	-	**0.302**	**2.77**	**22.6**	**36.2**	**80.5**	0.0745 U	**23**	2.1 U	**237**
Excluded: Assumed removed and disposed													
LO-13 L. CSP1	Stockpile composite	09/14/94	-	-	-	-	-	-	-	-	-	-	-
LO-13 L. CSP1 GEN	Assumed stockpile	09/14/94	-	-	-	-	-	-	-	-	-	-	-
LO-13 L. CSP2 GEN	Assumed stockpile	09/14/94	-	-	-	-	-	-	-	-	-	-	-

Appendix C
TABLE 1
Soil Analytical Data - Launch Site

Notes

All 1996 and 1999 data results were obtained from summary tables prepared by previous consultants; laboratory reports not available.

	Grey highlight - not used in risk assessments
Bold	Detected value
mg/kg	Milligrams per kilogram
J	Estimated
U	Not detected at reporting limit shown
ND	Not detected
VPH	Volatile petroleum hydrocarbons
EPH	Extractable petroleum hydrocarbons
NA or "-"	Not analyzed
/	Reporting limits not available
1.	Typed as #2/#4/fuel oil or diesel
2.	TPH-DRO extrapolated to 78% C9-C18 and 22% C11-C22 aromatic hydrocarbons (MACTEC 2010).

Appendix C
TABLE 2
Subsurface Soil Analytical Data - Control Site

Sample ID	Sample Depth	Sampling Date	TPH as Diesel-Range Organics		C_5-C_8 Aliphatic Hydrocarbons		C_9-C_{12} Aliphatic Hydrocarbons		C_9-C_{10} Aromatic Hydrocarbons		C_9-C_{18} Aliphatic Hydrocarbons		C_{19}-C_{36} Aliphatic Hydrocarbons		C_{11}-C_{22} Aromatic Hydrocarbons		Benzene		2-Butanone	
	ft bgs		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
SUBAREA 1 - Former Radar Towers																				
CSSB18-1	8-10	10/08/96	6.1	U	-		-		-		4.8	U[1]	-		1.3	U[1]	0.006	U	0.006	U
CSSB19-1	4-6	06/24/99	-		-		-		-		-		-		-		/	U	/	U
CSSB20-1	4-6	06/23/99	-		-		-		-		-		-		-		/	U	/	U
CSSB21-1	4-6	06/23/99	-		-		-		-		-		-		-		/	U	/	U
CSSB22-1/Dup [2]	4-6	06/24/99	-		-		-		-		-		-		-		/	U	/	U
Maximum Detected Concentration			**ND**		**NA**		**NA**		**NA**		**ND**		**NA**		**ND**		**ND**		**ND**	
SUBAREA 2 - Former Generating Building																				
CSSB2-1	6-8	09/11/96	6.2	U	-		-		-		4.8	U[1]	-		1.4	U[1]	0.006	U	0.006	U
CSSB3-1	8-10	09/12/96	5.5	U	-		-		-		4.3	U[1]	-		1.2	U[1]	0.006	U	0.006	U
CSSB4-1	14-16	09/12/96	5.6	U	-		-		-		4.4	U[1]	-		1.2	U[1]	0.006	U	0.006	U
CSSB5-1	14-16	09/13/96	11	U	-		-		-		8.6	U[1]	-		2.4	U[1]	0.006	U	0.006	U
CSSB6-1	14-16	10/09/96	5.3	U	-		-		-		4.1	U[1]	-		1.2	U[1]	0.005	U	0.005	U
CSSB7-1	6-8	10/08/96	5.5	U	-		-		-		4.3	U[1]	-		1.2	U[1]	0.006	U	0.006	U
CSSB27-1/Dup	5-7	07/18/17	-		**5**	**J**	**120**	**J**	**98**		**1,400**	**J**	**280**		**1,100**		0.036	U	-	
CSSB29-1	10-12	07/18/17	-		2.2	U	2.3	UB	**0.65**	**J**	6.6	U	11	U	6.6	U	0.045	U	-	
CSSB29-2	12-14	07/18/17	-		2.1	U	1.8	UB	0.34	U	**48**		**63**		**23**		0.043	U	-	
CSSB30-1	10-12	07/18/17	-		1.5	U	4	UB	**1.7**	**J**	6.5	U	11	U	6.5	U	0.031	U	-	
CSSB30-2	12-14	07/18/17	-		1.7	UJ	**21**	**J**	**14**	**J**	**16**	**J**	**10**	**J**	**9.5**	**J**	0.036	UJ	-	
CSSB31-1	5-7	07/18/17	-		2.3	U	1.8	UB	0.39	U	7.0	U	12	U	7.0	U	0.049	U	-	
CSMW1-1	10-11	09/11/96	5.5	U	-		-		-		4.3	U[1]	-		1.2	U[1]	0.006	U	0.006	U
Maximum Detected Concentration			**94**	**J**	**5.0**	**J**	**120**	**J**	**98**		**1,400**	**J**	**280**		**1,100**		**ND**		**ND**	
SUBAREA 3 - Former Mess Hall																				
CSSB8-1	6-8	09/15/96	5.7	U	-		-		-		4.4	U[1]	-		1.3	U[1]	0.006	U	0.006	U
CSSB10-1/Dup	11-13	09/14/96	5.2	U	-		-		-		4.1	U[1]	-		1.1	U[1]	0.005	U	0.005	U
CSSB11-1	14-16	09/13/96	**8.6**		**-**		**-**		**-**		**6.7**	**[1]**	**-**		**1.9**	**[1]**	0.005	U	0.005	U
CSSB12-1	14-16	09/13/96	**5.6**		**-**		**-**		**-**		**4.4**	**[1]**	**-**		**1.2**	**[1]**	0.006	U	0.006	U
CSMW5-1	14.4-15.5	09/15/96	5.5	U	-		-		-		4.3	U[1]	-		1.2	U[1]	0.006	U	0.006	U
CSMW4-1	6-7	09/15/96	5.7	U	-		-		-		4.4	U[1]	-		1.3	U[1]	0.006	U	0.006	U
Maximum Detected Concentration			**8.6**		**NA**		**NA**		**NA**		**6.7**		**NA**		**1.9**		**ND**		**ND**	
SUBAREA 4 - Former Administration Building																				
CSSB13-1	8-10	09/16/96	5.5	U	-		-		-		4.3	U[1]	-		1.2	U[1]	0.006	U	0.006	U
CSSB14-1	8-10	09/15/96	8	U	-		-		-		6.2	U[1]	-		1.8	U[1]	0.006	U	**0.011**	
CSSB15-1	8-10	10/08/96	5.4	U	-		-		-		4.2	U[1]	-		1.2	U[1]	0.006	U	0.006	U
CSSB16-1	10-12	10/08/96	5.8	U	-		-		-		4.5	U[1]	-		1.3	U[1]	0.006	U	0.006	U
CSSB17-1	6-8	10/09/96	5.6	U	-		-		-		4.4	U[1]	-		1.2	U[1]	0.006	U	0.006	U
CSMW6-1	6-8	10/09/96	5.7	U	-		-		-		4.4	U[1]	-		1.3	U[1]	0.006	U	0.006	U
CSMW7-1	6-8	10/08/96	5.6	U	-		-		-		4.4	U[1]	-		1.2	U[1]	0.006	U	0.006	U
Maximum Detected Concentration			**ND**		**NA**		**NA**		**NA**		**ND**		**NA**		**ND**		**ND**		**ND**	
SUBAREA 5 - Northeast of Administrative Building																				
CSSB23-1	4-6	06/22/99	-		-		-		-		--		-		--		/	U	/	U
CSSB24-1	4-6	06/22/99	-		-		-		-		--		-		--		/	U	/	U
CSSB25-1	4-6	06/23/99	-		-		-		-		--		-		--		/	U	/	U
CSSB26-1	4-6	06/25/99	-		-		-		-		--		-		--		/	U	/	U
CSMW8-1	6-8	09/16/96	5.8	U	-		-		-		4.5	U[1]	-		1.3	U[1]	0.006	U	0.006	U
Maximum Detected Concentration			**ND**		**NA**		**NA**		**NA**		**ND**		**NA**		**ND**		**ND**		**ND**	

Appendix C
TABLE 2
Subsurface Soil Analytical Data - Control Site

Sample ID	Sample Depth ft bgs	Sampling Date	1,2-Dichloroethene mg/kg		cis-1,2-Dichloroethene mg/kg		Ethylbenzene mg/kg		Methylene Chloride mg/kg		Toluene mg/kg		1,2,4-Trichloro-benzene mg/kg		1,1,1-Trichloroethane mg/kg		Trichlorothene mg/kg		Xylenes (total) mg/kg	
SUBAREA 1 - Former Radar Towers																				
CSSB18-1	8-10	10/08/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB19-1	4-6	06/24/99	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U
CSSB20-1	4-6	06/23/99	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U
CSSB21-1	4-6	06/23/99	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U
CSSB22-1/Dup [2]	4-6	06/24/99	/	U	/	U	/	U	/	U	/	U	/	U	/	U	**0.505**		/	U
Maximum Detected Concentration			**ND**		**ND**		**ND**		**ND**		**ND**		**ND**		**ND**		**0.505**		**ND**	
SUBAREA 2 - Former Generating Building																				
CSSB2-1	6-8	09/11/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	**0.002**	**J**
CSSB3-1	8-10	09/12/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	**0.001**	**J**
CSSB4-1	14-16	09/12/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB5-1	14-16	09/13/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB6-1	14-16	10/09/96	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
CSSB7-1	6-8	10/08/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB27-1/Dup	5-7	07/18/17	-		-		0.036	U	-		0.036	U	-		-		-		0.072	U
CSSB29-1	10-12	07/18/17	-		-		0.045	U	-		0.045	U	-		-		-		0.090	U
CSSB29-2	12-14	07/18/17	-		-		0.043	U	-		0.043	U	-		-		-		0.086	U
CSSB30-1	10-12	07/18/17	-		-		0.031	U	-		0.031	U	-		-		-		0.062	U
CSSB30-2	12-14	07/18/17	-		-		0.036	UJ	-		0.036	UJ	-		-		-		0.072	UJ
CSSB31-1	5-7	07/18/17	-		-		0.049	U	-		0.049	U	-		-		-		0.098	U
CSMW1-1	10-11	09/11/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	**0.003**	**J**	**0.001**	**J**
Maximum Detected Concentration			**ND**		**ND**		**0.005**	**J**	**ND**		**ND**		**ND**		**ND**		**0.003**	**J**	**0.002**	**J**
SUBAREA 3 - Former Mess Hall																				
CSSB8-1	6-8	09/15/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB10-1/Dup	11-13	09/14/96	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
CSSB11-1	14-16	09/13/96	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
CSSB12-1	14-16	09/13/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSMW5-1	14.4-15.5	09/15/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSMW4-1	6-7	09/15/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Maximum Detected Concentration			**ND**		**ND**		**ND**		**ND**		**ND**		**ND**		**ND**		**ND**		**ND**	
SUBAREA 4 - Former Administration Building																				
CSSB13-1	8-10	09/16/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB14-1	8-10	09/15/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB15-1	8-10	10/08/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB16-1	10-12	10/08/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB17-1	6-8	10/09/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSMW6-1	6-8	10/09/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSMW7-1	6-8	10/08/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Maximum Detected Concentration			**ND**		**ND**		**ND**		**ND**		**ND**		**ND**		**ND**		**ND**		**ND**	
SUBAREA 5 - Northeast of Administrative Building																				
CSSB23-1	4-6	06/22/99	/	U	/	U	**0.021**	**J**	/	U	/	U	**0.03**	**J**	/	U	/	U	**0.078**	**J**
CSSB24-1	4-6	06/22/99	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U
CSSB25-1	4-6	06/23/99	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U
CSSB26-1	4-6	06/25/99	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U
CSMW8-1	6-8	09/16/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	**0.003**	**J**	0.006	U
Maximum Detected Concentration			**ND**		**ND**		**0.021**	**J**	**ND**		**ND**		**0.03**	**J**	**ND**		**0.003**	**J**	**0.078**	**J**

Appendix C
TABLE 2
Subsurface Soil Analytical Data - Control Site

Sample ID	Sample Depth	Sampling Date	Naphthalene (VPH)		Naphthalene (SVOC)		2-Methyl-naphthalene		Acenaph-thene		Acenaph-thylene		Anthracene		Benzo(a)-anthracene		Benzo(b)-fluoranthene		Benzo(k)-fluoranthene		Benzo(g,h,i)-perylene		Benzo(a)-pyrene	
	ft bgs		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
SUBAREA 1 - Former Radar Towers																								
CSSB18-1	8-10	10/08/96	0.006	U	-		-		-		-		-		-		-		-		-		-	
CSSB19-1	4-6	06/24/99	/	U	-		-		-		-		-		-		-		-		-		-	
CSSB20-1	4-6	06/23/99	/	U	-		-		-		-		-		-		-		-		-		-	
CSSB21-1	4-6	06/23/99	/	U	-		-		-		-		-		-		-		-		-		-	
CSSB22-1/Dup [2]	4-6	06/24/99	/	U	-		-		-		-		-		-		-		-		-		-	
Maximum Detected Concentration			**ND**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**	
SUBAREA 2 - Former Generating Building																								
CSSB2-1	6-8	09/11/96	0.006	U	-		-		-		-		-		-		-		-		-		-	
CSSB3-1	8-10	09/12/96	0.006	U	-		-		-		-		-		-		-		-		-		-	
CSSB4-1	14-16	09/12/96	0.006	U	-		-		-		-		-		-		-		-		-		-	
CSSB5-1	14-16	09/13/96	0.006	U	-		-		-		-		-		-		-		-		-		-	
CSSB6-1	14-16	10/09/96	0.005	U	-		-		-		-		-		-		-		-		-		-	
CSSB7-1	6-8	10/08/96	0.006	U	-		-		-		-		-		-		-		-		-		-	
CSSB27-1/Dup	5-7	07/18/17	**2.7**		**0.0598**		**0.110**		**0.0409**		0.0018	U	0.0018	U	**0.0015**	**J**	0.0018	U	0.0018	U	0.0018	U	0.0018	U
CSSB29-1	10-12	07/18/17	0.045	U	0.0019	U	**0.0013**	**J**	0.0019	U	0.0019	U	0.0019	U	**0.00084**	**J**	0.0019	U	0.0019	U	**0.00084**	**J**	0.0019	U
CSSB29-2	12-14	07/18/17	**0.0091**	**J**	0.002	U	0.002	U	0.002	U	**0.00083**	**J**	**0.002**	**J**	**0.0277**		**0.0257**		**0.0085**		**0.0108**		**0.0195**	
CSSB30-1	10-12	07/18/17	**0.023**	**J**	**0.0009**	**J**	**0.0028**	**J**	0.0019	U	0.0019	U	0.0019	U	0.0019	U	0.0019	U	0.0019	U	0.0019	U	0.0019	U
CSSB30-2	12-14	07/18/17	**0.4**	**J**	**0.0076**	**J**	**0.0231**	**J**	**0.0024**	**J**	0.0019	U	0.0019	U	**0.0046**	**J**	**0.0044**	**J**	**0.0019**	**J**	**0.0015**	**J**	**0.0026**	**J**
CSSB31-1	5-7	07/18/17	0.049	U	0.0019	U	0.0019	U	0.0019	U	0.0019	U	0.0019	U	0.0019	U	0.0019	U	0.0019	U	0.0019	U	0.0019	U
CSMW1-1	10-11	09/11/96	0.006	U	-		-		-		-		-		-		-		-		-		-	
Maximum Detected Concentration			**2.7**		**0.0598**		**0.110**		**0.0409**		**0.00083**	**J**	**0.002**	**J**	**0.0277**		**0.0257**		**0.0085**		**0.0108**		**0.0195**	
SUBAREA 3 - Former Mess Hall																								
CSSB8-1	6-8	09/15/96	0.006	U	-		-		-		-		-		-		-		-		-		-	
CSSB10-1/Dup	11-13	09/14/96	0.005	U	-		-		-		-		-		-		-		-		-		-	
CSSB11-1	14-16	09/13/96	0.005	U	-		-		-		-		-		-		-		-		-		-	
CSSB12-1	14-16	09/13/96	0.006	U	-		-		-		-		-		-		-		-		-		-	
CSMW5-1	14.4-15.5	09/15/96	0.006	U	-		-		-		-		-		-		-		-		-		-	
CSMW4-1	6-7	09/15/96	0.006	U	-		-		-		-		-		-		-		-		-		-	
Maximum Detected Concentration			**ND**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**	
SUBAREA 4 - Former Administration Building																								
CSSB13-1	8-10	09/16/96	0.006	U	-		-		-		-		-		-		-		-		-		-	
CSSB14-1	8-10	09/15/96	0.006	U	-		-		-		-		-		-		-		-		-		-	
CSSB15-1	8-10	10/08/96	0.006	U	-		-		-		-		-		-		-		-		-		-	
CSSB16-1	10-12	10/08/96	0.006	U	-		-		-		-		-		-		-		-		-		-	
CSSB17-1	6-8	10/09/96	0.006	U	-		-		-		-		-		-		-		-		-		-	
CSMW6-1	6-8	10/09/96	0.006	U	-		-		-		-		-		-		-		-		-		-	
CSMW7-1	6-8	10/08/96	0.006	U	-		-		-		-		-		-		-		-		-		-	
Maximum Detected Concentration			**ND**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**	
SUBAREA 5 - Northeast of Administrative Building																								
CSSB23-1	4-6	06/22/99	**0.029**	**J**	-		-		-		-		-		-		-		-		-		-	
CSSB24-1	4-6	06/22/99	**0.033**	**J**	-		-		-		-		-		-		-		-		-		-	
CSSB25-1	4-6	06/23/99	/	U	-		-		-		-		-		-		-		-		-		-	
CSSB26-1	4-6	06/25/99	/	U	-		-		-		-		-		-		-		-		-		-	
CSMW8-1	6-8	09/16/96	0.006	U	-		-		-		-		-		-		-		-		-		-	
Maximum Detected Concentration			**0.033**	**J**	**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**	

Appendix C
TABLE 2
Subsurface Soil Analytical Data - Control Site

Sample ID	Sample Depth	Sampling Date	Chrysene		Dibenzo(a,h)-anthracene		Fluoranthene		Fluorene		Indeno(1,2,3-cd)-pyrene		Phenanthrene		Pyrene		Total Low Molecular Weight PAHs		Total High Molecular Weight PAHs	
	ft bgs		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
SUBAREA 1 - Former Radar Towers																				
CSSB18-1	8-10	10/08/96	-		-		-		-		-		-		-		-		-	
CSSB19-1	4-6	06/24/99	-		-		-		-		-		-		-		-		-	
CSSB20-1	4-6	06/23/99	-		-		-		-		-		-		-		-		-	
CSSB21-1	4-6	06/23/99	-		-		-		-		-		-		-		-		-	
CSSB22-1/Dup [2]	4-6	06/24/99	-		-		-		-		-		-		-		-		-	
Maximum Detected Concentration			**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**	
SUBAREA 2 - Former Generating Building																				
CSSB2-1	6-8	09/11/96	-		-		-		-		-		-		-		-		-	
CSSB3-1	8-10	09/12/96	-		-		-		-		-		-		-		-		-	
CSSB4-1	14-16	09/12/96	-		-		-		-		-		-		-		-		-	
CSSB5-1	14-16	09/13/96	-		-		-		-		-		-		-		-		-	
CSSB6-1	14-16	10/09/96	-		-		-		-		-		-		-		-		-	
CSSB7-1	6-8	10/08/96	-		-		-		-		-		-		-		-		-	
CSSB27-1/Dup	5-7	07/18/17	**0.0013**	**J**	0.0018	U	**0.0057**		**0.0644**		0.0018	U	**0.210**		**0.0159**		**3.147**		**0.003**	
CSSB29-1	10-12	07/18/17	0.0019	U	0.0019	U	**0.0013**	**J**	0.0019	U	**0.00081**	**J**	**0.0012**	**J**	**0.0015**	**J**	**0.006**		**0.002**	
CSSB29-2	12-14	07/18/17	**0.0205**		**0.0032**	**J**	**0.0407**		0.002	U	**0.0109**		**0.0087**		**0.0409**		**0.111**		**0.116**	
CSSB30-1	10-12	07/18/17	0.0019	U	0.0019	U	0.0019	U	0.0019	U	0.0019	U	**0.0014**	**J**	0.0019	U	**0.027**		0.0019	U
CSSB30-2	12-14	07/18/17	**0.0039**	**J**	0.0019	UJ	**0.0035**	**J**	**0.0043**	**J**	**0.0017**	**J**	**0.0086**	**J**	**0.0042**	**J**	**0.448**		**0.019**	
CSSB31-1	5-7	07/18/17	0.0019	U	0.0019	U	**0.0013**	**J**	0.0019	U	0.0019	U	0.0019	U	**0.0008**	**J**	**0.002**		0.0019	U
CSMW1-1	10-11	09/11/96	-		-		-		-		-		-		-		-			
Maximum Detected Concentration			**0.0205**		**0.0032**	**J**	**0.0407**		**0.0644**		**0.0109**		**0.210**		**0.0409**		**0.111**		**0.116**	
SUBAREA 3 - Former Mess Hall																				
CSSB8-1	6-8	09/15/96	-		-		-		-		-		-		-		-		-	
CSSB10-1/Dup	11-13	09/14/96	-		-		-		-		-		-		-		-		-	
CSSB11-1	14-16	09/13/96	-		-		-		-		-		-		-		-		-	
CSSB12-1	14-16	09/13/96	-		-		-		-		-		-		-		-		-	
CSMW5-1	14.4-15.5	09/15/96	-		-		-		-		-		-		-		-		-	
CSMW4-1	6-7	09/15/96	-		-		-		-		-		-		-		-		-	
Maximum Detected Concentration			**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**	
SUBAREA 4 - Former Administration Building																				
CSSB13-1	8-10	09/16/96	-		-		-		-		-		-		-		-		-	
CSSB14-1	8-10	09/15/96	-		-		-		-		-		-		-		-		-	
CSSB15-1	8-10	10/08/96	-		-		-		-		-		-		-		-		-	
CSSB16-1	10-12	10/08/96	-		-		-		-		-		-		-		-		-	
CSSB17-1	6-8	10/09/96	-		-		-		-		-		-		-		-		-	
CSMW6-1	6-8	10/09/96	-		-		-		-		-		-		-		-		-	
CSMW7-1	6-8	10/08/96	-		-		-		-		-		-		-		-		-	
Maximum Detected Concentration			**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**	
SUBAREA 5 - Northeast of Administrative Building																				
CSSB23-1	4-6	06/22/99	-		-		-		-		-		-		-		-		-	
CSSB24-1	4-6	06/22/99	-		-		-		-		-		-		-		-		-	
CSSB25-1	4-6	06/23/99	-		-		-		-		-		-		-		-		-	
CSSB26-1	4-6	06/25/99	-		-		-		-		-		-		-		-		-	
CSMW8-1	6-8	09/16/96	-		-		-		-		-		-		-		-		-	
Maximum Detected Concentration			**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**	

Appendix C
TABLE 2
Subsurface Soil Analytical Data - Control Site

Sample ID	Sample Depth	Sampling Date	TPH as Diesel-Range Organics	C_5-C_8 Aliphatic Hydrocarbons	C_9-C_{12} Aliphatic Hydrocarbons	C_9-C_{10} Aromatic Hydrocarbons	C_9-C_{18} Aliphatic Hydrocarbons	C_{19}-C_{36} Aliphatic Hydrocarbons	C_{11}-C_{22} Aromatic Hydrocarbons	Benzene	2-Butanone
	ft bgs		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Excluded: depths greater than 15 ft bgs											
CSSB1-2	18-20	09/11/96	**35**	**-**	**-**	**-**	**27.3** [1]	**-**	**7.7** [1]	0.005 U	0.005 U
CSSB2-2	18-20	09/11/96	5.2 U	-	-	-	4.1 U[1]	-	1.1 U[1]	0.005 U	0.005 U
CSSB3-2	18-20	09/12/96	5.6 U	-	-	-	4.4 U[1]	-	1.2 U[1]	0.006 U	0.006 U
CSSB4-2/Dup	19-21	09/12/96	6 U	-	-	-	4.7 U[1]	-	1.3 U[1]	0.006 U	0.006 U
CSSB5-2	19-21	09/13/96	5.9 U	-	-	-	4.6 U[1]	-	1.3 U[1]	0.006 U	0.006 U
CSSB6-2	19-21	10/09/96	6.2 U	-	-	-	4.8 U[1]	-	1.4 U[1]	0.006 U	0.006 U
CSSB7-2	18-20	10/08/96	**8.5**	**-**	**-**	**-**	**6.6** [1]	**-**	**1.9** [1]	0.006 U	0.006 U
CSSB8-2	18-20	09/15/96	6.1 U	-	-	-	4.8 U[1]	-	1.3 U[1]	0.006 U	0.006 U
CSSB10-2	19-21	09/14/96	6 U	-	-	-	4.7 U[1]	-	1.3 U[1]	0.006 U	0.006 U
CSSB11-2	19-21	09/13/96	**15**	**-**	**-**	**-**	**11.7** [1]	**-**	**3.3** [1]	0.006 U	0.006 U
CSSB12-2	19-21	09/13/96	**8.3**	**-**	**-**	**-**	**6.5** [1]	**-**	**1.8** [1]	0.006 U	0.006 U
CSSB13-2	18-20	09/16/96	5.5 U	-	-	-	4.3 U[1]	-	1.2 U[1]	0.006 U	0.006 U
CSSB14-2	18-20	09/15/96	5.5 U	-	-	-	4.3 U[1]	-	1.2 U[1]	0.006 U	0.006 U
CSSB15-2	18-20	10/08/96	5.4 U	-	-	-	4.2 U[1]	-	1.2 U[1]	0.006 U	0.006 U
CSSB16-2	18-20	10/08/96	5.9 U	-	-	-	4.6 U[1]	-	1.3 U[1]	0.006 U	0.006 U
CSSB17-2	18-20	10/09/96	6 U	-	-	-	4.7 U[1]	-	1.3 U[1]	0.006 U	0.006 U
CSSB18-2	18-20	10/08/96	5.5 U	-	-	-	4.3 U[1]	-	1.2 U[1]	0.006 U	0.006 U
CSSB19-2	38-40	06/24/99	-	-	-	-	--	-	--	/ U	/ U
CSSB20-2	38-40	06/24/99	-	-	-	-	--	-	--	/ U	/ U
CSSB21-2	38-40	06/24/99	-	-	-	-	-	-	-	/ U	/ U
CSSB22-2	38-40	06/25/99	-	-	-	-	--	-	--	/ U	/ U
CSSB23-2	38-40	06/22/99	-	-	-	-	--	-	--	/ U	/ U
CSSB24-2	38-40	06/22/99	-	-	-	-	--	-	--	/ U	/ U
CSSB25-2	38-40	06/23/99	-	-	-	-	--	-	--	/ U	/ U
CSSB26-2	38-40	06/25/99	-	-	-	-	--	-	--	/ U	/ U
CSSB27-2	20-22	07/18/17	-	2.2 U	**18**	**11**	**70** **J**	**21** **J**	**35**	0.046 U	-
CSSB28-1	19.5-20	07/18/17	-	2.4 U	1.8 UB	0.40 U	**6.7** **J**	**11** **J**	7.2 U	0.050 U	-
CSSB28-2	20-22	07/18/17	-	2.4 U	4.5 UB	**1.8** **J**	**4.7** **J**	12 U	7.1 U	0.051 U	-
CSSB32-1	19-21	07/18/17	-	1.8 U	1.8 UB	**0.56** **J**	6.9 U	11 U	6.9 U	0.039 U	-
CSSB32-2	21-23	07/18/17	-	2.4 U	2.1 UB	0.40 U	6.6 U	11 U	6.6 U	0.049 U	-
CSMW2-1	19.5-20	09/11/96	**200**	**-**	**-**	**-**	**156** [1]	-	**44** [1]	0.006 U	0.006 U
CSMW2-2	30-32	09/11/96	**7**	**-**	**-**	**-**	**5.46** [1]	-	**1.54** [1]	0.006 U	0.006 U
CSMW3-1	22-24	09/14/96	5.9 U	-	-	-	4.6 U[1]	-	1.3 U[1]	0.006 U	0.006 U
CSMW3-2	33-34.7	09/14/96	5.3 U	-	-	-	4.1 U[1]	-	1.2 U[1]	**0.002** **J**	0.005 U
CSMW4-2	32-34	09/15/96	5.2 U	-	-	-	4.1 U[1]	-	1.1 U[1]	0.005 U	0.005 U
CSMW5-2	28-30	09/15/96	5.1 U	-	-	-	4.0 U[1]	-	1.1 U[1]	0.005 U	0.005 U
CSMW6-2	32-34	10/09/96	5.9 U	-	-	-	4.6 U[1]	-	1.3 U[1]	0.006 U	0.006 U
CSMW7-2/Dup	25-27	10/08/96	5.6 U	-	-	-	4.4 U[1]	-	1.2 U[1]	0.006 U	0.006 U
CSMW8-2	32-34	09/16/96	5.5 U	-	-	-	4.3 U[1]	-	1.2 U[1]	0.006 U	0.006 U

Appendix C
TABLE 2
Subsurface Soil Analytical Data - Control Site

Sample ID	Sample Depth ft bgs	Sampling Date	1,2-Dichloroethene mg/kg		cis-1,2-Dichloroethene mg/kg		Ethylbenzene mg/kg		Methylene Chloride mg/kg		Toluene mg/kg		1,2,4-Trichloro-benzene mg/kg		1,1,1-Trichloroethane mg/kg		Trichlorothene mg/kg		Xylenes (total) mg/kg	
Excluded: depths greater than 15 ft bgs																				
CSSB1-2	18-20	09/11/96	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
CSSB2-2	18-20	09/11/96	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
CSSB3-2	18-20	09/12/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB4-2/Dup	19-21	09/12/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB5-2	19-21	09/13/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB6-2	19-21	10/09/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB7-2	18-20	10/08/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB8-2	18-20	09/15/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB10-2	19-21	09/14/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB11-2	19-21	09/13/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB12-2	19-21	09/13/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB13-2	18-20	09/16/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB14-2	18-20	09/15/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB15-2	18-20	10/08/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB16-2	18-20	10/08/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB17-2	18-20	10/09/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB18-2	18-20	10/08/96	0.006	U	0.006	U	0.006	U	0.006	U	**0.001**	**J**	0.006	U	0.006	U	**0.018**		0.006	U
CSSB19-2	38-40	06/24/99	/	U	/	U	/	U	/	U	/	U	/	U	/	U	**0.17**	**J**	/	U
CSSB20-2	38-40	06/24/99	/	U	/	U	/	U	**0.026**	**J**	/	U	/	U	/	U	**0.117**	**J**	/	U
CSSB21-2	38-40	06/24/99	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U
CSSB22-2	38-40	06/25/99	/	U	/	U	/	U	**0.031**	**J**	/	U	/	U	/	U	/	U	/	U
CSSB23-2	38-40	06/22/99	/	U	**0.101**	**J**	/	U	/	U	/	U	/	U	/	U	**0.616**		/	U
CSSB24-2	38-40	06/22/99	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U
CSSB25-2	38-40	06/23/99	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U
CSSB26-2	38-40	06/25/99	/	U	/	U	/	U	**0.036**	**J**	**0.039**	**J**	/	U	/	U	**0.07**	**J**	/	U
CSSB27-2	20-22	07/18/17	-		-		0.046	U	-		0.046	U	-		-		-		0.092	U
CSSB28-1	19.5-20	07/18/17	-		-		0.050	U	-		0.050	U	-		-		-		0.100	U
CSSB28-2	20-22	07/18/17	-		-		0.051	U	-		0.051	U	-		-		-		0.102	U
CSSB32-1	19-21	07/18/17	-		-		0.039	U	-		0.039	U	-		-		-		0.078	U
CSSB32-2	21-23	07/18/17	-		-		0.049	U	-		0.049	U	-		-		-		0.098	U
CSMW2-1	19.5-20	09/11/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSMW2-2	30-32	09/11/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSMW3-1	22-24	09/14/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSMW3-2	33-34.7	09/14/96	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
CSMW4-2	32-34	09/15/96	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
CSMW5-2	28-30	09/15/96	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
CSMW6-2	32-34	10/09/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSMW7-2/Dup	25-27	10/08/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSMW8-2	32-34	09/16/96	**0.007**		0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	**0.004**	**J**	**0.034**	**J**	0.006	U

Appendix C
TABLE 2
Subsurface Soil Analytical Data - Control Site

Sample ID	Sample Depth ft bgs	Sampling Date	Naphthalene (VPH) mg/kg	Naphthalene (SVOC) mg/kg	2-Methyl-naphthalene mg/kg	Acenaph-thene mg/kg	Acenaph-thylene mg/kg	Anthracene mg/kg	Benzo(a)-anthracene mg/kg	Benzo(b)-fluoranthene mg/kg	Benzo(k)-fluoranthene mg/kg	Benzo(g,h,i)-perylene mg/kg	Benzo(a)-pyrene mg/kg
Excluded: depths greater than 15 ft bgs													
CSSB1-2	18-20	09/11/96	0.005 U	-	-	-	-	-	-	-	-	-	-
CSSB2-2	18-20	09/11/96	0.005 U	-	-	-	-	-	-	-	-	-	-
CSSB3-2	18-20	09/12/96	0.006 U	-	-	-	-	-	-	-	-	-	-
CSSB4-2/Dup	19-21	09/12/96	0.006 U	-	-	-	-	-	-	-	-	-	-
CSSB5-2	19-21	09/13/96	0.006 U	-	-	-	-	-	-	-	-	-	-
CSSB6-2	19-21	10/09/96	0.006 U	-	-	-	-	-	-	-	-	-	-
CSSB7-2	18-20	10/08/96	0.006 U	-	-	-	-	-	-	-	-	-	-
CSSB8-2	18-20	09/15/96	0.006 U	-	-	-	-	-	-	-	-	-	-
CSSB10-2	19-21	09/14/96	0.006 U	-	-	-	-	-	-	-	-	-	-
CSSB11-2	19-21	09/13/96	0.006 U	-	-	-	-	-	-	-	-	-	-
CSSB12-2	19-21	09/13/96	0.006 U	-	-	-	-	-	-	-	-	-	-
CSSB13-2	18-20	09/16/96	0.006 U	-	-	-	-	-	-	-	-	-	-
CSSB14-2	18-20	09/15/96	0.006 U	-	-	-	-	-	-	-	-	-	-
CSSB15-2	18-20	10/08/96	0.006 U	-	-	-	-	-	-	-	-	-	-
CSSB16-2	18-20	10/08/96	0.006 U	-	-	-	-	-	-	-	-	-	-
CSSB17-2	18-20	10/09/96	0.006 U	-	-	-	-	-	-	-	-	-	-
CSSB18-2	18-20	10/08/96	0.006 U	-	-	-	-	-	-	-	-	-	-
CSSB19-2	38-40	06/24/99	/ U	-	-	-	-	-	-	-	-	-	-
CSSB20-2	38-40	06/24/99	/ U	-	-	-	-	-	-	-	-	-	-
CSSB21-2	38-40	06/24/99	missing	-	-	-	-	-	-	-	-	-	-
CSSB22-2	38-40	06/25/99	/ U	-	-	-	-	-	-	-	-	-	-
CSSB23-2	38-40	06/22/99	/ U	-	-	-	-	-	-	-	-	-	-
CSSB24-2	38-40	06/22/99	/ U	-	-	-	-	-	-	-	-	-	-
CSSB25-2	38-40	06/23/99	/ U	-	-	-	-	-	-	-	-	-	-
CSSB26-2	38-40	06/25/99	/ U	-	-	-	-	-	-	-	-	-	-
CSSB27-2	20-22	07/18/17	**0.17 J**	**0.0093**	**0.0236**	**0.0106**	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U
CSSB28-1	19.5-20	07/18/17	0.050 U	0.0019 U	**0.0011 J**	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U
CSSB28-2	20-22	07/18/17	0.051 U	**0.00092 J**	**0.0029 J**	**0.0015 J**	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U
CSSB32-1	19-21	07/18/17	0.039 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	**0.00092 J**	**0.0026 J**	**0.0022 J**	**0.0013 J**	**0.0017 J**	**0.0019 J**
CSSB32-2	21-23	07/18/17	0.049 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	**0.0011 J**	**0.0035 J**	**0.0037**	**0.0014 J**	**0.002 J**	**0.0027 J**
CSMW2-1	19.5-20	09/11/96	0.006 U	-	-	-	-	-	-	-	-	-	-
CSMW2-2	30-32	09/11/96	0.006 U	-	-	-	-	-	-	-	-	-	-
CSMW3-1	22-24	09/14/96	0.006 U	-	-	-	-	-	-	-	-	-	-
CSMW3-2	33-34.7	09/14/96	0.005 U	-	-	-	-	-	-	-	-	-	-
CSMW4-2	32-34	09/15/96	0.005 U	-	-	-	-	-	-	-	-	-	-
CSMW5-2	28-30	09/15/96	0.005 U	-	-	-	-	-	-	-	-	-	-
CSMW6-2	32-34	10/09/96	0.006 U	-	-	-	-	-	-	-	-	-	-
CSMW7-2/Dup	25-27	10/08/96	0.006 U	-	-	-	-	-	-	-	-	-	-
CSMW8-2	32-34	09/16/96	0.006 U	-	-	-	-	-	-	-	-	-	-

Appendix C
TABLE 2
Subsurface Soil Analytical Data - Control Site

Sample ID	Sample Depth	Sampling Date	Chrysene	Dibenzo(a,h)-anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)-pyrene	Phenanthrene	Pyrene	Total Low Molecular Weight PAHs	Total High Molecular Weight PAHs
	ft bgs		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Excluded: depths greater than 15 ft bgs											
CSSB1-2	18-20	09/11/96	-	-	-	-	-	-	-	-	-
CSSB2-2	18-20	09/11/96	-	-	-	-	-	-	-	-	-
CSSB3-2	18-20	09/12/96	-	-	-	-	-	-	-	-	-
CSSB4-2/Dup	19-21	09/12/96	-	-	-	-	-	-	-	-	-
CSSB5-2	19-21	09/13/96	-	-	-	-	-	-	-	-	-
CSSB6-2	19-21	10/09/96	-	-	-	-	-	-	-	-	-
CSSB7-2	18-20	10/08/96	-	-	-	-	-	-	-	-	-
CSSB8-2	18-20	09/15/96	-	-	-	-	-	-	-	-	-
CSSB10-2	19-21	09/14/96	-	-	-	-	-	-	-	-	-
CSSB11-2	19-21	09/13/96	-	-	-	-	-	-	-	-	-
CSSB12-2	19-21	09/13/96	-	-	-	-	-	-	-	-	-
CSSB13-2	18-20	09/16/96	-	-	-	-	-	-	-	-	-
CSSB14-2	18-20	09/15/96	-	-	-	-	-	-	-	-	-
CSSB15-2	18-20	10/08/96	-	-	-	-	-	-	-	-	-
CSSB16-2	18-20	10/08/96	-	-	-	-	-	-	-	-	-
CSSB17-2	18-20	10/09/96	-	-	-	-	-	-	-	-	-
CSSB18-2	18-20	10/08/96	-	-	-	-	-	-	-	-	-
CSSB19-2	38-40	06/24/99	-	-	-	-	-	-	-	-	-
CSSB20-2	38-40	06/24/99	-	-	-	-	-	-	-	-	-
CSSB21-2	38-40	06/24/99	-	-	-	-	-	-	-	-	-
CSSB22-2	38-40	06/25/99	-	-	-	-	-	-	-	-	-
CSSB23-2	38-40	06/22/99	-	-	-	-	-	-	-	-	-
CSSB24-2	38-40	06/22/99	-	-	-	-	-	-	-	-	-
CSSB25-2	38-40	06/23/99	-	-	-	-	-	-	-	-	-
CSSB26-2	38-40	06/25/99	-	-	-	-	-	-	-	-	-
CSSB27-2	20-22	07/18/17	0.0018 U	0.0018 U	**0.0011 J**	**0.0134**	0.0018 U	**0.0352**	**0.0025 J**	**0.256 J**	0.0018 U
CSSB28-1	19.5-20	07/18/17	0.0019 U	0.0019 U	**0.0009 J**	0.0019 U	0.0019 U	**0.00087 J**	0.0019 U	**0.003** J	0.0019 U
CSSB28-2	20-22	07/18/17	**0.00096 J**	0.0019 U	**0.0059**	0.0019 U	0.0019 U	**0.0051**	**0.0023 J**	**0.019 J**	**0.003 J**
CSSB32-1	19-21	07/18/17	**0.0023 J**	**0.0011 J**	**0.0031 J**	0.0019 U	**0.0016 J**	**0.0013 J**	**0.0037 J**	**0.011 J**	**0.013 J**
CSSB32-2	21-23	07/18/17	**0.0029 J**	0.0019 U	**0.0067**	0.0019 U	**0.0018 J**	**0.005**	**0.0055**	**0.020 J**	**0.016 J**
CSMW2-1	19.5-20	09/11/96	-	-	-	-	-	-	-	-	-
CSMW2-2	30-32	09/11/96	-	-	-	-	-	-	-	-	-
CSMW3-1	22-24	09/14/96	-	-	-	-	-	-	-	-	-
CSMW3-2	33-34.7	09/14/96	-	-	-	-	-	-	-	-	-
CSMW4-2	32-34	09/15/96	-	-	-	-	-	-	-	-	-
CSMW5-2	28-30	09/15/96	-	-	-	-	-	-	-	-	-
CSMW6-2	32-34	10/09/96	-	-	-	-	-	-	-	-	-
CSMW7-2/Dup	25-27	10/08/96	-	-	-	-	-	-	-	-	-
CSMW8-2	32-34	09/16/96	-	-	-	-	-	-	-	-	-

Appendix C
TABLE 2
Subsurface Soil Analytical Data - Control Site

Notes:
Soil data from well borings previously referenced as "CSSW-X-X;
modified to CSMW-X-X to match site figures.
1996 and 1999 soil data from summary tables; lab reports unavailable.

	Grey highlight - not used in risk assessments
Bold	Detected value
mg/kg	Milligrams per kilogram
ft bgs	Feet below ground surface
NE	Not established
ND	Not detected
U	Not detected at reporting limit shown
UJ	Not detected at estimated reporting limit shown
UB	Detected in blank sample; result
J	Estimated concentration below reporting limit or due to quality control limitations.
CSSB-X/Du	Highest detected concentration from original sample and duplicate presented.
NA or "-"	Not analyzed
/	Reporting limit not available.
1.	TPH-DRO extrapolated to 78% aliphatic hydrocarbons and 22% C11-C22 aromatic hydrocarbons based on No.2 fuel oil and MACTEC approach (2010).
2.	For TCE, DUP result is shown; Parent = 0.440 and DUP = 0.505

Appendix C
TABLE 3
Groundwater Analytical Data - Launch Site

Well ID	Sampling Date	Groundwater Depth	Total Petroleum Hydrocarbons - Gasoline-Range Organics (TPH-GRO)		Total Petroleum Hydrocarbons - Diesel-Range Organics (TPH-DRO)		cis-1,2-Dichloro-ethene		Toluene		Trichloroethene	
		Feet BTIC	µg/L		µg/L		µg/L		µg/L		µg/L	
LSMW-1	11/03/96	7.90	50	U	**210**		0.5	U	0.5	U	0.5	U
	05/29/97	6.69	50	U	50	U	0.5	U	0.5	U	0.5	U
LSMW-3	11/03/96	14.92	50	U	**52**		0.5	U	0.5	U	0.5	U
	05/29/97	17.32	50	U	50	U	0.5	U	0.5	U	0.5	U
LSMW-6	11/03/96	18.5	50	U	50	U	0.5	U	0.5	U	**0.8**	
	05/29/97	17.08	50	U	50	U	**0.5**		0.5	U	**2.0**	
LSMW-7	11/02/96	27.3	50	U	**150**		0.5	U	**1.0**		0.5	U
	05/29/97	23.98	50	U	**70**		0.5	U	0.5	U	0.5	U
	10/26/99	--	-		**180**	**J**	**-**		-		-	
	05/17/00	--	-		50	U	-		-		-	
	12/05/02	28.78	-		50	U	-		-		-	
	04/23/03	23.02	-		50	U	-		-		-	
	09/18/03	27.4	-		50	U	-		-		-	
	05/11/04	25.72	-		50	U	-		-		-	
LSMW-8	11/02/96	--	50	U	**173**		0.5	U	0.5	U	0.5	U
	05/29/97	--	50	U	50	U	0.5	U	0.5	U	0.5	U
LSDW-1	11/01/96	--	/	U	/	U	/	U	/	U	/	U
	05/19/97	--	/	U	/	U	/	U	/	U	/	U
	09/18/03	--	-		50	U	-		-		-	
	10/02/08	--	-		50	U	-		-		-	
	04/30/09	--	-		50	U	-		-		-	
	10/31/09	--	-		50	U	-		-		-	
	05/25/10	--	-		50	U	-		-		-	

Notes:
All data obtained from summary tables prepared by previous consultants; original laboratory reports not available.

Bold	Detected analyte
µg/L	micrograms per liter
J	Estimated concentration
U	Not detected at reporting limit shown
BTIC	Below top of inner well casing
/	Reporting limit unavailable
-	Not analyzed

Appendix C
TABLE 4
Groundwater Analytical Data - Control Site

Sample ID	Depth to Groundwater Feet BTIC	Sampling Date	Total Petroleum Hydrocarbons as Gasoline-Range Organics (GRO) µg/L	Total Petroleum Hydrocarbons as Diesel-Range Organics (DRO) µg/L	C5-C8 Aliphatic Hydrocarbons µg/L	C9-C12 Aliphatic Hydrocarbons µg/L	C9-C10 Aromatic Hydrocarbons µg/L	Extractable Petroleum Hydrocarbons (All Fractions) µg/L	C9-C18 Aliphatic Hydrocarbons µg/L	C11-C22 Aromatic Hydrocarbons µg/L	Acetone µg/L	cis-1,2-Dichloro-ethene µg/L
CSMW3-2	n/a	05/28/97	50 U	50 U	-	-	-	-	39 U[1]	11 U[1]	2 U	0.5 U
CSMW5-1	n/a	11/04/96	50 U	**230**	**-**	**-**	**-**	-	**179.4 [1]**	**50.6 [1]**	2 U	0.5 U
CSMW5-2/Dup	n/a	05/28/97	50 U	**180**	**-**	**-**	**-**	-	**140.4 [1]**	**39.6 [1]**	2 U	0.5 U
CSMW5-3	n/a	10/26/99	-	**220 J**	**-**	**-**	**-**	-	**171.6 [1]**	**48.4 [1]**	-	-
CSMW5-4	n/a	05/17/00	-	**120 J**	**-**	**-**	**-**	-	**93.6 [1]**	**26.4 [1]**	-	-
CSMW5-1202	n/a	12/04/02	-	-	-	-	-	-	--	--	-	-
CSMW5-0403	n/a	04/23/03	-	-	-	-	-	-	--	--	-	-
CSMW5-0903	n/a	09/18/03	-	**88**	**-**	**-**	**-**	-	**68.6 [1]**	**19.4 [1]**	-	-
CSMW5-0504	n/a	05/11/04	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-0904	n/a	09/30/04	-	**250**	**-**	**-**	**-**	-	**195 [1]**	**55 [1]**	-	-
CSMW5-0405	n/a	04/25/05	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-0905	n/a	09/15/05	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-0506	n/a	05/23/06	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-1006	n/a	10/24/06	-	**260 J**	**-**	**-**	**-**	-	**202.8 [1]**	**57.2 [1]**	-	-
CSMW5-0507	n/a	05/24/07	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-1007	n/a	10/24/07	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-0408	n/a	04/30/08	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-1008	n/a	10/28/08	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-0409	n/a	04/30/09	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-1009	n/a	10/30/09	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-0510	n/a	05/25/10	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-1110	n/a	11/02/10	-	-	-	-	-	100 U	100 U	100 U	-	-
CSMW5-0511	n/a	05/25/11	-	-	-	-	-	100 U	100 U	100 U	-	-
CSMW5-1111	n/a	11/16/11	-	-	-	-	-	100 U	100 U	100 U	-	-
CSMW5-0512	n/a	05/23/12	-	-	-	-	-	100 U	100 U	100 U	-	-
CSMW9-3 /Dup	n/a	10/26/99	50 U	80 U	-	-	-	-	62.4 U[1]	17.6 U[1]	**20 J**	**1.6 J**
CSMW9-4 /Dup	n/a	05/17/00	40 U	50 U	-	-	-	-	39 U[1]	11 U[1]	20 U	**1.6**
CSMW9-1202	n/a	04/14/02	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW9-0403	n/a	04/23/03	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW9-0903	n/a	09/18/03	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW9-0504	n/a	05/11/04	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW9	68.4	07/21/17	-	-	-	-	-	-	-	-	-	-
CSMW10-3	n/a	10/26/99	50 U	**120 J**	**-**	**-**	**-**	-	**93.6 [1]**	**26.4 [1]**	**20 J**	2 *U*
CSMW10-4	n/a	05/17/00	40 U	50 U	-	-	-	-	39 U[1]	11 U[1]	20 U	1 U
CSMW10-1202	n/a	12/04/02	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW10-0403	n/a	04/23/03	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW10-0903	n/a	09/18/03	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW10-0504	n/a	05/11/04	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW10	66.83	07/21/17	-	-	-	-	-	-	-	-	-	-
CSMW11-3	n/a	10/26/99	50 U	60 U	-	-	-	-	46.8 U[1]	13.2 U[1]	**20 J**	2 *U*
CSMW11-4	n/a	05/17/00	40 U	50 U	-	-	-	-	39 U[1]	11 U[1]	20 U	1 U
CSMW11-1202	n/a	12/05/02	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW11-0403	n/a	04/23/03	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW11-0903	n/a	09/18/03	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW11-0504	n/a	05/11/04	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW-100-0717/Dup	69.95	07/21/17	-	-	60 U	**56 J**	**13 J**	-	66 U	85 U [5]	-	-
CSMW-101-0717	67.01	07/21/17	-	-	60 U	**57 J**	**12 J**	-	66 U	85 U [5]	-	-
CSTAP-1 / Dup	tap water	11/04/96	50 U	50 U	-	-	-	/ U	/ U	/ U	0.5 U	0.5 U
CSTAP-2	tap water	05/28/97	50 U	50 U	-	-	-	/ U	/ U	/ U	0.5 U	0.5 U
CSDW1-0903	n/a	09/19/03	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSDW1-0504	n/a	05/11/04	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSDW1-0904	n/a	09/30/04	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSDW1-0405	n/a	04/25/05	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSDW1-0905	n/a	09/22/05	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSDW1-0506	n/a	05/23/06	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSDW1-1006	n/a	10/24/06	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-

Appendix C
TABLE 4
Groundwater Analytical Data - Control Site

Sample ID	Depth to Groundwater Feet BTIC	Sampling Date	1,1,1-Trichloro-ethane µg/L	Trichloroethene µg/L	Naphthalene (SVOC) µg/L	2-Methyl-naphthalene µg/L	Acenaphthene µg/L	Acenaphthylene µg/L	Anthracene µg/L	Benzo(a)-anthracene µg/L	Benzo(b)-fluoranthene µg/L	Benzo(k)-fluoranthene µg/L
CSMW3-2	n/a	05/28/97	**0.6**	*0.5 U*	-	-	-	-	-	-	-	-
CSMW5-1	n/a	11/04/96	**0.8**	*0.5 U*	-	-	-	-	-	-	-	-
CSMW5-2/Dup	n/a	05/28/97	**1.0**	*0.5 U*	-	-	-	-	-	-	-	-
CSMW5-3	n/a	10/26/99	-	-	-	-	-	-	-	-	-	-
CSMW5-4	n/a	05/17/00	-	-	-	-	-	-	-	-	-	-
CSMW5-1202	n/a	12/04/02	-	-	-	-	-	-	-	-	-	-
CSMW5-0403	n/a	04/23/03	-	-	-	-	-	-	-	-	-	-
CSMW5-0903	n/a	09/18/03	-	-	-	-	-	-	-	-	-	-
CSMW5-0504	n/a	05/11/04	-	-	-	-	-	-	-	-	-	-
CSMW5-0904	n/a	09/30/04	-	-	-	-	-	-	-	-	-	-
CSMW5-0405	n/a	04/25/05	-	-	-	-	-	-	-	-	-	-
CSMW5-0905	n/a	09/15/05	-	-	-	-	-	-	-	-	-	-
CSMW5-0506	n/a	05/23/06	-	-	-	-	-	-	-	-	-	-
CSMW5-1006	n/a	10/24/06	-	-	-	-	-	-	-	-	-	-
CSMW5-0507	n/a	05/24/07	-	-	-	-	-	-	-	-	-	-
CSMW5-1007	n/a	10/24/07	-	-	-	-	-	-	-	-	-	-
CSMW5-0408	n/a	04/30/08	-	-	-	-	-	-	-	-	-	-
CSMW5-1008	n/a	10/28/08	-	-	-	-	-	-	-	-	-	-
CSMW5-0409	n/a	04/30/09	-	-	-	-	-	-	-	-	-	-
CSMW5-1009	n/a	10/30/09	-	-	-	-	-	-	-	-	-	-
CSMW5-0510	n/a	05/25/10	-	-	-	-	-	-	-	-	-	-
CSMW5-1110	n/a	11/02/10	-	-	-	-	-	-	-	-	-	-
CSMW5-0511	n/a	05/25/11	-	-	-	-	-	-	-	-	-	-
CSMW5-1111	n/a	11/16/11	-	-	-	-	-	-	-	-	-	-
CSMW5-0512	n/a	05/23/12	-	-	-	-	-	-	-	-	-	-
CSMW9-3 /Dup	n/a	10/26/99	2 U	**1.4 J**	-	-	-	-	-	-	-	-
CSMW9-4 /Dup	n/a	05/17/00	1 U	**1.6**	-	-	-	-	-	-	-	-
CSMW9-1202	n/a	04/14/02	-	-	-	-	-	-	-	-	-	-
CSMW9-0403	n/a	04/23/03	-	-	-	-	-	-	-	-	-	-
CSMW9-0903	n/a	09/18/03	-	-	-	-	-	-	-	-	-	-
CSMW9-0504	n/a	05/11/04	-	-	-	-	-	-	-	-	-	-
CSMW9	68.4	07/21/17	-	-	-	-	-	-	-	-	-	-
CSMW10-3	n/a	10/26/99	**1.3 J**	*2 U*	-	-	-	-	-	-	-	-
CSMW10-4	n/a	05/17/00	**1.3**	*1 U*	-	-	-	-	-	-	-	-
CSMW10-1202	n/a	12/04/02	-	-	-	-	-	-	-	-	-	-
CSMW10-0403	n/a	04/23/03	-	-	-	-	-	-	-	-	-	-
CSMW10-0903	n/a	09/18/03	-	-	-	-	-	-	-	-	-	-
CSMW10-0504	n/a	05/11/04	-	-	-	-	-	-	-	-	-	-
CSMW10	66.83	07/21/17	-	-	-	-	-	-	-	-	-	-
CSMW11-3	n/a	10/26/99	**2.9**	**0.8 J**	-	-	-	-	-	-	-	-
CSMW11-4	n/a	05/17/00	**1.8**	**0.8 J**	-	-	-	-	-	-	-	-
CSMW11-1202	n/a	12/05/02	-	-	-	-	-	-	-	-	-	-
CSMW11-0403	n/a	04/23/03	-	-	-	-	-	-	-	-	-	-
CSMW11-0903	n/a	09/18/03	-	-	-	-	-	-	-	-	-	-
CSMW11-0504	n/a	05/11/04	-	-	-	-	-	-	-	-	-	-
CSMW-100-0717/Dup	69.95	07/21/17	-	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
CSMW-101-0717	67.01	07/21/17	-	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
CSTAP-1 / Dup	tap water	11/04/96	0.5 U	*0.5 U*	-	-	-	-	-	-	-	-
CSTAP-2	tap water	05/28/97	0.5 U	*0.5 U*	-	-	-	-	-	-	-	-
CSDW1-0903	n/a	09/19/03	-	-	-	-	-	-	-	-	-	-
CSDW1-0504	n/a	05/11/04	-	-	-	-	-	-	-	-	-	-
CSDW1-0904	n/a	09/30/04	-	-	-	-	-	-	-	-	-	-
CSDW1-0405	n/a	04/25/05	-	-	-	-	-	-	-	-	-	-
CSDW1-0905	n/a	09/22/05	-	-	-	-	-	-	-	-	-	-
CSDW1-0506	n/a	05/23/06	-	-	-	-	-	-	-	-	-	-
CSDW1-1006	n/a	10/24/06	-	-	-	-	-	-	-	-	-	-

Appendix C
TABLE 4
Groundwater Analytical Data - Control Site

Sample ID	Depth to Groundwater Feet BTIC	Sampling Date	Benzo(g,h,i)-perylene µg/L	Benzo(a)pyrene µg/L	Chrysene µg/L	Dibenzo(a,h)-anthracene µg/L	Fluoranthene µg/L	Fluorene µg/L	Indeno(1,2,3-cd)-pyrene µg/L	Phenanthrene µg/L	Pyrene µg/L
CSMW3-2	n/a	05/28/97	-	-	-	-	-	-	-	-	-
CSMW5-1	n/a	11/04/96	-	-	-	-	-	-	-	-	-
CSMW5-2/Dup	n/a	05/28/97	-	-	-	-	-	-	-	-	-
CSMW5-3	n/a	10/26/99	-	-	-	-	-	-	-	-	-
CSMW5-4	n/a	05/17/00	-	-	-	-	-	-	-	-	-
CSMW5-1202	n/a	12/04/02	-	-	-	-	-	-	-	-	-
CSMW5-0403	n/a	04/23/03	-	-	-	-	-	-	-	-	-
CSMW5-0903	n/a	09/18/03	-	-	-	-	-	-	-	-	-
CSMW5-0504	n/a	05/11/04	-	-	-	-	-	-	-	-	-
CSMW5-0904	n/a	09/30/04	-	-	-	-	-	-	-	-	-
CSMW5-0405	n/a	04/25/05	-	-	-	-	-	-	-	-	-
CSMW5-0905	n/a	09/15/05	-	-	-	-	-	-	-	-	-
CSMW5-0506	n/a	05/23/06	-	-	-	-	-	-	-	-	-
CSMW5-1006	n/a	10/24/06	-	-	-	-	-	-	-	-	-
CSMW5-0507	n/a	05/24/07	-	-	-	-	-	-	-	-	-
CSMW5-1007	n/a	10/24/07	-	-	-	-	-	-	-	-	-
CSMW5-0408	n/a	04/30/08	-	-	-	-	-	-	-	-	-
CSMW5-1008	n/a	10/28/08	-	-	-	-	-	-	-	-	-
CSMW5-0409	n/a	04/30/09	-	-	-	-	-	-	-	-	-
CSMW5-1009	n/a	10/30/09	-	-	-	-	-	-	-	-	-
CSMW5-0510	n/a	05/25/10	-	-	-	-	-	-	-	-	-
CSMW5-1110	n/a	11/02/10	-	-	-	-	-	-	-	-	-
CSMW5-0511	n/a	05/25/11	-	-	-	-	-	-	-	-	-
CSMW5-1111	n/a	11/16/11	-	-	-	-	-	-	-	-	-
CSMW5-0512	n/a	05/23/12	-	-	-	-	-	-	-	-	-
CSMW9-3 /Dup	n/a	10/26/99	-	-	-	-	-	-	-	-	-
CSMW9-4 /Dup	n/a	05/17/00	-	-	-	-	-	-	-	-	-
CSMW9-1202	n/a	04/14/02	-	-	-	-	-	-	-	-	-
CSMW9-0403	n/a	04/23/03	-	-	-	-	-	-	-	-	-
CSMW9-0903	n/a	09/18/03	-	-	-	-	-	-	-	-	-
CSMW9-0504	n/a	05/11/04	-	-	-	-	-	-	-	-	-
CSMW9	68.4	07/21/17	-	-	-	-	-	-	-	-	-
CSMW10-3	n/a	10/26/99	-	-	-	-	-	-	-	-	-
CSMW10-4	n/a	05/17/00	-	-	-	-	-	-	-	-	-
CSMW10-1202	n/a	12/04/02	-	-	-	-	-	-	-	-	-
CSMW10-0403	n/a	04/23/03	-	-	-	-	-	-	-	-	-
CSMW10-0903	n/a	09/18/03	-	-	-	-	-	-	-	-	-
CSMW10-0504	n/a	05/11/04	-	-	-	-	-	-	-	-	-
CSMW10	66.83	07/21/17	-	-	-	-	-	-	-	-	-
CSMW11-3	n/a	10/26/99	-	-	-	-	-	-	-	-	-
CSMW11-4	n/a	05/17/00	-	-	-	-	-	-	-	-	-
CSMW11-1202	n/a	12/05/02	-	-	-	-	-	-	-	-	-
CSMW11-0403	n/a	04/23/03	-	-	-	-	-	-	-	-	-
CSMW11-0903	n/a	09/18/03	-	-	-	-	-	-	-	-	-
CSMW11-0504	n/a	05/11/04	-	-	-	-	-	-	-	-	-
CSMW-100-0717/Dup	69.95	07/21/17	0.05 U	0.05 U	0.05 U	*0.05 U*	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
CSMW-101-0717	67.01	07/21/17	0.05 U	0.05 U	0.05 U	*0.05 U*	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
CSTAP-1 / Dup	tap water	11/04/96	-	-	-	-	-	-	-	-	-
CSTAP-2	tap water	05/28/97	-	-	-	-	-	-	-	-	-
CSDW1-0903	n/a	09/19/03	-	-	-	-	-	-	-	-	-
CSDW1-0504	n/a	05/11/04	-	-	-	-	-	-	-	-	-
CSDW1-0904	n/a	09/30/04	-	-	-	-	-	-	-	-	-
CSDW1-0405	n/a	04/25/05	-	-	-	-	-	-	-	-	-
CSDW1-0905	n/a	09/22/05	-	-	-	-	-	-	-	-	-
CSDW1-0506	n/a	05/23/06	-	-	-	-	-	-	-	-	-
CSDW1-1006	n/a	10/24/06	-	-	-	-	-	-	-	-	-

Appendix C
TABLE 4
Groundwater Analytical Data - Control Site

Notes:

All detected and other selected constituents presented.

Bold	Detected analyte
BTIC	Below top of inner well casing
µg/L	Micrograms per liter.
U	Not detected at reporting limit shown
J	Estimated concentration
2 U	(Italics) Reporting limit above screening level
NA; "-"	Not analyzed or not applicable
n/a	Not available
ND	Not detected
CSMW-X/I	Highest detected concentration in either original or duplicate sample.
1.	TPH-DRO extrapolated to 78% C_9-C_{18} aliphatic hydrocarbons and 22% C_{11}-C_{22} aromatic hydrocarbons (MACTEC 2010).

Appendix C
TABLE 5
Launch Site Indoor Air Analytical Data

Sample Location	Sample Date	Benzene [1] µg/m³	Ethylbenzene [1] µg/m³	Toluene [1] µg/m³	m,p-Xylene [1] µg/m³	o-Xylene [1] µg/m³	Comments
Apartment 1	01/19/95	BRL	BRL	**12.82**	NA	BRL	
Apartment 1	01/19/95	BRL	BRL	BRL	NA	BRL	
Apartment 2	01/19/95	BRL	BRL	**6.03**	NA	BRL	
Apartment 2	01/19/95	BRL	BRL	**10.25**	NA	BRL	
Apartment 3	01/19/95	**11.17**	BRL	**23.00**	NA	BRL	
Apartment 3	01/19/95	**11.52**	**29.12**	**25.64**	NA	**29.69**	
Apartment 1 - Living Room	09/30/96	**6.06**	*0.87 U*	**22.24**	**5.21**	*0.87 U*	Smoker, fuel oil furnace in operation.
Apartment 1 - Bedroom	09/30/96	**5.10**	*0.87 U*	**19.60**	**5.64**	*0.87 U*	
Apartment 2 - Living Room	09/30/96	*0.64 U*	*0.87 U*	**5.66**	*0.87 U*	*0.87 U*	Unoccupied; recently painted.
Apartment 2- Bedroom	09/30/96	*0.64 U*	*0.87 U*	**3.24**	*0.87 U*	*0.87 U*	
Apartment 3 - Living Room	09/30/96	**20.42**	**5.21**	**67.86**	**17.36**	**6.08**	Smoker; recently renovated (new flooring and painted walls).
Apartment 3- Bedroom	09/30/96	**18.50**	**6.08**	**64.09**	**19.96**	**8.25**	
Outdoor Background -1	09/30/96	*0.64 U*	*0.87 U*	0.75 U	*0.87 U*	*0.87 U*	
Outdoor Background -2	09/30/96	*0.64 U*	*0.87 U*	0.75 U	*0.87 U*	*0.87 U*	
Maine DEP RAGs for Indoor Air Residential [2]		3.60	11.0	5,200	100	100	

All detected analytes shown.

Value	Exceeds screening criterion
µg/m³	Micrograms per cubic meter
BRL	Below report limit [reporting limit not shown for 1995 indoor air sampling]
NA	Not analyzed
U	Not detected at reporting limit shown
2.93 U	(Italics) Reporting limit above screening level
/	Laboratory report missing for Apartment 1 samples; results from previously-prepared summary tables; reporting limits for ethylbenzene are not known.

1. Originally reported in parts per billion by volume (ppbv); converted to µg/m³ using the following conversions:
[CDC (2007) NIOSH Pocket Guide for Chemical Hazards (3rd Edition) (https://www.cdc.gov/niosh/npg/default.html)]

Benzene: 1 ppbv =	3.19	µg/m³
Ethylbenzene: 1 ppbv =	4.34	µg/m³
Toluene: 1 ppbv =	3.77	µg/m³
Xylenes: 1 ppbv =	4.34	µg/m³

2. MaineDEP (2023), Table 5
Maine DEP Remedial Action Guidelines for Contaminated Sites (RAGs)

Appendix C
TABLE 6
Launch Site Soil Data Summary

	TPH as Diesel Range Organics	C_9-C_{12} Aliphatic Hydrocarbons	C_9-C_{10} Aromatic Hydrocarbons	C_9-C_{18} Aliphatic Hydrocarbons	C_{19}-C_{36} Aliphatic Hydrocarbons	C_{11}-C_{22} Aromatic Hydrocarbons	Acetone	2-Butanone	Ethylbenzene
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Number of Samples	18	9	9	15	15	9	17	17	26
Number of Detections	3	1	2	4	4	4	2	1	1
Maximum Detected Concentration	**2,300 J**	**41**	**17**	**1,794 J**	**506 J**	**28**	**0.029**	**3.1**	**0.085 J**
Project-Specific Screening Levels	NE	NE [1]	NE [1]	NE [1]	NE [1]	NE [1]	7,000 [2]	2,700 [2]	5.8 [2]
Maine Background Values (Rural values when available) [3]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Plants [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Soil Invertebrates [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Avian [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Mammalian [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE
Region 4 Ecological Soil Screening Values [7]	NE	NE	NE	NE	NE	NE	1.2	1.0	0.27

Appendix C
TABLE 6
Launch Site Soil Data Summary

	1,1,1-Trichloro-ethane mg/kg	Trichloroethene mg/kg	Xylenes (total) mg/kg	Naphthalene (VPH) mg/kg	Naphthalene (EPH) mg/kg	Acenaphthene mg/kg	Anthracene mg/kg	Benzo(a)-anthracene mg/kg	Benzo(b)-fluoranthene mg/kg
Number of Samples	17	17	26	9	9	9	9	9	9
Number of Detections	2	0	1	1	0	1	1	1	1
Maximum Detected Concentration	**0.005**	**ND**	**0.16 J**	**0.15 J**	**ND**	**0.050 J**	**0.11 J**	**0.3**	**0.3**
Project-Specific Screening Levels	810 [2]	0.41 [2]	58 [2]	2 [2]	2 [2]	360 [2]	1,800 [2]	1.1 [2]	1.1 [2]
Maine Background Values (Rural values when available) [3]	NE	NE	NE	5	5	0.22	2.3	17	6.9
EPA EcoSSL - Plants [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Soil Invertebrates [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Avian [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Mammalian [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE
Region 4 Ecological Soil Screening Values [7]	0.04	0.06	0.10	See Total LMW-29	See Total LMW-29	See Total LMW-29	See Total LMW-29	See Total HMW-1.1	See Total HMW-1.1

Appendix C
TABLE 6
Launch Site Soil Data Summary

	Benzo(k)-fluoranthene mg/kg	Benzo(g,h,i)-perylene mg/kg	Benzo(a)pyrene mg/kg	Chrysene mg/kg	Dibenzo(a,h)-anthracene mg/kg	Fluoranthene mg/kg	Fluorene mg/kg	Indeno(1,2,3-cd)-pyrene mg/kg	Phenanthrene mg/kg
Number of Samples	9	9	9	9	9	9	9	9	9
Number of Detections	1	1	6	1	1	1	1	1	1
Maximum Detected Concentration	**0.2**	**0.19 J**	**0.3**	**0.4**	**0.10 J**	**0.7**	**0.043 J**	0.18 J	**0.5**
Project-Specific Screening Levels	11 [2]	NE	0.11 [2]	110 [2]	0.11 [2]	240 [2]	240 [2]	1.1 [2]	NE
Maine Background Values (Rural values when available) [3]	3.6	3	5.4	32	0.73	59	0.67	7.3	54
EPA EcoSSL - Plants [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Soil Invertebrates [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Avian [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Mammalian [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE
Region 4 Ecological Soil Screening Values [7]	See Total HMW-1.1	See Total HMW-1.1	See Total HMW-1.1	See Total HMW-1.1	See Total HMW-1.1	See Total LMW-29	See Total LMW-29	See Total HMW-1.1	See Total LMW-29

Appendix C
TABLE 6
Launch Site Soil Data Summary

	Pyrene mg/kg	Total Low Molecular Weight PAHs mg/kg	Total High Molecular Weight PAHs mg/kg	delta-BHC mg/kg	4,4'-DDE mg/kg	4.4'-DDD mg/kg	4.4'-DDT mg/kg	Total DDT and Metabolites mg/kg	Polychlorinated Biphenyls (PCBs) mg/kg
Number of Samples	9	9	9	0	0	0	0	0	8
Number of Detections	1	2	6	0	0	0	0	0	0
Maximum Detected Concentration	**0.6**	**2.19 J**	**1.78 J**	**NA**	**NA**	**NA**	**NA**	**NA**	**ND**
Project-Specific Screening Levels	180 [2]	NE	NE	NE	2.0 [2]	2.3 [2]	1.9 [2]	NE	0.12 [2,4]
Maine Background Values (Rural values when available) [3]	33	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Plants [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Soil Invertebrates [6]	NE	29	18	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Avian [6]	NE	NE	NE	NE	NE	NE	NE	0.093	NE
EPA EcoSSL - Mammalian [6]	NE	100	1.1	NE	NE	NE	NE	0.021	NE
Region 4 Ecological Soil Screening Values [7]	See Total LMW-29	29	1.1	NE	NE	NE	NE	0.021	0.041

Appendix C
TABLE 6
Launch Site Soil Data Summary

	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Cadmium mg/kg	Chromium (total) mg/kg	Copper mg/kg	Lead mg/kg	Mercury mg/kg	Nickel mg/kg	Selenium mg/kg	Zinc mg/kg
Number of Samples	0	0	0	0	0	0	0	0	0	0	0
Number of Detections	0	0	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Project-Specific Screening Levels	0.68 [2]	1,500 [2]	16 [2]	0.7 [2]	12,000 [2,5]	310 [2]	200 [8]	1.1 [2]	140 [2]	39 [2]	2,300 [2]
Maine Background Values (Rural values when available) [3]	28	79	NE	0.62	32 ChrVI	23	52	NE	35	NE	98
EPA EcoSSL - Plants [6]	18	NE	NE	32	NE	70	120	NE	38	0.52	160
EPA EcoSSL - Soil Invertebrates [6]	NE	330	40	140	NE	80	1700	NE	280	4.1	120
EPA EcoSSL - Avian [6]	43	NE	NE	0.77	26	28	11	NE	210	1.2	46
EPA EcoSSL - Mammalian [6]	46	2,000	21	0.36	34	49	56	NE	130	0.63	79
Region 4 Ecological Soil Screening Values [7]	18	330	10	0.36	18	28	11	0.1	38	0.52	46

Appendix C
TABLE 6
Launch Site Soil Data Summary

Notes

Value	Above human health screening criteria
Value	Above human health screening criteria but below background
Value	Above ecological screening level
mg/kg	Milligrams per kilogram
J	Estimated
U	Not detected at reporting limit shown
ND	Not detected
NE	Not established
VPH	Volatile petroleum hydrocarbons.
EPH	Extractable petroleum hydrocarbons.
NA or "-"	Not analyzed.
/	Reporting limits not available
1.	Evaluated in Appendix D, Petroleum Assessment
2.	US EPA (Nov 2023) Regional
3.	MaineDEP (2023)
4.	Screening level for Aroclor 1254.
5.	For trivalent chromium, insoluble salts.
6.	EPA EcoSSLs from individual chemical documents (https://www.epa.gov/risk/ecological-soil-screening-level-eco-ssl-guidance-and-documents.
7.	EPA Region 4 Ecological Soil Screening Levels, from EPA Region 4 (2018) Ecological Risk Assessment Supplemental Guidance, Interim Draft.
8.	

Appendix C
TABLE 7
Control Site Soil Data Summary

	TPH as Diesel-Range Organics mg/kg	C_5-C_8 Aliphatic Hydrocarbons mg/kg	C_9-C_{12} Aliphatic Hydrocarbons mg/kg	C_9-C_{10} Aromatic Hydrocarbons mg/kg	C_9-C_{18} Aliphatic Hydrocarbons mg/kg	C_{19}-C_{36} Aliphatic Hydrocarbons mg/kg	C_{11}-C_{22} Aromatic Hydrocarbons mg/kg	Benzene mg/kg	2-Butanone mg/kg
DATA SUMMARY AND SELECTION OF COPCs									
SUBAREA 1 - Former Radar Towers									
Number of Samples	1	0	0	0	1	0	1	5	5
Number of Detections	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**ND**	**NA**	**NA**	**NA**	**ND**	**NA**	**ND**	**ND**	**ND**
SUBAREA 2 - Former Generating Building									
Number of Samples	7	6	6	6	13	6	13	13	7
Number of Detections	0	1	2	4	3	3	3	0	0
Maximum Detected Concentration	**ND**	**5.0 J**	**120 J**	**98**	**1,400 J**	**280**	**1,100**	**ND**	**ND**
SUBAREA 3 - Former Mess Hall									
Number of Samples	6	0	0	0	6	0	6	6	6
Number of Detections	2	0	0	0	2	0	2	0	0
Maximum Detected Concentration	**8.6**	**NA**	**NA**	**NA**	**6.7**	**NA**	**1.9**	**ND**	**ND**
SUBAREA 4 - Former Administration Building									
Number of Samples	7	0	0	0	7	0	7	7	7
Number of Detections	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**ND**	**NA**	**NA**	**NA**	**ND**	**NA**	**ND**	**ND**	**ND**
SUBAREA 5 - Northeast of Administrative Building									
Number of Samples	1	0	0	0	1	0	1	1	1
Number of Detections	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**ND**	**NA**	**NA**	**NA**	**ND**	**NA**	**ND**	**ND**	**ND**
Project-Specific Screening Level	NE	NE [1]	NE [1]	NE [1]	NE [1]	NE [1]	NE [1]	1.2 [2]	2,700 [2]
Maine Background Values (Rural values when available) [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Plants [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Soil Invertebrates [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Avian [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Mammalian [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE
Region 4 Ecological Soil Screening Values [5]	NE	NE	NE	NE	NE	NE	NE	0.12	1.0

Appendix C
TABLE 7
Control Site Soil Data Summary

	1,2-Dichloroethene mg/kg	cis-1,2-Dichloroethene mg/kg	Ethylbenzene mg/kg	Methylene Chloride mg/kg	Toluene mg/kg	1,2,4-Trichloro-benzene mg/kg	1,1,1-Trichloroethane mg/kg	Trichlorothene mg/kg	Xylenes (total) mg/kg	Naphthalene (VPH) mg/kg
DATA SUMMARY AND SELECTION OF COPCs										
SUBAREA 1 - Former Radar Towers										
Number of Samples	5	5	5	5	5	5	5	5	5	5
Number of Detections	0	0	0	0	0	0	0	1	0	0
Maximum Detected Concentration	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**0.505**	**ND**	**ND**
SUBAREA 2 - Former Generating Building										
Number of Samples	7	7	13	7	13	7	7	7	13	13
Number of Detections	0	0	0	0	0	0	0	0	3	4
Maximum Detected Concentration	**ND**	**ND**	**0.005 J**	**ND**	**ND**	**ND**	**ND**	**0.003 J**	**0.002 J**	**2.7**
SUBAREA 3 - Former Mess Hall										
Number of Samples	6	6	6	6	6	6	6	6	6	6
Number of Detections	0	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
SUBAREA 4 - Former Administration Building										
Number of Samples	7	7	7	7	7	7	7	7	7	7
Number of Detections	0	0	1	0	0	1	0	1	1	2
Maximum Detected Concentration	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
SUBAREA 5 - Northeast of Administrative Building										
Number of Samples	1	1	2	1	1	2	1	1	2	3
Number of Detections	0	0	1	0	0	1	0	1	1	2
Maximum Detected Concentration	**ND**	**ND**	**0.021 J**	**ND**	**ND**	**0.03 J**	**ND**	**0.003 J**	**0.078 J**	**0.033 J**
Project-Specific Screening Level	6.3 [2,3]	6.3 [2]	5.8 [2]	35 [2]	490 [2]	5.8 [2]	810 [2]	0.41 [2]	58 [2]	2 [2]
Maine Background Values (Rural values when available) [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE	5
EPA EcoSSL - Plants [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Soil Invertebrates [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Avian [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Mammalian [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Region 4 Ecological Soil Screening Values [5]	0.04	0.04	0.27	0.21	0.15	0.27	0.04	0.06	0.10	See Total LMW-29

Appendix C
TABLE 7
Control Site Soil Data Summary

	Naphthalene (SVOC) mg/kg	2-Methyl-naphthalene mg/kg	Acenaph-thene mg/kg	Acenaph-thylene mg/kg	Anthracene mg/kg	Benzo(a)-anthracene mg/kg	Benzo(b)-fluoranthene mg/kg	Benzo(k)-fluoranthene mg/kg	Benzo(g,h,i)-perylene mg/kg	Benzo(a)-pyrene mg/kg	Chrysene mg/kg
DATA SUMMARY AND SELECTION OF COPCs											
SUBAREA 1 - Former Radar Towers											
Number of Samples	0	0	0	0	0	0	0	0	0	0	0
Number of Detections	0	0	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
SUBAREA 2 - Former Generating Building											
Number of Samples	6	6	6	6	6	6	6	6	6	6	6
Number of Detections	3	4	2	1	1	4	2	2	3	2	3
Maximum Detected Concentration	**0.0598**	**0.110**	**0.0409**	**0.00083 J**	**0.002 J**	**0.0277**	**0.0257**	**0.0085**	**0.0108**	**0.0195**	**0.0205**
SUBAREA 3 - Former Mess Hall											
Number of Samples	0	0	0	0	0	0	0	0	0	0	0
Number of Detections	0	0	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
SUBAREA 4 - Former Administration Building											
Number of Samples	0	0	0	0	0	0	0	0	0	0	0
Number of Detections	0	0	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
SUBAREA 5 - Northeast of Administrative Building											
Number of Samples	0	0	0	0	0	0	0	0	0	0	0
Number of Detections	0	0	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Project-Specific Screening Level	2 [2]	24 [2]	360 [2]	NE [2]	1,800 [2]	1.1 [2]	1.1 [2]	11 [2]	NE [2]	0.11 [2]	110 [2]
Maine Background Values (Rural values when available) [6]	5	0.15	0.22	1.9	2.3	17	6.9	3.6	3	5.4	32
EPA EcoSSL - Plants [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Soil Invertebrates [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Avian [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Mammalian [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Region 4 Ecological Soil Screening Values [5]	See Total LMW-29	See Total LMW-29	See Total LMW-29	See Total LMW-29	See Total LMW-29	See Total HMW-1.1	See Total HMW-1.1	See Total HMW-1.1	See Total LMW-29	See Total HMW-1.1	See Total HMW-1.1

Appendix C
TABLE 7
Control Site Soil Data Summary

	Dibenzo(a,h)-anthracene mg/kg	Fluoranthene mg/kg	Fluorene mg/kg	Indeno(1,2,3-cd)-pyrene mg/kg	Phenanthrene mg/kg	Pyrene mg/kg	Total Low Molecular Weight PAHs mg/kg	Total High Molecular Weight PAHs mg/kg
DATA SUMMARY AND SELECTION OF COPCs								
SUBAREA 1 - Former Radar Towers								
Number of Samples	0	0	0	0	0	0	0	0
Number of Detections	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
SUBAREA 2 - Former Generating Building								
Number of Samples	6	6	6	6	6	6	6	6
Number of Detections	1	5	2	3	5	5	6	4
Maximum Detected Concentration	**0.0032 J**	**0.0407**	**0.0644**	**0.0109**	**0.210**	**0.0409**	**0.111**	**0.116**
SUBAREA 3 - Former Mess Hall								
Number of Samples	0	0	0	0	0	0	0	0
Number of Detections	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
SUBAREA 4 - Former Administration Building								
Number of Samples	0	0	0	0	0	0	0	0
Number of Detections	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
SUBAREA 5 - Northeast of Administrative Building								
Number of Samples	0	0	0	0	0	0	0	0
Number of Detections	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Project-Specific Screening Level	0.11 [2]	240 [2]	240 [2]	1.1 [2]	NE [2]	180 [2]	NE [2]	NE [2]
Maine Background Values (Rural values when available) [6]	0.73	59	0.67	7.3	54	33	NE	NE
EPA EcoSSL - Plants [4]	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Soil Invertebrates [4]	NE	NE	NE	NE	NE	NE	29	18
EPA EcoSSL - Avian [4]	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Mammalian [4]	NE	NE	NE	NE	NE	NE	100	1.1
Region 4 Ecological Soil Screening Values [5]	See Total HMW-1.1	See Total HMW-1.1	See Total LMW-29	See Total HMW-1.1	See Total LMW-29	See Total LMW-29	29	1.1

Appendix C
TABLE 7
Control Site Soil Data Summary

Notes:

Value	Above human health screening criteria
Value	Above human health screening
Value	Exceeds ecological screening criteria
Bold	Detected value
mg/kg	Milligrams per kilogram
ft bgs	Feet below ground surface
NE	Not established
ND	Not detected
U	Not detected at reporting limit shown
UJ	Not detected at estimated reporting limit shown
UB	Detected in blank sample; result
J	Estimated concentration below repo
CSSB-X/Du	Highest detected concentration from
NA or "-"	Not analyzed.
1.	Evaluated in Appendix D, Petroleum Assessment
2.	US EPA (Nov 2023) Regional
3.	RAG values applied to non-
4.	EPA EcoSSLs from individual
5.	EPA Region 4 Ecological Soil
6.	MaineDEP (2023)

Appendix C
Table 8
Launch Site Groundwater Data Summary COPC Selection

	Total Petroleum Hydrocarbons - Gasoline-Range Organics (TPH-GRO) µg/L	Total Petroleum Hydrocarbons - Diesel-Range Organics (TPH-DRO) µg/L	cis-1,2-Dichloro-ethene µg/L	Toluene µg/L	Trichloroethene µg/L
Number of Samples	10	21	10	10	10
Number of Detections	0	6	1	1	2
Maximum Detected Concentration	NA	**210**	**0.5**	**1.0**	**2.0**
Project-Specific Action Level [1]	NE	NE	2.5	110	0.28
USEPA MCL [2]			70	1,000	5
VISL (calculated) [3]	-	-	25	1,920	0.518

Notes:

Bold	Detected analyte
Value	Exceeds one or more screening criteria
J	Estimated concentration.
U	Not detected at reporting limit shown
NE	Not established

1. US EPA (Nov 2023) Regional Screening Levels (RSLs) for tapwater (HI=0.1, Risk=1E-06)
2. EPA, accessed on-line 2023 and in the RSL tables.
3. Calculated vapor intrusion screening levels (VISLs) (https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator) VISLs are calculated by the EPA VISL Calculator only when a chemical is of sufficient volatility and has inhalation toxicity data

Appendix C
Table 9
Control Site Groundwater Data Summary and COPC Selection

	Total Petroleum Hydrocarbons as Gasoline-Range Organics (GRO) µg/L	Total Petroleum Hydrocarbons as Diesel-Range Organics (DRO) µg/L	C5-C8 Aliphatic Hydrocarbons µg/L	C9-C12 Aliphatic Hydrocarbons µg/L	C9-C10 Aromatic Hydrocarbons µg/L	Extractable Petroleum Hydrocarbons (All Fractions) µg/L	C9-C18 Aliphatic Hydrocarbons µg/L	C11-C22 Aromatic Hydrocarbons µg/L	Acetone µg/L
Number of Samples	11	46	2	2	2	4	50	50	11
Number of Detections	0	8	0	2	2	0	8	7	3
Maximum Detected Concentration	ND	**260**	ND	**57 J**	**13 J**	ND	**202.8**	**57.2**	**20 J**
Project-Specific Action Level [2]	NE	NE	NE	NE	NE	NE	NE	NE	1,800
USEPA MCL [3]	NE	NE	NE	NE	NE	NE	NE	NE	NE
VISL (calculated) [4]	-	-	-	-	-	-	-	-	-

Appendix C
Table 9
Control Site Groundwater Data Summary and COPC Selection

	cis-1,2-Dichloro-ethene µg/L	1,1,1-Trichloro-ethane µg/L	Trichloro-ethene µg/L	Naphthalene (SVOC) µg/L	2-Methyl-naphthalene µg/L	Acenaphthene µg/L	Acenaphthylene µg/L	Anthracene µg/L	Benzo(a)-anthracene µg/L	Benzo(b)-fluoranthene µg/L
Number of Samples	11	11	11	2	2	2	2	2	2	2
Number of Detections	2	7	4	0	0	0	0	0	0	0
Maximum Detected Concentration	**1.6 J**	**2.9**	**1.6**	ND	ND	ND	ND	ND	ND	ND
Project-Specific Action Level [2]	2.5	800	0.28	0.12	3.6	53	NE	180	0.03	0.25
USEPA MCL [3]	70	200	5	NE	NE	NE	NE	NE	NE	NE
VISL (calculated) [4]	25	742	0.518	4.59	-	-	-	-	-	-

Appendix C
Table 9
Control Site Groundwater Data Summary and COPC Selection

	Benzo(k)-fluoranthene µg/L	Benzo(g,h,i)-perylene µg/L	Benzo(a) pyrene µg/L	Chrysene µg/L	Dibenzo(a,h)-anthracene µg/L	Fluoran-thene µg/L	Fluorene µg/L	Indeno (1,2,3-cd)-pyrene µg/L	Phenan-threne µg/L	Pyrene µg/L
Number of Samples	2	2	2	2	2	2	2	2	2	2
Number of Detections	0	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Project-Specific Action Level [2]	2.5	NE	0.025	25	0.025	80	29	0.25	NE	12
USEPA MCL [3]	NE	NE	0.2	NE	NE	NE	NE	NE	NE	NE
VISL (calculated) [4]	-	-	-	-	-	-	-	-	-	-

Appendix C
Table 9
Control Site Groundwater Data Summary and COPC Selection

Notes:

Bold	Detected analyte
Value	Exceeds screening level
BTIC	Below top of inner well casing
µg/L	Micrograms per liter.
U	Not detected at reporting limit shown
0.05 U	(italics) Not detected at reporting limit above one or more screening criteria
J	Estimated concentration
NA; "-"	Not analyzed or not applicable
n/a	Not available
ND	Not detected
NE	Not established
1.	TPH-DRO extrapolated to 78% C_9-C_{18} aliphatic hydrocarbons and 22% C_{11}-C_{22} aromatic hydrocarbons (MACTEC 2010).
2.	US EPA (Nov 2023) Regional Screening Levels (RSLs) for tapwater (HI=0.1, Risk=1E-06).
3.	EPA, accessed on-line 2023 and in the RSL tables.
4.	Calculated vapor intrusion screening levels (VISLs) (https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator) Calculator only when a chemical is of

Appendix C
TABLE 10
Summary of Exposure Factors
Former Nike Missile LO-13 Control and Launch Sites

PARAMETER	VALUE	REFERENCE
Soil exposure point concentration (C_{soil})	Constituent-specific	Soil exposure point concentration (EPC) for constituents of concern (COC) TCE was the maximum detected concentration.
Air exposure point concentration (C_{air})	Constituent-specific	Modeled from soil EPC using screening level fate and transport models.
Soil ingestion rate (IR)	200 milligrams (mg)/day (child resident) 100 mg/day (adult resident) 50 mg/day (commercial worker indoor) 330 mg/day (construction/utility worker) 100 mg/day (trespasser)	Values for residents and commercial workers from U.S. Environmental Protection Agency (EPA) (2014). Applied values for construction/utility workers from EPA (2002). Trespasser value based on adult resident (6+ years old).
Relative soil absorption factor, oral (RAFo)	Constituent-specific	Recommended value of 1 for TCE from EPA (2023).
Exposed skin surface area, soil exposure (SA)	2,373 square centimeters (cm^2) (child resident) 6,032 cm^2 (adult resident) 3,527 cm^2 (commercial worker indoor) 3,527 cm^2 (construction/utility worker) 4,639 cm^2 cm^2 (trespasser)	Values for residents and workers from EPA (2014). EPA provides no guidance for trespassers, so used values for 6-<16 year old. See age -adjusted SA for Mutagenic Mode of Action Chemicals below.
Soil-skin adherence factor (AF)	0.2 milligrams (mg)/cm^2 (child resident) 0.07 mg/cm^2 (adult resident) 0.12 mg/cm^2 (commercial worker) 0.3 mg/cm^2 (construction/utility worker) 0.12 mg/cm^2 (trespasser)	Applied values for residents and commercial workers recommended in EPA (2014). Applied value for construction/utility worker from EPA (2002). EPA provides no guidance for trespassers, so used same value as commercial worker.
Relative soil absorption factor, dermal (RAFd)	Constituent-specific	Recommended value for volatile compounds from EPA Region 3 for TCE of 0.05%.
Residential exposure time (ET)	24 hours/day	Recommended value (EPA 2014).
Residential drinking water consumption	0.78 liters/day (child) 2.5 liters/day (adult)	Recommended value (EPA 2014).
Residential water skin surface area	6,365 cm^2 (child) 19,652 cm^2 (adult)	
Residential exposure frequency (EF)	350 days/year	Recommended value (EPA 2014).
Residential exposure duration (ED)	6 years (child) 20 years (adult)	Recommended values (EPA 2014).
Residential averaging time (AT)	Non-carcinogens: 6 or 20 years Carcinogens: Lifetime 70 yrs	Recommended values (EPA 2014).
Commercial worker exposure time (ET)	8 hours/day	Recommended value (EPA 2014).
Commercial worker exposure frequency (EF)	225 days/year	Recommended worker exposure frequency value (EPA 2014).
Commercial worker exposure duration (ED)	25 years	Recommended value (EPA 2014).
Commercial worker averaging time (AT)	Non-carcinogens: 25 years Carcinogens: 70 years	Recommended values (EPA, 2014).
Construction/utility worker exposure time (ET)	8 hours/day	Corresponds to a typical workday duration (EPA 2014).
Construction/utility worker exposure frequency (EF)	225 days/year	Recommended worker exposure frequency value (EPA 2014).
Construction/utility worker exposure duration (ED)	1 year	No EPA-recommended value; site-specific value assumed.

Appendix C
TABLE 10 (continued)
Summary of Exposure Factors
Former Nike Missile LO-13 Control and Launch Sites

PARAMETER	VALUE	REFERENCE
Construction/utility worker averaging time (AT)	Non-carcinogens: 0.5 year Carcinogens: 70 years	Recommended values (EPA, 2014).
Trespasser exposure time (ET)	3 hours/day	No EPA recommended value for trespassers; value applied is for recreator from MaineDEP (2021).
Trespasser exposure frequency (EF)	52 days/year	No EPA recommended value for trespassers; value applied is from MaineDEP (2021).
Trespasser exposure duration (ED)	10 years	No EPA recommended value for trespassers; value applied is from MaineDEP (2021) for trespasser assumed to be older child ages 6-16.
Trespasser averaging time (AT)	Non-carcinogens: 10 years Carcinogens: 70 years	Recommended values (EPA, 2014).
Body weight (BW)	15 kg (child resident) 80 kg (adult resident) 80 kg (commercial worker) 80 kg (construction/utility worker) 44 kg (trespassers)	Values for residents and workers from EPA (2014). Trespasser value 6-<16 year old. See age -adjusted BW for Mutagenic Mode of Action Chemicals below.
Age -adjusted Exposure Factors for Mutagenic Mode of Action Chemicals		
Body weight (BW)	9 kg (0-<2 y/o) 17 kg (2-<6 y/o) 44 kg (6-<16 y/o)	Age-weighted values from EPA's Exposure Factors Handbook (EPA, 2011)
Soil ingestion rate (IR)	200 mg/day (0-<2 y/o) 200 mg/day (2-<6 y/o) 100 mg/day (6-<16 y/o)	Recommended values for child (0-<6 y/o) and adult (6+ y/o) residents (EPA, 2014)
Residential drinking water consumption	0.78 liters/day (0-<2 y/o) 0.78 liters/day (2-<6 y/o) 2.5 liters/day (6-<16 y/o)	Recommended values for child (0-<6 y/o) and adult (6+ y/o) residents (EPA, 2014)
Surface Area Exposed to Soil (SA)	1,954 cm^2 (0-<2 y/o) 2,591 cm^2 (2-<6 y/o) 4,639 cm^2 (6-<16 y/o)	Assumed to be exposed to soil on head, forearms, hands, lower legs and feet (EPA, 2014). Forearms assumed to represent 45% of arm and the lower legs assumed to represent 40% of legs (EPA, 2004, 2011). Surface area from EPA's Exposure Factos Handbook (EPA, 2011).
Surface Area Exposed to Tapwater	4,463 cm^2 (0-<2 y/o) 7,225 cm^2 (2-<6 y/o) 13,350 cm^2 (6-<16 y/o)	Surface area from EPA's Exposure Factos Handbook (EPA, 2011).
Exposure Duration (ED)	4 yr (0-<2 y/o) 4 yr (2-<6 y/o) 10 yr (6-<16 y/o) 10 yr (16-<26 y/o)	Recommended values (EPA, 2005)
Age-dependent adjustment factor for mutagens (ADAF)	10 (0-<2 y/o) 3 (2-<6 y/o) 3 (6-<16 y/o)	Recommended values (EPA, 2005)

References used:
EPA, 2023c. Regional Screening Level Table (Nov 2023).
EPA, 2014. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors (OSWER Directive 9200.1-120).
EPA, 2011. Exposure Factors Handbook: 2011 Edition (EPA/600/R-09/042F).
EPA, 2005. Supplemental Guidance for Assessing Susceptbility from Early-Life Exposures to Carcinogens. (EPA/630/R-03/003F).

Appendix C
TABLE 10 (continued)
Summary of Exposure Factors
Former Nike Missile LO-13 Control and Launch Sites

EPA, 2004. Risk Assessment Guidance for Superfund – Volume I: Human Health Evaluation Manual (Part E: Supplemental Guidance for Dermal Risk Assessment).
EPA, 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24 (December).
EPA Region 3 [https://www.epa.gov/risk/assessing-dermal-exposure-soil]
Maine DEP, 2021. Remedial Action Guidelines

Attachment A: Toxicity Profiles

Toxicological Profile for Petroleum Hydrocarbons

Petroleum is a mixture of hundreds of hydrocarbon compounds. Industry specifications for refined products, such as gasoline and diesel fuel, are based upon physical and performance-based criteria, not upon a specific chemical formulation. As such, the composition of petroleum products released to the environment are complex and variable, and are a function of: (1) the origin and chemistry of the parent crude oil, (2) refining and blending processes, and (3) the use of performance enhancing additives. Once released to the environment, the chemistry of a petroleum product is further altered by contaminant fate and transport processes, such as leaching, volatilization, and biodegradation (ATSDR, 1999).

Based upon the available information on petroleum hydrocarbon compounds, it is possible to make some broad observations and conclusions:

- Petroleum products are comprised mainly of aliphatic/alicyclic and aromatic hydrocarbon compounds;
- Aromatic hydrocarbons appear to be more toxic than aliphatic compounds; and
- The toxicity of aliphatic compounds appears to be related to their carbon number/molecular weights.

The Maine Department of Environmental Protection (Maine DEP) Remedial Action Guidelines (RAGs) for Sites Contaminated with Hazardous Substances (2023) list petroleum hydrocarbon standards for the State of Maine. The petroleum remediation program utilizes the RAGs to complete risk-based cleanup decisions at oil discharge sites in Maine. Petroleum sites must also follow the procedures in Attachment C to the RAGS document, the 2023 Remedial Action Guidelines Addendum for Petroleum Remediation.

The Maine DEP soil RAGs for the petroleum hydrocarbon fractions are derived with user-provided chemical information for the hydrocarbon fractions measured by the Extractable Petroleum Hydrocarbon (EPH) and Volatile Petroleum Hydrocarbon (VPH) test methods. The Maine agencies obtained these inputs from the 2003 Massachusetts Department of Environmental Protection (MassDEP) “Updated Petroleum Hydrocarbon Fraction Toxicity Values for the VPH/EPH/APH Methodology” and the 2002 MassDEP “Characterizing Risks Posed by Petroleum Contaminated Sites.

In the MassDEP approach, the non-cancer toxicity of petroleum-contaminated media is established by segregating the petroleum hydrocarbon compounds present in mixtures into broad chemical classes (alkane/cycloalkane, alkene and aromatics) and further into subgroups or fractions based upon their size (defined by number of carbons atoms in the compounds). For each subgroup of compounds, a "reference compound" was initially identified to represent the toxicity of all compounds in the range. It was usually chosen because its toxicity was relatively well characterized. For each reference compound, a USEPA published oral reference dose value (RfD) or inhalation reference concentration (RfC) was identified or, for those "reference compounds" without USEPA published values, an oral dose-response value was identified based on available toxicity information. These values are shown below:

Carbon Range	2002 MassDEP Recommended Values (RfD in mg/kg-day)	Critical Effect
Aliphatic		
C_5 - C_8	0.04	Neurotoxicity
C_9 - C_{12}	0.1	Hepatic and hematological
C_9 - C_{18}	0.1	Hepatic and hematological
C_{19} - C_{36}	2.0	Liver granuloma
Aromatic		
C_9 - C_{10}	0.03	Nephrotoxicity
C_{11} - C_{22}	0.03	Nephrotoxicity

Carbon Range	2002 MassDEP Recommended Values (RfC in mg/m^3)	Critical Effect
Aliphatic		
C_5 - C_8	0.2	Neurotoxicity
C_9 - C_{12}	0.2	Neurotoxicity
C_9 - C_{18}	0.2	Neurotoxicity
C_{19} - C_{36}	NA	NA
Aromatic		
C_9 - C_{10}	0.05	Body weight reduction, hepatic renal, and developmental effects
C_{11} - C_{22}	0.05	Body weight reduction, hepatic renal, and developmental effects

From: MassDEP (2002)

Petroleum Hydrocarbons Toxicity Profile References

Agency for Toxic Substances and Disease Registry (ATSDR), 1999. *Toxicological Profile for Total Petroleum Hydrocarbons (TPH)*. September 1999.

Massachusetts Department of Environmental Protection (MassDEP), 2002. *Characterizing Risks Posed by Petroleum Contaminated Sites: Implementation of the MADEP VPH/EPH Approach.* October 31, 2002, Policy #WSC-02-411. Final Policy.

MassDEP, 2003. *Updated Petroleum Hydrocarbon Fraction Toxicity Values for the VPH/EPH/APH Methodology*.

Maine Department of Environmental Protection (Maine DEP), 2023. *Remedial Action Guidelines (RAGs) for Sites Contaminated with Hazardous Substances*. November 15, 2023.

Toxicity Profile for Trichloroethene

Trichloroethene or trichloroethylene (TCE) is a nonflammable, colorless liquid with a somewhat sweet odor. Prior to its listing as a hazardous material, TCE was widely used as a solvent for degreasing, an intermediate compound for producing other chemicals, a refrigerant, and a general anesthetic. TCE is still used in consumer products including arts and crafts, office supplies, hunting or weapons cleaning solvents, and automotive supplies and for such uses as cleaners and penetrating fluids.

TCE can be absorbed through the lungs, mucous membranes, gastrointestinal tract, and the skin. TCE is extensively metabolized in humans to trichloroacetic acid and trichloroethanol, as well as to several minor metabolites, with most of the absorbed dose excreted in urine (ATSDR, 2019; USEPA, 1985). The systemic effects elicited by TCE are not specific to certain exposure routes and similar effects can be elicited via oral and inhalation exposure routes (ATSDR, 2019).

Available human and animal data indicate that the central nervous system is a target for TCE toxicity. Acute overexposure to TCE vapors results in effects that may include central nervous system depression, loss of consciousness, and even death (ATSDR, 2019). In humans, acute inhalation exposure to TCE causes central nervous system symptoms such as headache, dizziness, nausea, and unconsciousness (USEPA, 1985). Among the reported effects from occupational exposure studies are fatigue, light-headedness, sleepiness, vision distortion, abnormal reflexes, tremors, ataxia, nystagmus, increased respiration, as well as neurobehavioral or psychological changes.

Human and animal data indicate that exposure to TCE can result in toxic effects on a number of organs and systems; the kidney, liver, immune system, male reproductive system, and developing fetus have been identified as potential targets of TCE toxicity. Results from available animal studies suggest that the immune system and developing fetus may represent particularly sensitive targets of TCE toxicity. TCE has been shown to cause dermal and ocular irritation and depressed body weight gain (ATSDR, 2019).

Increased incidences of tumors in the kidney, liver, and lymphoid tissues have been reported in chronic bioassays of rats and mice exposed to high levels of TCE via inhalation and oral exposure routes. Available human data provide strong support for TCE-induced kidney cancer and somewhat lesser support for TCE-induced liver cancer and malignant lymphoma (ATSDR, 2019). USEPA's IRIS characterizes TCE's Weight of Evidence for Cancer as "carcinogenic to humans" by all routes of exposure, and bases its cancer toxicity factors on renal cell carcinoma, non-Hodgkin's lymphoma, and liver tumors (Charbotel et al., 2006; EPA, 2011; and Raaschou-Nielsen et al., 2003) (see USEPA, 2011 for more information). In addition, USEPA has concluded that TCE is carcinogenic by a mutagenic mode of action. Application of age-dependent adjustment factors (ADAFs) to the oral slope factor is recommended in combination with appropriate exposure data when assessing risk associated with early-life exposure.

A USEPA 2020 re-examination of the evidence of fetal cardiac malformations from short-duration exposure duration as reported in a study by Johnson et al. (2003) supported the revision of the USEPA toxicity values published in the USEPA's online IRIS database. Johnson et al. reported a statistically and biologically significant increase in the formation of heart defects at the 0.048 mg/kg-bw/day and at higher dose levels, measured on both an individual fetus basis and a litter basis. Benchmark dose levels were identified by USEPA for the inhalation and oral exposure routes for heart malformations (USEPA, 2014). USEPA quantified the totality of cardiac defects instead of any particular defect, as cardiac teratogens can result in a diverse constellation of effects

For TCE non-cancer effects, USEPA IRIS uses as an oral reference dose (RfD) the midpoint among three similar candidate RfDs—0.00048 mg/kg-day for decreased thymus weight in mice (Keil et al., 2009), 0.00037 mg/kg-day for developmental immunotoxicity (decreased PFC and increased delayed-type hypersensitivity) in mice (Peden-Adams et al., 2006), and 0.00051 mg/kg-day for fetal heart malformations

in rats (Johnson et al., 2003). See Section I.A.1 of the *IRIS Summary for Trichloroethylene* (USEPA, 2011) for more information.

TCE Toxicity Profile References

Agency for Toxic Substances and Disease Registry (ATSDR), 2019. *Toxicological Profile for Trichloroethylene*, June 2019.

Charbotel, B et al., 2006. Case-control study on renal cell cancer and occupational exposure to trichloroethylene. Part II: Epidemiological aspects. *Journal Annals of Occupational Hygiene* Vol. 50; Issue 8; pgs. 777-787.

Johnson, PD et al., 2003. Threshold of trichloroethylene contamination in maternal drinking waters affecting fetal heart development in the rat. *Environmental Health Perspectives* Vol. 1; Issue 3; pgs. 289-292.

Keil, DE et al., 2009. Assessment of trichloroethylene (TCE) exposure in murine strains genetically-prone and non-prone to develop autoimmune disease. *Journal of Environmental Science and Health, Part A: Toxic/Hazardous Substances & Environmental Engineering*, Vol. 44; Issue 5; pgs. 443-453.

Peden-Adams, MM et al., 2006. Developmental immunotoxicity of trichloroethylene (TCE): Studies in B6C3F1 mice. *Journal of Environmental Science and Health, Part A: Toxic/Hazardous Substances & Environmental Engineering* Vol. 41; Issue 3; pgs. 249-271.

Raaschou-Nielsen, O et al., 2003. Cancer risk among workers at Danish companies using trichloroethylene: A cohort study. *American Journal of Epidemiology* Vol. 158; Issue 12; pgs. 1182-1192.

United States Environmental Protection Agency (USEPA), 1985. *Health Assessment Document for Trichloroethylene Final Report*.

USEPA, 2011. *Toxicological review of trichloroethylene (CAS No. 79-01-6) in support of summary Information on the Integrated Risk Information System (IRIS)*.

USEPA, 2014. *TSCA work plan chemical risk assessment - Trichloroethylene: Degreasing, spot cleaning and arts & crafts uses*. EPA Doc# 740-R1-4002.

USEPA, 2020. *Risk Evaluation for Trichloroethylene*. EPA Document #740R18008, November 2020.

USEPA, 2023. IRIS accessed on-line December 2023. *Trichloroethylene Summary Page*. https://iris.epa.gov/ChemicalLanding/&substance_nmbr=199

ATTACHMENT B
HHRA and SLERA TABLES

Attachment B-1

Risk Assessment Calculations
Residents
Former Nike Missile LO-13 Launch Site

Resident Scenario - Launch Site Groundwater
Summary of Estimated Risks

Exposure Pathway	Non-Carcinogenic Hazard Index		Incremental Cancer
	Child	Adult	Sum of child + adult =
Groundwater Ingestion	0.2	0.1	2E-06
Groundwater Dermal Contact during Showering	0.03	0.02	3E-07
Groundwater Inhalation of Volatiles for Residential Water Use	0.5	0.5	2E-06
Indoor Inhalation - Vapor Intrusion through Basement - Groundwater[1]	0.4	0.4	2E-06
Total (All Pathways)	**1**	**1**	**6.E-06**
Maximum Acceptable Level	**1**		**1.E-04**

1. HIs and cancer risks estimated using air concentrations estimated using the VISL on-line calculator.

Attachment B-1

Risk Assessment Calculations
Residents
Former Nike Missile LO-13 Launch Site

Resident - Launch Site
Groundwater Ingestion

ADD = **[C_{water} x IR x EF x ED x CF] / [BW x AT x 365 days/year]**

ADD = Average daily dose (mg/kg-day)
C_{water} = Constituent concentration in water (µg/L)
IR = Soil ingestion rate (mg/day)
EF = Exposure frequency (day/yr)
ED = Exposure duration (yr)
CF = Unit conversion factor (mg/µg)
BW = Body weight (kg)
AT = Averaging time (yr) * 365 days/year

HQ = ADD (nc)/RfD

HQ = Hazard Quotient (unitless)
RfD = Reference Dose (mg/kg-dy)
HI = Sum [HQ]

Cancer Risk = ADD (ca) * OSF * ADAF (mutagens only)

OSF = Oral slope factor $(mg/kg\text{-}day)^{-1}$
ADAF = Age-dependent adjustment factor for mutagens (unitless)

Child

Age (yr)	Constituent	C_{water} (µg/L)	IR (L/day)	EF (day/yr)	ED (yr)	CF (mg/µg)	BW (kg)	AT (nc) (yr)	AT (c) (yr)	ADD (nc) (mg/kg-day)	RfD (mg/kg-day)	HQ (unitless)	ADD (ca) (mg/kg-day)	OSF $[(mg/kg\text{-}day)^{-1}]$	Cancer Endpoint	ADAF (unitless)	Risk (unitless)
0-<2	TCE	2	0.78	350	2	0.001	9.0	2	70				4.8E-06	9.3E-03	Kidney	10	4.4E-07
2-<6	TCE	2	0.78	350	4	0.001	17	4	70				4.9E-06	9.3E-03	Kidney	3	1.4E-07
														Total Mutagenic Risk - child (Kidney) =			**6E-07**
0-<6	TCE	2	0.78	350	6	0.001	15	6	70	9.97E-05	5.0E-04	0.20	8.5E-06	3.7E-02	Liver, NHL	--	3.2E-07
											HI - child =	**0.2**		**Total Carcinogenic Risk - child (Liver and NHL) =**			**3E-07**
Adult																	
6-<16	TCE	2	2.5	350	10	0.001	44	10	70				1.5E-05	9.3E-03	Kidney	3	4.3E-07
16-<26	TCE	2	2.5	350	10	0.001	80	10	70				8.6E-06	9.3E-03	Kidney	1	8.0E-08
														Total Mutagenic Risk - adult (Kidney) =			**5E-07**
6-<26	TCE	2	2.5	350	20	0.001	80	20	70	5.99E-05	5.0E-04	0.12	1.7E-05	3.7E-02	Liver, NHL	--	6.3E-07
											HI - adult =	**0.1**		**Total Carcinogenic Risk - adult (Liver and NHL) =**			**6E-07**
														Total Cancer Risk - child + adult (all cancers) =			**2E-06**

Attachment B-1

Risk Assessment Calculations
Residents
Former Nike Missile LO-13 Launch Site

Resident - Launch Site
Groundwater Dermal Contact

ADDabs = [DAevent * SA * EV * EF * ED] / [BW * AT]

ADDabs = Average daily dose, absorbed (mg/kg-day)
DAevent = Absorbed dose (mg/cm^2-event)
SA = Exposed skin surface area (cm^2)
EV = Event Frequency (events/day)
EF = Exposure frequency (day/yr)
ED = Exposure duration (yr)

BW = Body weight (kg)
AT = Averaging time (yr) * 365 day/year

HQ = ADD (nc)/RfD
HI = Sum [HQ]
RfD = Reference Dose (mg/kg-day)

Cancer Risk = ADD (ca) * OSF * ADAF (mutagens only)
OSF = Oral slope factor $(mg/kg\text{-}day)^{-1}$
ADAF = Age-dependent adjustment factor for mutagens (unitless)

Child

Age (yr)	Constituent	C_{water} (µg/L)	C_{water} (mg/cm^3)	DAevent (mg/cm^2-event)	SA (cm^2)	EV (events/day)	EF (days/year)	ED (yr)	BW (kg)	AT (nc) (yr)	AT (c) (yr)	ADD (nc) (mg/kg-day)	RfD (mg/kg-day)	HQ (unitless)	ADD (ca) (mg/kg-day)	OSF $[(mg/kg\text{-}day)^{-1}]$	Cancer Endpoint	ADAF (unitless)	Risk (unitless)
0-<2	TCE	2	2.0E-06	3.71E-08	4,463	1	365	2	9.0	2	70				5.3E-07	9.3E-03	Kidney	10	4.9E-08
2-<6	TCE	2	2.0E-06	3.71E-08	7,225	1	365	4	17	4	70				8.8E-07	9.3E-03	Kidney	3	2.5E-08
																	Total Mutagenic Risk - child (Kidney) =		**7E-08**
0-<6	TCE	2	2.0E-06	3.71E-08	6,365	1	365	6	15	6	70	1.58E-05	5.0E-04	0.032	1.4E-06	3.7E-02	Liver, NHL	--	5.0E-08
													HI - child =	**0.03**			**Total Carcinogenic Risk - child (Liver and NHL) =**		**5E-08**
Adult																			
6-<16	TCE	2	2.0E-06	4.26E-08	13,350	1	365	10	44	10	70				1.8E-06	9.3E-03	Kidney	3	5.1E-08
16-<26	TCE	2	2.0E-06	4.26E-08	19,652	1	365	10	80	10	70				1.5E-06	9.3E-03	Kidney	1	1.4E-08
																	Total Mutagenic Risk - adult (Kidney) =		**6E-08**
6-<26	TCE	2	2.0E-06	4.26E-08	19,652	1	365	20	80	20	70	1.05E-05	5.0E-04	0.021	3.0E-06	3.7E-02	Liver, NHL	--	1.1E-07
													HI - adult =	**0.02**			**Total Carcinogenic Risk - adult (Liver and NHL) =**		**1E-07**
																	Total Cancer Risk - child + adult (all cancers) =		**3E-07**

DAevent: U.S. EPA (2004) provides alternate forms of this equation for estimating dermal exposure to organics in water, along with default values for the equations below for organic chemicals.
For organics:

If t_{event} < or = t*, then t_{event} = 0.54 or 0.71 hours which is less than t* for TCE of 1.39 hours

$DA_{event} = 2(FA)(Kp)(Cw)(6 \times \tau_{event} \times t_{event} \times 1/\pi)^{1/2}$

If t_{event} > t*, then

$Devent = (FA)(Kp)(CF)(Cw)[t_{event}/(1+B)+2\tau_{event}((1+3B+B^2/(1+B)^2)]$

Where:

CW	site-specific TCE concentration in water	mg/cm3	0.000002			
t_{event}	Exposure time-child	hours/event	0.54	EPA, 2014		
	Exposure time-adult	hours/event	0.71	EPA, 2014		
τ event	lag time per event	event/hour	chem specific	EPA, 2004	0.58	for TCE
FA	Fraction absorbed	unitless	chem specific	EPA, 2004	1	for TCE
Kp	Permeability Coefficient	cm/hr	chem specific	EPA, 2004	1.20E-02	for TCE
B	Dimensionless constant	unitless	calculated	EPA, 2004	0.1	for TCE
t*	Time to reach steady-state	hrs	calculated	EPA, 2004	1.39	for TCE

Attachment B-1

Risk Assessment Calculations
Residents
Former Nike Missile LO-13 Launch Site

Resident - Launch Site

Groundwater Inhalation of Volatiles from Residential Use of Water

ADE = **[C_{air} x ED x EF x ET x CF(non-cancer only)] / [AT x 365 days/year x 24 hr/day]**

HQ = ADE(nc)/RfC

HQ = Hazard Quotient (unitless)
RfC = Reference Concentration (mg/m^3)
HI = Sum [HQ]

ADE = Average daily exposure (mg/m^3)
C_{air} = Constituent concentration in air (mg/m^3)
$C_{air} = C_{water} * K$
K = Andelman's Coefficient 0.5 L/m^3
ED = Exposure duration (yr)
EF = Exposure frequency (day/yr)
ET = Exposure time (hrs/day)
CF = Unit conversion factor (mg/µg) - needed for non-cancer only
BW = Body weight (kg)
AT = Averaging time (yr) * 365 days/year

Cancer Risk = ADE(ca) * IUR * ADAF (mutagens only)
IUR = Inhalation Unit Risk [1/($\mu g/m^3$)]
ADAF = Age-dependent adjustment factor for mutagens (unitless)

Child

Age (yr)	Constituent	C_{water} (µg/L)	C_{air}[1] ($\mu g/m^3$)	EF (day/yr)	ED (yr)	ET (hours/day)	CF (mg/µg)	AT (nc) (yr)	AT (c) (yr)	ADE (nc) (mg/m^3)	RfC (mg/m^3)	HQ (unitless)	ADE (ca) ($\mu g/m^3$)	(IUR) [1/($\mu g/m^3$)]	Cancer Endpoint	ADAF (unitless)	Risk (unitless)
0-<2	TCE	2	1.00	350	2	24	0.001	2	70				2.7E-02	1.0E-06	Kidney	10	2.7E-07
2-<6	TCE	2	1.00	350	4	24	0.001	4	70				5.5E-02	1.0E-06	Kidney	3	1.6E-07
													Total Mutagenic Risk - child (Kidney) =				**4E-07**
0-<6	TCE	2	1.00	350	6	24	0.001	6	70	9.59E-04	2.0E-03	0.48	8.2E-02	3.1E-06	Liver, NHL	--	2.5E-07
											HI - child =	**0.5**	**Total Carcinogenic Risk - child (Liver and NHL) =**				**2.5E-07**
Adult																	
6-<16	TCE	2	1.00	350	10	24	0.001	10	70				1.4E-01	1.0E-06	Kidney	3	4.1E-07
16-<26	TCE	2	1.00	350	10	24	0.001	10	70				1.4E-01	1.0E-06	Kidney	1	1.4E-07
													Total Mutagenic Risk - adult (Kidney) =				**5E-07**
6-<26	TCE	2	1.00	350	20	24	0.001	20	70	9.59E-04	2.0E-03	0.48	2.7E-01	3.1E-06	Liver, NHL	--	8.5E-07
											HI - adult =	**0.5**	**Total Carcinogenic Risk - adult (Liver and NHL) =**				**8.5E-07**
													Total Cancer Risk - child + adult (all cancers) =				**2E-06**

1. Using default volatilization factor (K) of 0.5 L/m^3 (0.0005 x 1,000 L/m^3)

Resident - Launch Site

Groundwater Inhalation from Vapor Instrusion

ADE = **[C_{air} x ED x EF x ET x CF(cancer only)] / [AT x 365 days/year x 24 hr/day]**

ADE = Average daily exposure (mg/m^3)
C_{air} = Constituent concentration in air (mg/m^3)
ED = Exposure duration (yr)
EF = Exposure frequency (day/yr)
ET = Exposure time (hrs/day)
CF = Unit conversion factor (µg/mg) - cancer only
BW = Body weight (kg)
AT = Averaging time (yr) * 365 days/year

HQ = ADE(nc)/RfC

HQ = Hazard Quotient (unitless)
RfC = Reference Concentration (mg/m^3)
HI = Sum [HQ]

Cancer Risk = ADE(ca) * IUR * ADAF (mutagens only)

IUR = Inhalation Unit Risk [1/(µg/m^3)]
ADAF = Age-dependent adjustment factor for mutagens (unitless)

Child

Age (yr)	Constituent	C_{water} (µg/L)	C_{air} (mg/m^3)	EF (day/yr)	ED (yr)	ET (hours/day)	CF (µg/mg)	AT (nc) (yr)	AT (c) (yr)	ADE (nc) (mg/m^3)	RfC (mg/m^3)	HQ (unitless)	ADE (ca) ($µg/m^3$)	(IUR) [1/(µg/m^3)]	Cancer Endpoint	ADAF (unitless)	Risk (unitless)
0-<2	TCE	2	0.00081	350	2	24	1,000	2	70				2.2E-02	1.0E-06	Kidney	10	2.2E-07
2-<6	TCE	2	0.00081	350	4	24	1,000	4	70				4.4E-02	1.0E-06	Kidney	3	1.3E-07
															Total Mutagenic Risk - child (Kidney) =		**4E-07**
0-<6	TCE	2	0.00081	350	6	24	1,000	6	70	7.72E-04	2.0E-03	0.39	6.6E-02	3.1E-06	Liver, NHL	--	2.1E-07
											HI - child =	**0.4**			**tal Carcinogenic Risk - child (Liver and NHL) =**		**2.1E-07**
Adult																	
6-<16	TCE	2	0.00081	350	10	24	1,000	10	70				1.1E-01	1.0E-06	Kidney	3	3.3E-07
16-<26	TCE	2	0.00081	350	10	24	1,000	10	70				1.1E-01	1.0E-06	Kidney	1	1.1E-07
															Total Mutagenic Risk - adult (Kidney) =		**4E-07**
6-<26	TCE	2	0.00081	350	20	24	1,000	20	70	7.72E-04	2.0E-03	0.39	2.2E-01	3.1E-06	Liver, NHL	--	6.8E-07
											HI - adult =	**0.4**			**al Carcinogenic Risk - adult (Liver and NHL) =**		**6.8E-07**
															Total Cancer Risk - child + adult (all cancers) =		**2E-06**

Attachment B-2

Risk Assessment Calculations
Residents
Former Nike Missile LO-13 Control Site Subarea 1

Resident Scenario - Control Site Subarea 1 Soil and Groundwater

Summary of Estimated Risks

Exposure Pathway	Non-Carcinogenic Hazard Index		Incremental Cancer Risk
	Child	Adult	Sum of child + adult =
Soil Incidental Ingestion	0.01	0.001	7E-08
Soil Dermal Contact	0.002	0.0003	1E-08
Inhalation of Entrained Soil Particles Outdoors	0.00000005	0.00000005	2E-13
Groundwater Ingestion	0.3	0.1	2E-06
Groundwater Dermal Contact during bathing	0.03	0.02	2E-07
Groundwater Inhalation of Volatiles for Residential Water Use	0.4	0.4	2E-06
Indoor Inhalation - Vapor Intrusion through Basement - Groundwater[1]	0.3	0.3	1E-06
Total (All Pathways)	**1**	**0.8**	**5E-06**
Maximum Acceptable Level	**1**		**1.E-04**

1. HIs and cancer risks estimated using air concentrations estimated using the VISL on-line calculator.

Attachment B-2

Risk Assessment Calculations
Residents
Former Nike Missile LO-13 Control Site Subarea 1

Resident - Control Site Subarea 1
Soil Ingestion

ADD = **[C_{soil} x IR x RAFo x EF x ED x CF] / [BW x AT x 365 days/year]**

ADD = Average daily dose (mg/kg-day)
C_{soil} = Constituent concentration in soil (mg/kg)
IR = Soil ingestion rate (mg/day)
RAFo = Oral relative absorption factor (unitless)
EF = Exposure frequency (day/yr)
ED = Exposure duration (yr)
CF = Unit conversion factor (kg/mg)
BW = Body weight (kg)
AT = Averaging time (yr) * 365 days/year

HQ = ADD (nc)/RfD
HQ = Hazard Quotient (unitless)
RfD = Reference Dose (mg/kg-dy)
HI = Sum [HQ]

Cancer Risk = ADD (ca) * OSF * ADAF (mutagens only)
OSF = Oral slope factor $(mg/kg\text{-}day)^{-1}$
ADAF = Age-dependent adjustment factor for mutagens (unitless)

Child

Age (yr)	Constituent	C_{soil} (mg/kg)	IR (mg/day)	RAFo (unitless)	EF (day/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT (nc) (yr)	AT (c) (yr)	ADD (nc) (mg/kg-day)	RfD (mg/kg-day)	HQ (unitless)	ADD (ca) (mg/kg-day)	OSF $[(mg/kg\text{-}day)^{-1}]$	Cancer Endpoint	ADAF (unitless)	Risk (unitless)
0-<2	TCE	0.505	200	1	350	2	0.000001	9.0	2	70				3.1E-07	9.3E-03	Kidney	10	2.9E-08
2-<6	TCE	0.505	200	1	350	4	0.000001	17	4	70				3.2E-07	9.3E-03	Kidney	3	8.9E-09
														Total Mutagenic Risk - child (Kidney) =				**4E-08**
0-<6	TCE	0.505	200	1	350	6	0.000001	15	6	70	6.46E-06	5.0E-04	0.013	5.5E-07	3.7E-02	Liver, NHL	--	2.0E-08
												HI - child =	**0.01**	**Total Carcinogenic Risk - child (Liver and NHL) =**				**2E-08**
Adult																		
6-<16	TCE	0.505	100	1	350	10	0.000001	44	10	70				1.6E-07	9.3E-03	Kidney	3	4.4E-09
16-<26	TCE	0.505	100	1	350	10	0.000001	76	10	70				9.1E-08	9.3E-03	Kidney	1	8.5E-10
														Total Mutagenic Risk - adult (Kidney) =				**5E-09**
6-<26	TCE	0.505	100	1	350	20	0.000001	80	20	70	6.05E-07	5.0E-04	0.0012	1.7E-07	3.7E-02	Liver, NHL	--	6.4E-09
												HI - adult =	**0.001**	**Total Carcinogenic Risk - adult (Liver and NHL) =**				**6E-09**
														Total Cancer Risk - child + adult (all cancers) =				**7E-08**

Attachment B-2

Risk Assessment Calculations
Residents
Former Nike Missile LO-13 Control Site Subarea 1

Resident - Control Site Subarea 1
Soil Dermal Contact

ADD = **[C_{soil} * SA * AF * RAFd * EF * ED * CF] / [BW * AT]**

ADD = Average daily dose (mg/kg-day)
C_{soil} = Constituent concentration in soil (mg/kg)
SA = Exposed skin surface area (cm^2/day)
AF = Soil adherence factor (mg/cm^2)
RAFd = Dermal Relative Absorption Factor (unitless)
EF = Exposure frequency (day/yr)
ED = Exposure duration (yr)
CF = Unit conversion factor (kg/mg)
BW = Body weight (kg)
AT = Averaging time (yr) * 365 day/year

HQ = ADD (nc)/RfD
HQ = Hazard Quotient (unitless)
RfD = Reference Dose (mg/kg-dy)
HI = Sum [HQ]

Cancer Risk = ADD (ca) * OSF * ADAF (mutagens only)
OSF = Oral slope factor $(mg/kg\text{-}day)^{-1}$
ADAF = Age-dependent adjustment factor for mutagens (unitless)

Child

Age (yr)	Constituent	C_{soil} (mg/kg)	SA (cm^2/day)	AF (mg/cm^2)	RAFd (unitless)	EF (day/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT (nc) (yr)	AT (c) (yr)	ADD (nc) (mg/kg-day)	RfD (mg/kg-day)	HQ (unitless)	ADD (ca) (mg/kg-day)	OSF $[(mg/kg\text{-}day)^{-1}]$	Cancer Endpoint	ADAF (unitless)	Risk (unitless)
0-<2	TCE	0.505	1,954	0.2	0.05	350	2	0.000001	9.0	2	70				3.01E-08	9.3E-03	Kidney	10	2.8E-09
2-<6	TCE	0.505	7,225	0.2	0.05	350	4	0.000001	17	4	70				1.15E-07	9.3E-03	Kidney	3	3.2E-09
																	Total Mutagenic Risk - child (Kidney) =		**6E-09**
0-<6	TCE	0.505	2,373	0.2	0.05	350	6	0.000001	15	6	70	7.66E-07	5.0E-04	0.0015	6.57E-08	3.7E-02	Liver, NHL	--	2.4E-09
													HI - child =	**0.002**			**Total Carcinogenic Risk - child (Liver and NHL) =**		**2E-09**
Adult																			
6-<16	TCE	0.505	4,639	0.07	0.05	350	10	0.000001	44	10	70				2.54E-08	9.3E-03	Kidney	3	7.1E-10
16-<26	TCE	0.505	6,709	0.07	0.05	350	10	0.000001	76	10	70				2.14E-08	9.3E-03	Kidney	1	2.0E-10
																	Total Mutagenic Risk - adult (Kidney) =		**9E-10**
6-<26	TCE	0.505	6,032	0.07	0.05	350	20	0.000001	80	20	70	1.28E-07	5.0E-04	0.00026	3.65E-08	3.7E-02	Liver, NHL	--	1.4E-09
													HI - adult =	**0.0003**			**Total Carcinogenic Risk - adult (Liver and NHL) =**		**1E-09**
																	Total Cancer Risk - child + adult (all cancers) =		**1E-08**

Risk Assessment Calculations
Residents
Former Nike Missile LO-13 Control Site Subarea 1

Resident - Control Site Subarea 1
Inhalation of Entrained Soil Particles

$$\textbf{ADE} = \frac{\textbf{C}_{soil} \textbf{ x (1/PEF) x ET x EF x ED}}{\textbf{AT x CF}}$$

ADE = Average daily exposure (mg/m^3)
C_{soil} = Constituent concentration in soil (mg/kg)
PEF = Particulate emission factor (m^3/kg)
ET = Exposure time (hr/dy)
EF = Exposure frequency (day/yr)
ED = Exposure duration (yr)
CF = Unit conversion factor (hr/yr)
AT = Averaging time (yr)

HQ = ADE(nc)/RfC
HQ = Hazard Quotient (unitless)
RfC = Reference Concentration (mg/kg-day)
HI = Sum [HQ]

Cancer Risk = ADE(ca) * IUR * ADAF (mutagens only)
IUR = Inhalation Unit Risk [1/(µg/m^3)]
ADAF = Age-dependent adjustment factor for mutagens (unitless)

Child

Age (yr)	Constituent	C_{soil} (mg/kg)	1/PEF 1/(m^3/kg)	ET (hr/day)	EF (day/yr)	ED (yr)	CF (hr/yr)	AT (nc) (yr)	AT (c) (yr)	ADE (nc) (mg/m^3)	RfC (mg/m^3)	HQ (unitless)	ADE (ca) (mg/m^3)	(IUR) [1/(µg/m^3)]	CF (µg/mg)	Cancer Endpoint	ADAF (unitless)	Risk (unitless)
0-<2	TCE	0.505	1.92E-10	24	350	2	8,760	2	70				2.7E-12	1.0E-06	1,000	Kidney	10	2.7E-14
2-<6	TCE	0.505	1.92E-10	24	350	4	8,760	4	70				5.3E-12	1.0E-06	1,000	Kidney	3	1.6E-14
																Total Mutagenic Risk - child (Kidney) =		**4.3E-14**
0-<6	TCE	0.505	1.92E-10	24	350	6	8,760	6	70	9.3E-11	2.0E-03	4.7E-08	8.0E-12	3.1E-06	1,000	Liver, NHL	--	2.5E-14
											HI - child =	**0.00000005**				**Total Carcinogenic Risk - child (Liver and NHL) =**		**2.5E-14**
Adult																		
6-<16	TCE	0.505	1.92E-10	24	350	10	8,760	10	70				1.3E-11	1.0E-06	1,000	Kidney	3	4.0E-14
16-<26	TCE	0.505	1.92E-10	24	350	10	8,760	10	70				1.3E-11	1.0E-06	1,000	Kidney	1	1.3E-14
																Total Mutagenic Risk - adult (Kidney) =		**4E-14**
6-<26	TCE	0.505	1.92E-10	24	350	20	8,760	20	70	9.3E-11	2.0E-03	4.7E-08	2.7E-11	3.1E-06	1,000	Liver, NHL	--	8.2E-14
											HI - adult =	**0.00000005**				**Total Carcinogenic Risk - adult (Liver and NHL) =**		**8.2E-14**
																Total Cancer Risk - child + adult (all cancers) =		**2E-13**

EPA default	7.35E-10
Site specific (17 acres, Portland, ME)	1.92E-10

Attachment B-2

Risk Assessment Calculations
Residents
Former Nike Missile LO-13 Control Site Subarea 1

Resident - Control Site Subarea 1
Groundwater Ingestion

ADD = **[C_{water} x IR x EF x ED x CF] / [BW x AT x 365 days/year]**

ADD = Average daily dose (mg/kg-day)
C_{water} = Constituent concentration in water (µg/L)
IR = Soil ingestion rate (mg/day)
EF = Exposure frequency (day/yr)
ED = Exposure duration (yr)
CF = Unit conversion factor (mg/µg)
BW = Body weight (kg)
AT = Averaging time (yr) * 365 days/year

HQ = ADD (nc)/RfD

HQ = Hazard Quotient (unitless)
RfD = Reference Dose (mg/kg-dy)
HI = Sum [HQ]

Cancer Risk = ADD (ca) * OSF * ADAF (mutagens only)

OSF = Oral slope factor $(mg/kg\text{-}day)^{-1}$
ADAF = Age-dependent adjustment factor for mutagens (unitless)

Child

Age (yr)	Constituent	C_{water} (µg/L)	IR (L/day)	EF (day/yr)	ED (yr)	CF (mg/µg)	BW (kg)	AT (nc) (yr)	AT (c) (yr)	ADD (nc) (mg/kg-day)	RfD (mg/kg-day)	HQ (unitless)	ADD (ca) (mg/kg-day)	OSF $[(mg/kg\text{-}day)^{-1}]$	Cancer Endpoint	ADAF (unitless)	Risk (unitless)
0-<2	TCE	1.6	0.78	350	2	0.001	9.0	2	70	1.33E-04	5.0E-04	0.27	3.8E-06	9.3E-03	Kidney	10	3.5E-07
2-<6	TCE	1.6	0.78	350	4	0.001	17	4	70	6.88E-05	5.0E-04	0.14	3.9E-06	9.3E-03	Kidney	3	1.1E-07
																Total Mutagenic Risk - child (Kidney) =	**5E-07**
0-<6	TCE	1.6	0.78	350	6	0.001	15	6	70	7.98E-05	5.0E-04	0.16	6.8E-06	3.7E-02	Liver, NHL	--	2.5E-07
											HI - child =	**0.3**				**Total Carcinogenic Risk - child (Liver and NHL) =**	**3E-07**
Adult																	
6-<16	TCE	1.6	2.5	350	10	0.001	44	10	70	8.66E-05	5.0E-04	0.17	1.2E-05	9.3E-03	Kidney	3	3.4E-07
16-<26	TCE	1.6	2.5	350	10	0.001	76	10	70	5.06E-05	5.0E-04	0.10	7.2E-06	9.3E-03	Kidney	1	6.7E-08
																Total Mutagenic Risk - adult (Kidney) =	**4E-07**
6-<26	TCE	1.6	2.5	350	20	0.001	80	20	70	4.79E-05	5.0E-04	0.10	1.4E-05	3.7E-02	Liver, NHL	--	5.1E-07
											HI - adult =	**0.1**				**Total Carcinogenic Risk - adult (Liver and NHL) =**	**5E-07**
																Total Cancer Risk - child + adult (all cancers) =	**2E-06**

Risk Assessment Calculations
Residents
Former Nike Missile LO-13 Control Site Subarea 1

Resident - Control Site Subarea 1
Groundwater Dermal Contact

ADDabs = [DAevent * SA * EV * EF * ED] / [BW * AT]

ADDabs = Average daily dose, absorbed (mg/kg-day)
DAevent = Absorbed dose (mg/cm^2-event)
SA = Exposed skin surface area (cm^2)
EV = Event Frequency (events/day)
EF = Exposure frequency (day/yr)
ED = Exposure duration (yr)

BW = Body weight (kg)
AT = Averaging time (yr) * 365 day/year

HQ = ADD (nc)/RfD
HQ = Hazard Quotient (unitless)
RfD = Reference Dose (mg/kg-dy)
HI = Sum [HQ]

Cancer Risk = ADD (ca) * OSF * ADAF (mutagens only)
OSF = Oral slope factor $(mg/kg\text{-}day)^{-1}$
ADAF = Age-dependent adjustment factor for mutagens (unitless)

Child

Age (yr)	Constituent	C_{water} (µg/L)	C_{water} (mg/cm^3)	DAevent (mg/cm^2-event)	SA (cm^2)	EV (events/day)	EF (days/year)	ED (yr)	BW (kg)	AT (nc) (yr)	AT (c) (yr)	ADD (nc) (mg/kg-day)	RfD (mg/kg-day)	HQ (unitless)	ADD (ca) (mg/kg-day)	OSF $[(mg/kg\text{-}day)^{-1}]$	Cancer Endpoint	ADAF (unitless)	Risk (unitless)
0-<2	TCE	1.6	1.6E-06	2.97E-08	4,463	1	365	2	9.0	2	70				4.2E-07	9.3E-03	Kidney	10	3.9E-08
2-<6	TCE	1.6	1.6E-06	2.97E-08	7,225	1	365	4	17	4	70				7.0E-07	9.3E-03	Kidney	3	2.0E-08
																Total Mutagenic Risk - child (Kidney) =			**6E-08**
0-<6	TCE	1.6	1.6E-06	2.97E-08	6,365	1	365	6	15	6	70	1.26E-05	5.0E-04	0.025	1.1E-06	3.7E-02	Liver, NHL	--	4.0E-08
													HI - child =	**0.03**		**Total Carcinogenic Risk - child (Liver and NHL) =**			**4E-08**
Adult																			
6-<16	TCE	1.6	1.60E-06	3.41E-08	13,350	1	365	10	44	10	70				1.5E-06	9.3E-03	Kidney	3	4.1E-08
16-<26	TCE	1.6	1.6E-06	3.41E-08	18,850	1	365	10	76	10	70				1.2E-06	9.3E-03	Kidney	1	1.1E-08
																Total Mutagenic Risk - adult (Kidney) =			**5E-08**
6-<26	TCE	1.6	1.6E-06	3.41E-08	19,652	1	365	20	80	20	70	8.37E-06	5.0E-04	0.017	2.4E-06	3.7E-02	Liver, NHL	--	8.8E-08
													HI - adult =	**0.02**		**Total Carcinogenic Risk - adult (Liver and NHL) =**			**9E-08**
																Total Cancer Risk - child + adult (all cancers) =			**2E-07**

1 microgram per liter (µg/l , mcg/l) = 0.0000010 milligrams per cubic centimeter (mg/cm3)
DAevent U.S. EPA (2004) provides alternate forms of this equation for estimating dermal exposure to organics in water, along with default values for the equations below for organic chemicals.
For organics:

If t_{event} < or = t*, then t_{event} = 0.54 or 0.71 hours which is less than t* for TCE of 1.39 hours

$$DA_{event} = 2(FA)(Kp)(Cw)(6 \times \boldsymbol{t}_{event} \times t_{event} \times 1/\pi)^{1/2}$$

If t_{event} > t*, then

$$Devent = (FA)(Kp)(CF)(Cw)[t_{event}/(1+B)+2\boldsymbol{t}_{event}((1+3B+B^2/(1+B)^2)]$$

Where:

CW	site-specific TCE concentration in water	mg/cm3	0.000002			
t_{event}	Exposure time-child	hours/event	0.54	EPA, 2014		
	Exposure time-adult	hours/event	0.71	EPA, 2014		
t event	lag time per event	event/hour	chem specific	EPA, 2004	0.58	for TCE
FA	Fraction absorbed	unitless	chem specific	EPA, 2004	1	for TCE
Kp	Permeability Coefficient	cm/hr	chem specific	EPA, 2004	1.20E-02	for TCE
B	Dimensionless constant	unitless	calculated	EPA, 2004	0.1	for TCE
t*	Time to reach steady-state	hrs	calculated	EPA, 2004	1.39	for TCE

Attachment B-2

Risk Assessment Calculations
Residents
Former Nike Missile LO-13 Launch Site

Resident - Launch Site

Groundwater Inhalation of Volatiles from Residential Use of Water

ADE = **[C_{air} x ED x EF x ET x CF(non-cancer only)] / [AT x 365 days/year x 24 hr/day]**

HQ = ADE(nc)/RfC

HQ = Hazard Quotient (unitless)
RfC = Reference Concentration (mg/m^3)
HI = Sum [HQ]

ADE = Average daily exposure (mg/m^3)
C_{air} = Constituent concentration in air (mg/m^3)
$C_{air} = C_{water} * K$
K = Andelman's Coefficient 0.5 L/m^3
ED = Exposure duration (yr)
EF = Exposure frequency (day/yr)
ET = Exposure time (hrs/day)
CF = Unit conversion factor (mg/µg) - non-cancer only
BW = Body weight (kg)
AT = Averaging time (yr) * 365 days/year

Cancer Risk = ADE(ca) * IUR * ADAF (mutagens only)

IUR = Inhalation Unit Risk [1/(µg/m^3)]
ADAF = Age-dependent adjustment factor for mutagens (unitless)

Child

Age (yr)	Constituent	C_{water} (µg/L)	C_{air}[1] (µg/m^3)	EF (day/yr)	ED (yr)	ET (hours/day)	CF (mg/µg)	AT (nc) (yr)	AT (c) (yr)	ADE (nc) (mg/m^3)	RfC (mg/m^3)	HQ (unitless)	ADE (ca) (µg/m^3)	(IUR) [1/(µg/m^3)]	Cancer Endpoint	ADAF (unitless)	Risk (unitless)
0-<2	TCE	1.6	0.80	350	2	24	0.001	2	70				2.2E-02	1.0E-06	Kidney	10	2.2E-07
2-<6	TCE	1.6	0.80	350	4	24	0.001	4	70				4.4E-02	1.0E-06	Kidney	3	1.3E-07
													Total Mutagenic Risk - child (Kidney) =				**4E-07**
0-<6	TCE	1.6	0.80	350	6	24	0.001	6	70	7.67E-04	2.0E-03	0.38	6.6E-02	3.1E-06	Liver, NHL	--	2.0E-07
										HI - child =		**0.4**	**Total Carcinogenic Risk - child (Liver and NHL) =**				**2.0E-07**
Adult																	
6-<16	TCE	1.6	0.80	350	10	24	0.001	10	70				1.1E-01	1.0E-06	Kidney	3	3.3E-07
16-<26	TCE	1.6	0.80	350	10	24	0.001	10	70				1.1E-01	1.0E-06	Kidney	1	1.1E-07
													Total Mutagenic Risk - adult (Kidney) =				**4E-07**
6-<26	TCE	1.6	0.80	350	20	24	0.001	20	70	7.67E-04	2.0E-03	0.38	2.2E-01	3.1E-06	Liver, NHL	--	6.8E-07
										HI - adult =		**0.4**	**Total Carcinogenic Risk - adult (Liver and NHL) =**				**6.8E-07**
													Total Cancer Risk - child + adult (all cancers) =				**2E-06**

1. Using default volatilization factor (K) of 0.5 L/m^3 (0.0005 x 1,000 L/m^3)

Risk Assessment Calculations
Residents
Former Nike Missile LO-13 Launch Site

Resident - Launch Site

Groundwater Inhalation from Vapor Instrusion

ADE = **[C_{air} x ED x EF x ET x CF(cancer only)] / [AT x 365 days/year x 24 hr/day]**

ADE = Average daily exposure (mg/m^3)
C_{air} = Constituent concentration in air (mg/m^3)
ED = Exposure duration (yr)
EF = Exposure frequency (day/yr)
ET = Exposure time (hrs/day)
CF = Unit conversion factor (µg/mg) - cancer only
BW = Body weight (kg)
AT = Averaging time (yr) * 365 days/year

HQ = ADE(nc)/RfC
HQ = Hazard Quotient (unitless)
RfC = Reference Concentration (mg/m^3)
HI = Sum [HQ]

Cancer Risk = ADE(ca) * IUR * ADAF (mutagens only)
IUR = Inhalation Unit Risk [$1/(\mu g/m^3)$]
ADAF = Age-dependent adjustment factor for mutagens (unitless)

Child

Age (yr)	Constituent	C_{water} (µg/L)	C_{air} (mg/m^3)	EF (day/yr)	ED (yr)	ET (hours/day)	CF (µg/mg)	AT (nc) (yr)	AT (c) (yr)	ADE (nc) (mg/m^3)	RfC (mg/m^3)	HQ (unitless)	ADE (ca) ($\mu g/m^3$)	(IUR) [$1/(\mu g/m^3)$]	Cancer Endpoint	ADAF (unitless)	Risk (unitless)
0-<2	TCE	1.6	0.00064	350	2	24	1,000	2	70				1.8E-02	1.0E-06	Kidney	10	1.8E-07
2-<6	TCE	1.6	0.00064	350	4	24	1,000	4	70				3.5E-02	1.0E-06	Kidney	3	1.1E-07
															Total Mutagenic Risk - child (Kidney) =		**3E-07**
0-<6	TCE	1.6	0.00064	350	6	24	1,000	6	70	6.18E-04	2.0E-03	0.31	5.3E-02	3.1E-06	Liver, NHL	--	1.6E-07
											HI - child =	**0.3**			**Total Carcinogenic Risk - child (Liver and NHL) =**		**1.6E-07**
Adult																	
6-<16	TCE	1.6	0.00064	350	10	24	1,000	10	70				8.8E-02	1.0E-06	Kidney	3	2.6E-07
16-<26	TCE	1.6	0.00064	350	10	24	1,000	10	70				8.8E-02	1.0E-06	Kidney	1	8.8E-08
															Total Mutagenic Risk - adult (Kidney) =		**4E-07**
6-<26	TCE	1.6	0.00064	350	20	24	1,000	20	70	6.18E-04	2.0E-03	0.31	1.8E-01	3.1E-06	Liver, NHL	--	5.5E-07
											HI - adult =	**0.3**			**Total Carcinogenic Risk - adult (Liver and NHL) =**		**5.5E-07**
															Total Cancer Risk - child + adult (all cancers) =		**1E-06**

Attachment B-3

Risk Assessment Calculations
Commercial Workers
Former Nike Missile LO-13 Control Site Subarea 1

Commercial Worker Scenario - Control Site Subarea 1 Soil

Summary of Estimated Risks

Exposure Pathway	Non-Carcinogenic Hazard Index	Incremental Cancer Risk
Soil Ingestion	0.0004	3E-09
Soil Dermal Contact	0.0002	3E-09
Inhalation of Entrained Soil Particles	0.0000002	3E-14
Total (All Pathways)	**0.0006**	**6E-09**
Maximum Acceptable Level	**1**	**1.E-04**

Risk Assessment Calculations
Commercial Workers
Former Nike Missile LO-13 Control Site Subarea 1

Commercial Worker - Control Site Subarea 1 Soil

Soil Ingestion

ADD = **[C_{soil} x IR x RAFo x EF x ED x CF] / [BW x AT x 365 days/year]**

HQ = ADD(nc)/RfD

HI = Sum [HQ]

Cancer Risk = ADD(ca) * OSF

OSF = Oral slope factor (mg/kg-day)$^{-1}$

RfD = Reference Dose (mg/kg-day)

ADD = Average daily dose (mg/kg-dy)
C_{soil} = Constituent concentration in soil (mg/kg)
IR = Soil ingestion rate (mg/day)
RAFo = Oral relative absorption factor (unitless)
EF = Exposure frequency (day/yr)
ED = Exposure duration (yr)
CF = Unit conversion factor (kg/mg)
BW = Body weight (kg)
AT = Averaging time (yr)

Constituent	C_{soil} (mg/kg)	IR (mg/day)	RAFo (unitless)	EF (day/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT (nc) (yr)	AT (c) (yr)	ADD (nc) (mg/kg-day)	RfD (mg/kg-day)	HQ (unitless)	ADD (ca) (mg/kg-day)	OSF [(mg/kg-day)$^{-1}$]	Risk (unitless)
TCE	0.505	50	1	225	25	0.000001	80	25	70	1.95E-07	0.0005	0.00039	6.9E-08	4.6E-02	3.2E-09
Total												**HI =** **0.0004**		**Risk =**	**3E-09**

Risk Assessment Calculations
Commercial Workers
Former Nike Missile LO-13 Control Site Subarea 1

Commercial Worker - Control Site Subarea 1 Soil

Soil Dermal Contact

ADD = [C_{soil} * SA * AF * RAFd * EF * ED * CF] / [BW * AT]

HQ = ADD(nc)/RfD **Cancer Risk = ADD(ca) * OSF**

HI = Sum [HQ] **OSF = Oral slope factor $(mg/kg\text{-}day)^{-1}$**

RfD = Reference Dose (mg/kg-day)

ADD = Average daily dose (mg/kg-dy)
C_{soil} = Constituent concentration in soil (mg/kg)
SA = Exposed skin surface area (cm^2/day)
AF = Soil adherence factor (mg/cm^2)
RAFd = Dermal Relative Absorption Factor (unitless)
EF = Exposure frequency (day/yr)
ED = Exposure duration (yr)
CF = Unit conversion factor (kg/mg)
BW = Body weight (kg)
AT = Averaging time (yr) * 365 day/year

Constituent	C_{soil} (mg/kg)	SA (cm^2/day)	AF (mg/cm^2)	RAFd (unitless)	EF (day/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT (nc) (yr)	AT(ca) (yr)	ADD (nc) (mg/kg-day)	RfD (mg/kg-day)	HQ (unitless)	ADD (ca) (mg/kg-day)	OSF $[(mg/kg\text{-}day)^{-1}]$	Risk (unitless)
TCE	0.505	3527	1.20E-01	0.05	225	25	0.000001	80	25	70	8.23E-08	0.0005	0.00016	5.8E-08	0.046	2.7E-09
Total													**HI =** **0.0002**			**Risk =** **3E-09**

Risk Assessment Calculations
Commercial Workers
Former Nike Missile LO-13 Control Site Subarea 1

Commercial Worker - Control Site Subarea 1 Soil

Inhalation of Entrained Soil Particles

$$\textbf{ADE} = \frac{\textbf{C}_{soil} \textbf{ x (1/PEF) x ET x EF x ED}}{\textbf{AT x CF}}$$

ADE = Average daily exposure (mg/m^3)
C_{soil} = Constituent concentration in soil (mg/kg)
PEF = Particulate emission factor (m^3/kg)
ET = Exposure time (hr/dy)
EF = Exposure frequency (day/yr)
ED = Exposure duration (yr)
CF = Unit conversion factor (hr/yr)
AT = Averaging time (yr)

HQ = ADE(nc)/RfC
HI = Sum [HQ]
RfC = Reference Concentration (mg/kg-dy)

Cancer Risk = ADE(ca) * IUR
Inhalation Unit Risk = IUR [1/(µg/m^3)]

Constituent	Csoil (mg/kg)	1/PEF 1/(m^3/kg)	ET (hr/day)	EF (day/yr)	ED (yr)	CF (hr/yr)	AT (nc) (yr)	AT (c) (yr)	ADE (nc) (mg/m^3)	RfC (mg/m^3)	HQ (unitless)	ADD (ca) (mg/m^3)	(IUR) [1/(µg/m^3)]	CF 1/(mg/µg)	Risk (unitless)
TCE	0.505	1.92E-10	8	225	25	8760	25	70	2.0E-11	2.0E-03	0.00000018	7.1E-12	4.1E-06	1000	2.9E-14
Total										**HI =**	**0.0000002**			**Risk =**	**3.E-14**

EPA default	7.35E-10
Site specific (17 acres, Portland, ME)	1.92E-10

Attachment B-4

Risk Assessment Calculations
Construction Workers
Former Nike Missile LO-13 Control Site Subarea 1

Construction Worker Scenario - Control Site Subarea 1 Soil

Summary of Estimated Risks

Exposure Pathway	Non-Carcinogenic Hazard Index	Incremental Cancer Risk
Soil Ingestion	0.003	8E-10
Soil Dermal Contact	0.0004	3E-10
Inhalation of Entrained Soil Particles	0.0000002	1E-13
Total (All Pathways)	**0.003**	**1E-09**
Maximum Acceptable Level	**1**	**1.E-04**

Risk Assessment Calculations
Construction Workers
Former Nike Missile LO-13 Control Site Subarea 1

Construction Worker - Control Site Subarea 1

Soil Ingestion

ADD = **[C_{soil} x IR x RAFo x EF x ED x CF] / [BW x AT x 365 days/year]**

HQ = ADD(nc)/RfD

HI = Sum [HQ]

Cancer Risk = ADD(ca) * OSF

OSF = Oral slope factor (mg/kg-day)$^{-1}$

ADD = Average daily dose (mg/kg-day)
C_{soil} = Constituent concentration in soil (mg/kg)
IR = Soil ingestion rate (mg/day)
RAFo = Oral relative absorption factor (unitless)
EF = Exposure frequency (day/yr)
ED = Exposure duration (yr)
CF = Unit conversion factor (kg/mg)
BW = Body weight (kg)
AT = Averaging time (yr)

RfD = Reference Dose (mg/kg-day)

Constituent	C_{soil} (mg/kg)	IR (mg/day)	RAFo (unitless)	EF (day/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT (nc) (yr)	AT (c) (yr)	ADD (nc) (mg/kg-day)	RfD (mg/kg-day)	HQ (unitless)	ADD (ca) (mg/kg-day)	OSF [(mg/kg-day)$^{-1}$]	Risk (unitless)
TCE	0.505	330	1	225	1	0.000001	80	1	70	1.28E-06	5.0E-04	0.0026	1.8E-08	4.6E-02	8.4E-10
Total												**HI =** **0.003**		**Risk =**	**8E-10**

Risk Assessment Calculations
Construction Workers
Former Nike Missile LO-13 Control Site Subarea 1

Construction Worker - Control Site Subarea 1

Soil Dermal Contact

ADD = [C_{soil} * SA * AF * RAFd * EF * ED * CF] / [BW * AT]

ADD = Average daily dose (mg/kg-dy)
C_{soil} = Constituent concentration in soil (mg/kg)
SA = Exposed skin surface area (cm^2/day)
AF = Soil adherence factor (mg/cm^2)
RAFd = Dermal Relative Absorption Factor (unitless)
EF = Exposure frequency (day/yr)
ED = Exposure duration (yr)
CF = Unit conversion factor (kg/mg)
BW = Body weight (kg)
AT = Averaging time (yr) * 365 day/year

HQ = ADD(nc)/RfD **Cancer Risk = ADD(ca) * OSF**
HI = Sum [HQ] **OSF = Oral slope factor $(mg/kg\text{-}day)^{-1}$**
RfD = Reference Dose (mg/kg-dy)

Constituent	C_{soil}	SA	AF	RAFd	EF	ED	CF	BW	AT (nc)	AT(ca)	ADD (nc)	RfD	HQ	ADD(ca)	OSF	Risk
	(mg/kg)	(cm^2/day)	(mg/cm^2)	(unitless)	(day/yr)	(yr)	(kg/mg)	(kg)	(yr)	(yr)	(mg/kg-day)	(mg/kg-day)	(unitless)	(mg/kg-day)	$[(mg/kg\text{-}dy)^{-1}]$	(unitless)
TCE	0.505	3527	3.00E-01	0.05	225	1	0.000001	80	1	70	2.1E-07	0.0005	0.00041	5.8E-09	0.046	2.7E-10
Total												**HI =**	**0.00041**		**Risk =**	**3E-10**

Risk Assessment Calculations
Construction Workers
Former Nike Missile LO-13 Control Site Subarea 1

Construction Worker - Control Site Subarea 1

Inhalation of Entrained Soil Particles

[added upwards adjustment factor of 100 for construction workers to account for higher than normal site soil moving activities]

$$\mathbf{ADE} = \frac{\mathbf{C_{soil} \times (1/PEF) \times 100 \times ET \times EF \times ED}}{\mathbf{AT \times CF}}$$

ADE = Average daily exposure (mg/m^3)
C_{soil} = Constituent concentration in soil (mg/kg)
PEF = Particulate emission factor (m^3/kg)
ET = Exposure time (hr/dy)
EF = Exposure frequency (day/yr)
ED = Exposure duration (yr)
CF = Unit conversion factor (hr/yr)
AT = Averaging time (yr)

HQ = ADE(nc)/RfC **Cancer Risk = ADE(ca) * IUR**
HI = Sum [HQ] **Inhalation Unit Risk = IUR [1/(µg/m^3)]**
RfC = Reference Concentration (mg/kg-dy)

Constituent	Csoil (mg/kg)	1/PEF 1/(m^3/kg)	ET (hr/day)	EF (day/yr)	ED (yr)	CF (hr/yr)	AT (nc) (yr)	AT (c) (yr)	ADE (nc) (mg/m^3)	RfC (mg/m^3)	HQ (unitless)	ADD (ca) (mg/m^3)	(IUR) [1/(µg/m^3)]	CF 1/(mg/µg)	Risk (unitless)
TCE	0.505	1.92E-10	8	225	1	8760	1	70	2.0E-09	2.0E-03	0.00000018	2.8E-11	4.1E-06	1000	1.2E-13
Total										**HI =**	**0.0000002**			**Risk =**	**1.E-13**

EPA default	7.35E-10
Site specific (17 acres, Portland, ME)	1.92E-10

Attachment B-5

Risk Assessment Calculations
Trespassers
Former Nike Missile LO-13 Control Site Subarea 1

Trespasser Scenario - Control Site Soil

Summary of Estimated Risks

Exposure Pathway	Non-Carcinogenic Hazard Index	Incremental Cancer Risk
Soil Ingestion	0.0003	2E-09
Soil Dermal Contact	0.00009	8E-10
Inhalation of Entrained Soil Particles	0.0000002	6E-15
Total (All Pathways)	**0.0004**	**2E-09**
Maximum Acceptable Level	**1**	**1E-04**

Risk Assessment Calculations
Trespassers
Former Nike Missile LO-13 Control Site Subarea 1

Trespasser (6-<16 year old) - Control Site

Soil Ingestion

ADD = **[C_{soil} x IR x RAFo x EF x ED x CF] / [BW x AT x 365 days/year]**

ADD = Average daily dose (mg/kg-dy)
C_{soil} = Constituent concentration in soil (mg/kg)
IR = Soil ingestion rate (mg/day)
RAFo = Oral relative absorption factor (unitless)
EF = Exposure frequency (day/yr)
ED = Exposure duration (yr)
CF = Unit conversion factor (kg/mg)
BW = Body weight (kg)
AT = Averaging time (yr)

HQ = ADD(nc)/RfD

HQ = Hazard Quotient (unitless)
RfD = Reference Dose (mg/kg-day)
HI = Sum [HQ]

Cancer Risk = ADD(ca) * OSF * ADAF (mutagens only)

OSF = Oral slope factor (mg/kg-day)$^{-1}$
ADAF = Age-dependent adjustment factor for mutagens (unitless)

Age (yr)	Constituent	C_{soil} (mg/kg)	IR (mg/day)	RAFo (unitless)	EF (day/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT (nc) (yr)	AT (c) (yr)	ADD (nc) (mg/kg-day)	RfD (mg/kg-day)	HQ (unitless)	ADD (ca) (mg/kg-day)	OSF [(mg/kg-day)$^{-1}$]	Cancer Endpoint	ADAF (unitless)	Risk (unitless)
16-<26	TCE	0.505	100	1	52	10	0.000001	44	10	70	1.6E-07	0.00050	0.00032	2.3E-08	9.3E-03	Kidney	3	6.5E-10
Total																	**Total Mutagenic Risk (Kidney)=**	**6E-10**
16-<26	TCE	0.505	100	1	52	10	0.000001	44	10	70				2.3E-08	3.7E-02	Liver, NHL	--	8.6E-10
Total													**HI =**	**0.0003**			**Total Carcinogenic Risk (Liver and NHL) =**	**9E-10**
													Total HI =	**0.0003**			**Total Cancer Risk (all cancers) =**	**2E-09**

Attachment B-5

Risk Assessment Calculations
Trespassers
Former Nike Missile LO-13 Control Site Subarea 1

Trespasser (6-<16 year old) - Control Site

Soil Dermal Contact

ADD = **[C_{soil} * SA * AF * RAFd * EF * ED * CF] / [BW * AT]**

ADD = Average daily dose (mg/kg-dy)
C_{soil} = Constituent concentration in soil (mg/kg)
SA = Exposed skin surface area (cm^2/day)
AF = Soil adherence factor (mg/cm^2)
RAFd = Dermal Relative Absorption Factor (unitless)
EF = Exposure frequency (day/yr)
ED = Exposure duration (yr)
CF = Unit conversion factor (kg/mg)
BW = Body weight (kg)
AT = Averaging time (yr) * 365 day/year

HQ = ADD(nc)/RfD
HQ = Hazard Quotient (unitless)
RfD = Reference Dose (mg/kg-day)
HI = Sum [HQ]

Cancer Risk = ADD(ca) * OSF * ADAF (mutagens only)
OSF = Oral slope factor $(mg/kg-day)^{-1}$
ADAF = Age-dependent adjustment factor for mutagens (unitless)

Age (yr)	Constituent	C_{soil} (mg/kg)	SA (cm^2/day)	AF (mg/cm^2)	RAFd (unitless)	EF (day/yr)	ED (yr)	CF (kg/mg)	BW (kg)	AT (nc) (yr)	AT(ca) (yr)	ADD (nc) (mg/kg-day)	RfD (mg/kg-day)	HQ (unitless)	ADD (ca) (mg/kg-day)	OSF $[(mg/kg-day)^{-1}]$	Cancer Endpoint	ADAF (unitless)	Risk (unitless)
16-<26	TCE	0.505	4,639	0.12	0.05	52	10	0.000001	44	10	70	4.5E-08	0.00050	0.00009	1.3E-08	9.3E-03	Kidney	3	3.6E-10
Total													**HI =**	**0.00009**	**Total Mutagenic Risk (Kidney)=**				**4E-10**
16-<26	TCE	0.505	4,639	0.12	0.05	52	10	0.000001	44	10	70				1.3E-08	3.7E-02	Liver, NHL	--	4.7E-10
Total															**Total Carcinogenic Risk (Liver and NHL) =**				**5E-10**
													Total HI =	**0.00009**	**Total Cancer Risk (all cancers) =**				**8E-10**

Risk Assessment Calculations
Trespassers
Former Nike Missile LO-13 Control Site Subarea 1

Trespasser (6-<16 year old) - Control Site

Inhalation of Entrained Soil Particles

$$\textbf{ADE} = \frac{\textbf{C}_{soil} \textbf{ x (1/PEF) x ET x EF x ED}}{\textbf{AT x CF}}$$

ADE = Average daily exposure (mg/m^3)
C_{soil} = Constituent concentration in soil (mg/kg)
PEF = Particulate emission factor (m^3/kg)
ET = Exposure time (hr/dy)
EF = Exposure frequency (day/yr)
ED = Exposure duration (yr)
CF = Unit conversion factor (hr/yr)
AT = Averaging time (yr)

HQ = ADE(nc)/RfC
HQ = Hazard Quotient (unitless)
RfC = Reference Concentration (mg/m^3)
HI = Sum [HQ]

Cancer Risk = ADE(ca) * IUR * ADAF (mutagens only)
IUR = Inhalation Unit Risk [1/(µg/m^3)]
ADAF = Age-dependent adjustment factor for mutagens (unitless)

Age (yr)	Constituent	Csoil (mg/kg)	1/PEF 1/(m^3/kg)	ET (hr/day)	EF (day/yr)	ED (yr)	CF (hr/yr)	AT (nc) (yr)	AT (c) (yr)	ADE (nc) (mg/m^3)	RfC (mg/m^3)	HQ (unitless)	ADE (ca) (mg/m^3)	(IUR) [1/(µg/m^3)]	Cancer Endpoint	CF 1/(mg/µg)	ADAF (unitless)	Risk (unitless)
16-<26	TCE	0.505	7.35E-10	3	52	10	8,760	10	70	6.6E-12	0.0020	0.00000018	9.4E-13	1.0E-06	Kidney	1,000	3	2.8E-15
Total												**HI = 0.0000002**					**Total Mutagenic Risk (Kidney)=**		**3.E-15**
16-<26	TCE	0.505	7.35E-10	3	52	10	8,760	10	70				9.4E-13	3.1E-06	Liver, NHL	1,000	--	2.9E-15
Total																	**Total Carcinogenic Risk (Liver and NHL) =**	**3.E-15**
												HI = 0.0000002					**Total Cancer Risk (all cancers) =**	**6.E-15**

APPENDIX D

MAINE DEP PETROLEUM ASSESSMENT

Appendix D: Petroleum Assessment Report

DRAFT February 27, 2024

TABLE OF CONTENTS

Acronyms 3
1.0 INTRODUCTION 1
2.0 SITE SETTING AND BACKGROUND 1
2.1 Overview 2
2.2 Nike Missile LO-13 Launch Site 2
2.3 Nike Missile LO-13 Control Site 2
3.0 SITE ENVIRONMENTAL CONDITIONS 3
3.1 History of Releases and Investigations 3
3.1.1 Launch Site 3
3.1.2 Control Site 4
3.2 Summary of Site Data 5
3.2.1 Soil 6
3.2.1.1 Launch Site Soil 6
3.2.1.2 Control Site Soil 7
3.2.2 Groundwater 8
3.2.2.1 Launch Site Groundwater 8
3.2.2.2 Control Site Groundwater 9
3.2.3 Indoor and Outdoor Air 9
3.2.3.1 Launch Site Indoor Air 9
3.2.3.2 Launch Site Outdoor Air 9
3.3 Conceptual Site Model for Risk Assessment 10
3.3.1 Potential Sources, Nature and Extent, and Fate and Transport of Contamination 10
3.3.2 Human Receptors and Exposure Pathways 10
3.3.3 Ecological Receptors and Exposure Pathways 11
4.0 PETROLEUM EVALUATION 11
4.1 Selection of RAGs Exposure Scenarios 12
4.1 Comparison of Indoor Air Results to Maine DEP RAGs 12
4.2 Comparison of Grouped Petroleum Analyte Results to Maine DEP RAGs for Petroleum Constituents in Soil 12
4.3 Comparison of Grouped Petroleum Analyte Results to Maine DEP RAGs for Petroleum Constituents in Groundwater 13
5.0 SUMMARY AND CONCLUSIONS 13
5.1 Summary 13
5.2 Conclusions 14
6.0 REFERENCES 14

FIGURES

Figure 1A Topographic Site View of Launch and Control Sites
Figure 1B Aerial Site View of Launch and Control Sites
Figure 2 Site Plan – Launch Site
Figure 3 Site Plan – Control Site

TABLES

Table 1 Launch Site Soil Data
Table 2 Control Site Soil Data
Table 3 Launch Site Groundwater Data
Table 4 Control Site Groundwater Data
Table 5 Launch Site Indoor Air Data and Comparison to Maine DEP RAGs
Table 6 Launch Site Soil Petroleum Data Comparison to Maine DEP RAGs
Table 7 Control Site Soil Petroleum Data Comparison to Maine DEP RAGs
Table 8 Launch Site Groundwater Petroleum Data Comparison to Maine DEP RAGs
Table 9 Control Site Groundwater Petroleum Data Comparison to Maine DEP RAGs

Acronyms

AFB	Air Force base
bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and xylenes (total)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPCs	Constituents of potential concern
CSM	Conceptual site model
DERP-FUDs	Defense Environmental Restoration Program Formerly Used Defense Sites
EPA	U.S. Environmental Protection Agency
EPC	Exposure point concentration
EPH	Extractable petroleum hydrocarbon
ft	feet
GSA	General Services Administration
JP-4	Jet petroleum fuel #4
kVA	kilovolt-amps
Maine DEP	Maine Department of Environmental Protection
Mass DEP	Massachusetts Department of Environmental Protection
m^3/kg	meters cubed per kilogram
µg/L	micrograms per Liter
mg/kg	milligrams per kilogram
ppbv	part-per-billion by volume
PAH	Polycyclic aromatic hydrocarbon
PCBs	Polychlorinated biphenyls
RAGs	Maine DEP Remedial Action Guidelines for Sites Contaminated with Hazardous Substances
RI	Remedial investigation
TCE	Trichloroethylene
TPH	Total petroleum hydrocarbon
TPH-DRO	Total petroleum hydrocarbons – diesel range organics
TPH-GRO	Total petroleum hydrocarbons – gasoline-range organics
USACE	U.S. Army Corps of Engineers
UST	Underground storage tank
VOC	Volatile organic compound

1.0 INTRODUCTION

This Petroleum Assessment for the Former Loring Air Force Base (AFB) LO-13 Launch and Control Sites in Caswell, Aroostook County, Maine (the Site) is included as **Appendix D** to the Remedial Investigation (RI) report. This Appendix evaluates the available petroleum data for the Site (i.e., the hydrocarbon fractions and grouped analyses).

Petroleum releases are exempt from the federal response authority under Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and therefore the LO-13 petroleum data, including hydrocarbon fraction results analyzed by extractable petroleum hydrocarbons (EPH) and volatile petroleum hydrocarbons (VPH), total petroleum hydrocarbons – diesel range organics (TPH-DRO), and total petroleum hydrocarbons – gasoline-range organics (TPH-GRO) are being evaluated separately in this **Appendix D** according to Maine Department of Environmental Protection (DEP) Remedial Action Guidelines (RAGs) for Contaminated Sites (Maine DEP, 2023), which provide technical guidance for making risk-based remediation decisions based on human exposures at oil and hazardous material discharge sites in Maine to ensure public health is adequately protected. This guidance is not applicable to ecological impacts. **Appendix C** (Risk Assessment) of the RI focuses on human health and ecological risks associated with individual compounds that are regulated under the CERCLA and that may be present as a consequence of past practices or releases at the Site.

The purpose of this Petroleum Assessment is to evaluate the petroleum fraction results pertinent to the Maine DEP RAGs. The compounds evaluated are related to the CERCLA contaminants and sources as described in the RI. Thus the RI should be referenced for a full discussion of the Conceptual Site Model (CSM), while this **Appendix D** focuses on exposure and risk assessment for petroleum fractions under the Maine DEP RAGs.

2.0 SITE SETTING AND BACKGROUND

The LO-13 Site comprises two parcels known as the Launch and Control Sites bordered by Route 1A/Route 165 to the east. The Control Site is located approximately 0.5 miles northwest of the Launch Site. The Site is surrounded by undeveloped land with areas for logging and/or recreational use.

The Site does not contain any surface water features and the closest water bodies are Lavoie Brook and Martin Brook located northeast and west of the Site, respectively. The topography at the Site is generally flat, and the local area slopes downward to the northeast and southeast from the Control Site and the north, east and southeast from the Launch Site. Groundwater generally flows to the south-southeast at the Launch Site and north-northwest at the Control Site. A Site Location Plan showing topography is provided as **Figure 1A**.

Following is a brief summary of Site background relevant to the risk assessments. Additional details may be found in the RI.

2.1 Overview

The former Nike Missile LO-13 Site was constructed between 1955 and 1957 on what is believed to be former farmland and was operated by the Army as a surface-to-air, anti-aircraft missile facility. The missile Site consists of a former Launch Site, a former Control Site, and a former family housing area. In 1969, two years after the closing of the installation, the family housing area was transferred to the Loring Air Force Base. The Launch and Control Sites were reported to the General Services Administration (GSA) as excess property in 1967 and sold to private individuals. An aerial view of these areas is presented in **Figure 1B**.

2.2 Nike Missile LO-13 Launch Site

The 17-acre Nike Missile LO-13 Launch Site is located west of Route 1A in Caswell, Maine. The former Launch Site contains several manmade structures from the former military installation, including three former underground missile silos, a former missile maintenance and acid neutralization pit area, a generator building, a water pump house, and the former barracks building (later used as apartments). The barracks/apartments are served by a private bedrock drinking water well located approximately 75 feet west of the barracks/apartments. Underground storage tanks (USTs) were located adjacent to the barracks/apartments and former generator buildings. The barracks were in use as of May 2021 as a residence, and it is expected that future use of the Site will remain the same. General features of the Launch Site are depicted on **Figure 2**.

The acid neutralization pit area of the Launch Site was reportedly used for the fueling and de-fueling of missiles prior to warhead maintenance and/or transportation to the launcher area. A concrete platform in the area was designed to collect discharged or spilled fuel mixtures, likely consisting of a blend of jet petroleum fuel #4 (JP-4), inhibited red fuming nitric acid, and unsymmetrical dimethylhydrazine. Runoff from the concrete pad was directed into catch basins and a nearby unlined drainage swale. Background information on the former operations of the acid neutralization pit area was presented in *Results of Acid Neutralization Pit Background Information Review* (Weston, 1999).

2.3 Nike Missile LO-13 Control Site

The 11-acre former Nike Missile LO-13 Control Site is also located on the western side of U.S Route 1A in Caswell, Maine and is approximately 0.5 miles northwest of the Launch Site. The Site was active from the mid-1950s to the 1970s and is occupied by several buildings, including a generator building, former barracks, a mess hall, and an administration building. All buildings were constructed on concrete slabs. Four former USTs were located at the facility and were associated with these buildings; a fifth former UST was located near the former radar towers. General features of the Control Site are depicted on **Figure 3**.

The property was most recently purchased by a private party who renovated the main administration building into a residence, which, as of October 2023, is occupied on a part-time basis. Remaining military structures are still in place in various stages of disrepair and are used for

storage and other passive purposes. A bedrock water supply well servicing the residence is located within 300 feet of the facility. Future use is expected to remain the same as current use.

3.0 SITE ENVIRONMENTAL CONDITIONS

This section summarizes the petroleum results evaluated as TPH-DRO and as VPH and EPH fractions, along with other analyses, as part of the Site history. **Section 3.1** provides a history of releases and investigations, and **Section 3.2** provides a summary of all Site data and describes which data were used in the Petroleum Assessment. Additional discussion of the sampling and analysis done at the Launch and Control Sites, detected constituents, and fate and transport may be found in the RI.

3.1 History of Releases and Investigations

Data from the historical reports described in this section were used and are described further in **Section 3.2**.

3.1.1 Launch Site

On August 23, 1994, an out-of-service, 2,000-gallon steel UST located near the former barracks building was removed. Prior to removal, 2,000 gallons of petroleum-contaminated water were pumped from the UST and filtered through activated carbon prior to discharge. Upon removal, the UST was observed to be intact, but an observed release in the subsurface after removal was postulated to have occurred from either the UST fill/vent pipes or feed/return lines. Approximately 90 cubic yards of petroleum-contaminated soil were excavated to facilitate removal of the UST, and stockpiled on polyethylene sheeting. Further removal of contaminated soil was not feasible without compromising the structural integrity of the building and a chimney located immediately adjacent to the excavation. Therefore, petroleum-contaminated soil remained under the concrete anchor slab used to hold the UST in place. After the UST removal, the excavated area was lined with 6 mil (0.006 inch thick) polyethylene sheeting and backfilled with unspecified material. Soil samples from the stockpile and a soil sample from the excavation sidewall were collected and analyzed for TPH-DRO.

Upon occupancy of the barracks building by new apartment residents, USACE authorized the collection of indoor air and tap water samples. In January 1995, indoor air samples were collected from each of the three apartments, and analyzed for benzene, toluene, ethylbenzene, and xylenes (total) (BTEX). Low concentrations of one or more BTEX constituents were detected in the indoor air of each apartment, particularly in Apartment 3, potentially attributed to residential sources, such as smoking. A groundwater sample from the associated Launch Site groundwater drinking well was also collected and no BTEX compounds were detected. In addition, PCB-containing transformers were reportedly removed from inside the generator building at the former Launch Site in 1994; no post-removal soil sampling data were collected.

In September 1996, three areas of the former Launch Site (the former barracks, the generator building, and the acid neutralization pit) were investigated through the advancement of soil borings, installation of groundwater monitoring wells, and collection of soil and groundwater

samples for analytical testing. Indoor air sampling was again performed within three apartments of the former barracks, as described in *Site Investigation Report, Initial Site Investigations at Four Defense Environmental Restoration Program Formerly Used Defense Sites (DERP-FUDS), Caswell, Perham, Presque Isle, Maine* (Weston, 1997). Benzene and xylenes were detected in Apartments 1 and 3 in both the living and bedrooms. Ethylbenzene was also detected in Apartment 3. Toluene was detected in all three apartments sampled. Benzene, ethylbenzene, and xylene concentration were highest in Apartment 3, which corresponds to elevated soil results in LSSB-3 (Weston, 1997a).

Additional soil samples were collected in June 1999 from near drainage system outfalls and a catch basin of the former acid neutralization pit area, as discussed in *Site Investigation Report Addendum, at Four Defense Environmental Restoration Program Formerly Used Defense Sites (DERP-FUDS), Caswell, Perham, Presque Isle, Maine* (Weston, 2000).

In 2015, shallow soil samples were collected from around the former generating building from 0-0.5 and 0.5-1 foot bgs and analyzed for PCBs; no PCBs were detected (AECOM, 2015).

In 2016, soil borings were advanced and soil samples collected from around the former barracks to update characterization of soil conditions in this area.

3.1.2 Control Site

In August 1994, five USTs were removed from the Control Site: one 6,000-gallon diesel UST from near the generator building, three 2,000-gallon No. 2 fuel oil USTs from near the mess hall, administration building, and barracks, and one 500-gallon No. 2 fuel oil UST near the radar tower generator building. Upon removal, indications of releases associated with overfills and ancillary piping were identified at each UST location except at the 500-gallon UST (Mason, 1995). A summary of each UST is provided below.

- **6,000-gallon diesel UST from near the generator building:** Approximately 840 cubic yards of contaminated soil and the underlying concrete pad were excavated during the UST removal. In October 1994, two soil samples were collected from test pits representing the bottom of the excavation and submitted for fuel oil analyses. Total petroleum hydrocarbon (TPH) concentrations of 180 milligrams per kilogram (mg/kg) and 250 mg/kg were detected. The area was subsequently backfilled with unknown material.
- **2,000-gallon No. 2 fuel oil UST from near barracks:** Approximately 70 tons of contaminated soil and the underlying concrete pad were excavated during the UST removal. Contaminated soil was observed beneath the foundation wall; further soil removal was determined to be infeasible, and the excavation area was backfilled. In October 1994, three soil samples (one base and two sidewall samples) were collected from test pits in the former excavation area and submitted for analyses. TPH concentrations from below detectable concentrations to 170 mg/kg were detected.
- **2,000-gallon No. 2 fuel oil UST from near the mess hall:** Approximately 150 tons of contaminated soil and the underlying concrete pad were excavated during the UST removal. Additional contaminated soil was observed adjacent to and under the building. In

October 1994, two soil samples were collected from test pits representing the bottom of the excavation and beneath the building foundation, and submitted for analyses. TPH concentrations from 27 mg/kg to 180 mg/kg were detected.

- **2,000-gallon No. 2 fuel oil UST from near former administration building:** Approximately 150 tons of contaminated soil and the underlying concrete pad were excavated during the UST removal. Extensive soil contamination was visually observed throughout the excavation and along the tank's supply and return lines, suggesting further contamination existed under the building foundation. Further soil removal was not conducted due to concerns about the building stability. In October 1994, a soil sample was collected from a test pit extending beneath the building foundation and submitted for analyses. TPH was detected at a concentration of 320 mg/kg.
- **500-gallon UST area near the former radar towers:** While no contaminated soil was removed from the 500-gallon UST area near the former radar tower generator building, the two soil samples collected after the UST removal contained no detectable TPH quantified as fuel oil, but contained 20 and 24 mg/kg of TPH quantified as "other hydrocarbons."

In addition to the USTs, Site activities in 1994 included the removal of five pole-mounted transformers [three 50 kilovolt-amps (kVA), one 5 kVA, one 10 kVA] and an oil switch along the access road to the property. The contents of the transformers were analyzed. All three 50 kVA transformers contained concentrations of the PCB Aroclor 1254 (up to 11 mg/kg) and Aroclor 1260 (up to 46 mg/kg) with higher concentrations detected in the 10 kVA transformer (19 mg/kg of Aroclor 1254 and 79 mg/kg of Aroclor 1260). No PCBs were detected in the 5 kVA transformer or oil switch. Evidence of releases was visually observed near three of the transformers. Subsequently, approximately 20 tons of contaminated soil was removed from beneath the transformers. Confirmation soil sampling identified no residual PCBs in soil beneath the former transformers, but did detect TPH as "other" petroleum hydrocarbons (up to 84 mg/kg).

In 1996-1997, additional investigations were conducted to delineate the extent of petroleum contamination and other possible contaminants at the generator building, barracks building, mess hall, and administration building USTs with limited additional assessment at the radar tower generator building. A total of 55 subsurface soil samples from 25 locations at the Control Site were collected for analysis. Sampling identified the presence of nine volatile organic compounds (volatile organic compounds [VOCs], including chlorinated VOCs) and TPH-DRO. Groundwater was also sampled and found to contain similar constituents. Additional soil sampling was conducted in 2017 for VPH, EPH, and VOCs to update information on the nature and extent of contamination.

3.2 Summary of Site Data

This section provides a summary of Site data and outlines which data are used in the Petroleum Assessment. Comparisons of detected concentrations of petroleum constituents to the Maine DEP RAGs are provided in **Section 4**. It is noted that historical analytical laboratory reports were not available for most sampling events, so data were obtained from summary tables presented in previous Site documents. The petroleum results evaluated as TPH-DRO and as VPH and EPH

fractions are assessed separately under Maine DEP guidance. Other analytical results are also shown in **Tables 1** through **5**, but are not discussed herein.

3.2.1 Soil

A total of 129 soil samples collected at the Site (54 samples from Launch Site and 75 samples from Control Site) during the various investigations in 1994, 1996, 1999, 2015, 2016, and 2017 were compiled and considered for the Petroleum Assessment. In addition, 8 field duplicate samples were collected and averaged with their pair sample (3 samples from Launch Site and 5 samples from Control Site).

Original laboratory reports were not available for soil samples collected in 1996 and 1999, but rather these older data were obtained from summary tables included in prior reports. Summaries of the results by area (Launch Site and Control Site) are presented below.

3.2.1.1 Launch Site Soil

Table 1 shows available analytical results for soil samples from the former Launch area; only constituents detected in one or more soil samples are presented. Sample locations are presented in **Figure 2**. Because the potential source areas are closely located, the Launch Site is evaluated as one area. A total of 54 soil samples were collected from various depths between the ground surface to 20 feet (ft) below the ground surface (bgs) during the various investigations in 1994, 1996, 1999, 2015, and 2016. Samples were analyzed for TPH-DRO, VPH and EPH fractions and target compounds by the Massachusetts Department of Environmental Protection (Mass DEP, 2002) method. Samples were also analyzed for chlorinated herbicides/pesticides, PCBs, and metals, which are not further considered as part of this Petroleum Evaluation. However, each sample was not necessarily analyzed for all constituents.

Soil data evaluated in this Petroleum Assessment are shown in the top portion of **Table 1** for Launch Site soil. Data excluded are shown in the grey-highlighted, bottom portion of **Table 1** because they do not represent soils where exposures can occur, as follows:

- Deep soils: Seven samples (LSSB4-2, LSSB7-2, LSSB1-2, LSSB6-2, LSMW1-2, LSMW4-2, and LSMW5-2) were collected at various depths 16-20 ft bgs. Current and future human and ecological receptors are not expected to be exposed to soils at depths greater than 15 ft bgs. Samples collected from depths of 14-16 ft bgs were assumed to represent concentrations at 15 ft bgs and included in the evaluation. All other samples collected at depths greater than 15 ft bgs were excluded.
- Unknown sample: A soil sample (LSCB-1) was collected in 1999 with missing information regarding the sample depth. In addition, the sample ID does not follow the naming convention of other soil samples collected at the same time. Due to the uncertainty of this sample, it was excluded from the risk assessment.
- Soil samples collected from stockpiles: Three samples (LO-13 L CSP1, CSP1 GEN and CSP2 GEN) have presumably been removed and are not presentative of current conditions. Therefore, these samples were excluded from further analysis.

- Acid Neutralization Pits and related sediment samples: Eight soil samples (LSANPB-1, LSANPB1-2, LSANPB2-1, LSANPB2-2, LSANPB3-1, LSANPB3-2, LSANPB4-1, and LSANPB4-2) and one sediment sample (LSCB-1) from former waste management structures such as the acid neutralization pit and associated catch basins and drainage swales were analyzed for VOCs, SVOCs, pesticides/PCBs, and metals. Only some of these samples were taken at depths relevant for the risk assessments, including the shallow intervals from two soil borings in the drainage swales (LSANPB-3 and LSANPB-4) and one sample from the sediment at the bottom of a catch basin (LSCB-1) within the acid neutralization pit. These data were excluded from the HHRA for several reasons:
    - The results from these samples showed that there were no SVOCs and limited pesticides, and metals were detected below Maine DEP RAGS (current in 1997). Thus, no additional soil sampling was recommended based on the lack of identified contamination.
    - In 1999, additional investigation of the acid pit area indicated elevated DRO was present in a catch basin; however, similar concentrations were not identified in the swales that received the discharge (LSANPB-3 and LSANPB-4). Therefore, it appears the DRO was confined to the catch basins within the former building.
    - Note that the exclusion of these data points means there are no metals analyses available for consideration in the risk assessments for the Launch Site soils. However, none of the metals detected in these excluded samples exceed the current Maine RAGs, except for arsenic, which is detected at concentrations (maximum detection of 9.97 mg/kg) above the lowest current Maine RAG of 0.l83 mg/kg, based on leaching potential, but below the soil RAG for the commercial worker of 41 mg/kg and below the Maine background value (28 mg/kg).

A total of 35 soil samples (both surface and subsurface) collected from surface to 16 ft bgs were included in the Launch Site Petroleum Assessment (**Table 1**). Note that 18 of the 35 soil samples were collected during or prior to 1996 and may not be representative of current Site conditions. In particular, since several areas of the Site have been excavated and backfilled, and the source of the backfill material is not known, the available soil data may or may not be fully representative of current conditions. While newer soil data were collected in the general vicinity of the older data, samples were not collected from the same depth. Therefore, both the older and the newer data are included in the evaluations of Site data.

3.2.1.2 Control Site Soil

Table 2 shows analytical results for soil samples from the former Control Site. The only soil data available at the Control Site were from subsurface samples at depths of 4 to 16 ft bgs. Although the lack of surface soil data at the Control Site limits the completeness of this analysis, the likely contaminants due to USTs would primarily be found in the subsurface soils and it is likely that fill has been added to the Site over the years. Only constituents detected in one or more soil samples are presented. Sample locations are presented in **Figure 3**.

Based on the identified USTs removed from the Site (**Section 3.1.2**), and differences in the presence and concentrations of constituents of potential concern (COPCs), soil results for the

Control Site were divided into the following five subareas, to be consistent with the CERCLA HHRA (**Appendix C**):

- *Subarea 1 – Former Radar Tower Generator Building* – an area surrounding the location of a former 500-gallon UST that was removed.
- *Subarea 2 – Former Generator Building* – an area near the locations where former 6,000-gallon and 2,000-gallon USTs were removed.
- *Subarea 3 – Former Mess Hall* – an area where a former 2,000-gallon UST was removed.
- *Subarea 4 –Former Administration Building* – an area surrounding the location of a former 2,000-gallon UST that was removed.
- *Subarea 5 – Northeast of Administration Building* – an area northeast of the administrative building where TCE was detected in soil and groundwater.

Soil samples were collected from 4 to 40 feet bgs in the five subareas of the Control Site from the various investigations in 1996, 1999, and 2017. Soil samples were analyzed for TPH-DRO, VPH fractions, VPH VOCs, additional VOCs, EPH fractions, and EPH target PAHs. No metals analyses were found for soil samples from the Control Site.

Control Site subsurface soil data evaluated in the Petroleum Assessment are shown on the top portion of **Table 2**. Data excluded from consideration are shown in the grey-highlighted, bottom portion of **Table 2**, and include:

- Deeper soils: Thirty-nine soil samples collected from 18 to 40 feet bgs (i.e., greater than 15 feet bgs) from various intervals. Receptors are not expected to be exposed to soils at these depths; therefore, these samples were not included in the evaluation.

Newer subsurface soil data were collected only in Subarea 2; remaining subareas have data only from 1996 or 1999. These older data may not be representative of current Site conditions but are included in the absence of newer data in other Subareas (**Table 2**).

3.2.2 Groundwater

All groundwater samples collected at the Site during the various investigations and long-term monitoring (LTM) in 1996, 1997, 1999, 2000, 2002-2004, 2008-2010 were compiled and considered in the Petroleum Assessment. In addition, five field duplicate samples were collected from the Control Site and averaged with their parent sample.

Original laboratory reports were not available for all groundwater data, but were obtained from summary tables. While reporting limits were not present for some sample results presented as "non-detected", all samples were considered. Summaries of the results by area (Launch Site and Control Site) are presented below.

3.2.2.1 Launch Site Groundwater

Table 3 shows all available individual analytical results for groundwater samples from six groundwater monitoring or drinking water wells located throughout the former Launch Site,

collected between 1996 and 2010. All data were considered in the Petroleum Assessment. Four of these monitoring wells (LSMW-1, LSMW-3, LSMW-6, and LSMW-8) were sampled twice only, in November 1996 and May 1997 during initial Site Investigation. Monitoring well LSMW-7, located near a former UST area, was sampled eight times between 1996 and 2004 during the LTM program. Well LSDW-1, the on-Site drinking water well for the apartments/barracks, was sampled seven times between November 1996 and May 2010 during the LTM program. Samples were analyzed for TPH (TPH-GRO and TPH-DRO) and VOCs, although not all samples were analyzed for all constituents. Data were collated from the historical reports, as described in **Section 3.1**, and therefore, the analytical results available for groundwater were limited to those available in the reports.

3.2.2.2 Control Site Groundwater

Table 4 shows all available individual analytical results for groundwater samples collected from six monitoring wells, one drinking water well, and from the tap between November 1996 and July 2017. Two wells (CSMW-3 and CSMW-10) were only sampled once each during this time period during the initial Site Investigation; wells CSMW-5, CSMW-9, and CSMW-11 were sampled and analyzed multiple times as part of the LTM program. Samples were analyzed for TPH (TPH-GRO and TPH-DRO), PAHs, and VOCs. For samples not analyzed for the individual VPH fractions, C9-C18 aliphatic hydrocarbons and C11-C22 aromatic hydrocarbons were estimated based the TPH-DRO results. Analyses in 2017 only consisted of VPH and target analytes. The presence of chlorinated VOCs from earlier sampling rounds, although detected above comparison values in some wells, was not reassessed 2017.

3.2.3 Indoor and Outdoor Air

Indoor air samples were collected from three different apartments at the residence on the Launch Site. In addition, outdoor air samples were collected to represent background concentrations. Original laboratory reports were not available for indoor air samples. Therefore, these results were obtained from summary tables and may not include reporting limits for analytes that were not detected. No indoor air samples were collected from the Control Site because the buildings were vacant and not considered occupiable at the time due to their condition. All samples were presented in parts per billion by volume and converted to $\mu g/m^3$. Summaries of the Launch Site air results by sample type are presented below.

3.2.3.1 Launch Site Indoor Air

Table 5 shows the analytical results for indoor air samples collected from the three apartments/former barracks in January 1995 and September 1996, along with the Maine RAGs for residential indoor air. Indoor air samples were analyzed only for BTEX. Two of the apartments (Apartment 1 and 3) were occupied at the time by tobacco smokers; however, the highest results were consistently in Apartment 3.

3.2.3.2 Launch Site Outdoor Air

Two outdoor background air samples were collected near the apartments on the Launch Site These samples were analyzed for BTEX and used to identify potential background source of BTEX that

could be contributing to indoor air concentrations. Both outdoor samples did not detect BTEX, indicating there are no outdoor sources in the air that could be contributing to the observed indoor concentrations.

3.3 Conceptual Site Model for Risk Assessment

Based on the information provided above and in the RI Report, a CSM for the risk assessments is described in this section. The CSM defines potential sources, migration, exposure pathways and receptors and evaluates whether exposure pathways are complete, thereby informing the human health and ecological risk assessments. It is noted that historical data records were used to compile the data set for the risk assessments, and some information on the analytical results may be incomplete.

3.3.1 Potential Sources, Nature and Extent, and Fate and Transport of Contamination

Past Site uses have resulted in contamination at the LO-13 Site. As noted in the previous sections and the RI report, the primary source of contamination at the Site are the former USTs. In addition, two areas of TCE contamination are present near the radar towers and northeast of the administration building, but the source of TCE in these areas is unknown. Majority of the contamination is in the subsurface soils (> 4 ft bgs), consistent with releases from USTs.

3.3.2 Human Receptors and Exposure Pathways

Both the Launch and the Control Sites are currently used by individual residents, and each contain a single residential building (apartments on the Launch Site and a part-time summer residence on the Control Site). The water supply wells are in use for these residences. This current use is expected to continue into the future, there are no local limitation or ordinances on potential Site uses.

The potential human receptors considered for the CSM were as follows:

- **Residents.** There are currently residences present at both the Launch and Control Sites. Residents can be exposed to soils via incidental ingestion, dermal contact, and inhalation of particulates. Residents using potable water wells on the two sites could be exposed via ingestion, dermal contact, or inhalation of volatiles. In addition, the potential for vapor intrusion into residential indoor air from groundwater exists, as volatile chlorinated compounds have been detected in groundwater from monitoring wells (although these were not detected in the drinking water).
- **Commercial Workers.** Neither Site is currently commercially or industrially used, but there is no prohibition on such use. Therefore, potential future hypothetical commercial adult workers, who primarily work indoors but could be exposed to soils outdoors during breaks, are quantitatively assessed. Soil exposure pathways for these workers could include incidental ingestion, dermal contact, and inhalation of particulates. Groundwater exposures are not quantitatively evaluated for this receptor, as the exposures for residents would be greater.

- **Construction/Utility Workers.** The potential for construction or utility worker exposure exists under current and future land uses at both Sites. Adult construction workers are quantitatively assessed assuming exposures to surface and subsurface soils via incidental ingestion, dermal contact, and inhalation of particulates during construction activities. Risks for utility workers were not quantified but evaluated qualitatively based on the results of the assessment of the construction worker.
- **Trespassers.** Trespassing may occur under current and future land use at both Sites, so trespassers are assessed as an older child/youth. Trespassers can be exposed to surface soils from incidental ingestion, dermal contact and inhalation of particulates while trespassing at the Site.

The following receptor groups were not quantitatively assessed for the reasons provided:

- **Recreational Receptors.** The Sites are not intentionally used for recreational purposes on a regular basis. Such similar incidental use would be considered trespassing, which is evaluated quantitatively in the HHRA; therefore, recreational receptors are not specifically assessed.
- **Landscape workers.** The Sites are not known to be formally landscaped beyond surface mowing in select areas; however, if landscaped areas were developed in the future, landscapers could be exposed. Direct soil contact by landscapers is anticipated to be moderate to intense, intermittent, and of a short to moderate, seasonal duration. Landscape worker exposure is not assessed, as the assessment of construction/utility workers is likely a conservative representation of potential soil exposures, due to the potential for direct contact with soil over an assumed one year construction project.

Residents, commercial workers, and trespassers are most likely exposed to surface soils. However, given that the contaminants were primarily only assessed in the subsurface soils at these Sites and future construction activities could move subsurface soils to the surface where exposures could occur, risks were evaluated for all receptors assuming exposure to surface and subsurface soils up to 15 feet in depth.

3.3.3 Ecological Receptors and Exposure Pathways

Only terrestrial habitats are present at the Site and ecological receptors are not expected to be exposed to groundwater. In addition, risks were not evaluated for aquatic receptors in the absence of aquatic habitats. Therefore, potentially exposed ecological receptors are limited to terrestrial plant, mammalian, bird, and insect species that would normally be present in this part of Maine.

4.0 PETROLEUM EVALUATION

This section presents the results of the screening of detected grouped petroleum analytes to the appropriate Maine DEP RAGs. The individual compounds detected at the Sites have been evaluated for human health and ecological risks in **Appendix C**, Risk Assessment.

4.1 Selection of RAGs Exposure Scenarios

As described above in the CSM, potential receptors at the Sites include residents, commercial workers, construction workers, and trespassers. Considering the Maine DEP RAGs receptor categories, the following potential receptors were evaluated:

- Residential for soil, groundwater, and indoor air
- Outdoor commercial workers for soil
- Excavation/construction workers for soil

Since residential, outdoor commercial workers, and excavation/construction workers would be exposed more than trespassers, this potential exposure group is not evaluated herein.

The Maine DEP RAGs consider accessible soil to be within the top 2 feet of soil. In this Petroleum Assessment, potentially accessible soil results collected from 0 to 15 ft bgs were compared to the residential, outdoor commercial worker and excavation/construction worker RAGs assuming that soil could be reworked during any future utility or redevelopment construction. Soil below 15 ft bgs is not likely to be accessible.

4.1 Comparison of Indoor Air Results to Maine DEP RAGs

The indoor air results are shown in **Table 5**, with the individual benzene, ethylbenzene, toluene and xylenes results compared to the Maine DEP RAGs for indoor air for the residential scenario. The measured benzene concentrations in indoor air exceed the residential RAG. As previously mentioned, two of the residential apartments (Apartment 1 and 3) were occupied at the time by tobacco smokers. In addition, these data are from 1996, and thus would not represent current indoor air concentrations.

4.2 Comparison of Grouped Petroleum Analyte Results to Maine DEP RAGs for Petroleum Constituents in Soil

Tables 6 and **7** present data summaries and comparisons to Maine DEP RAGs, for detected grouped petroleum compounds in Launch Site soils and Control Site soils for residential, commercial, and excavation/construction worker exposure scenarios.

Soil results for both Sites indicate that there are no exceedances of the Maine DEP RAGs for the detected grouped petroleum analytes. It is noted that there was a detection of TPH-DRO at 2,300 mg/kg (estimated) in LSSB-3-1 at 4-5 foot bgs, in a sample taken in 1996 at the Launch Site. However, more recent analysis in this vicinity in LSSB-10 indicates EPH and VPH results to be below the current Maine DEP RAGs. In addition, TPH-DRO was only detected in 3 of 18 samples; the other detections were 457 and 22 mg/kg (see **Table 1**).

4.3 Comparison of Grouped Petroleum Analyte Results to Maine DEP RAGs for Petroleum Constituents in Groundwater

Tables 8 and **9** present the data summaries and comparisons to Maine DEP RAGs, for detected grouped petroleum compounds in Launch Site groundwater and Control Site groundwater for the residential scenario.

Since the Maine RAGs do not have specific RAGs for the TPH-GRO and TPH-DRO grouped petroleum hydrocarbon analyses, and these are the only grouped petroleum hydrocarbon analytes that were analyzed in Launch Site groundwater, the results for the Launch Site groundwater cannot be evaluated in this Petroleum Assessment. However, it is noted that TPH-GRO was not detected in 10 samples and TPH-DRO was detected in 6 of 21 samples taken.

For Control Site groundwater, none of the aromatic or aliphatic hydrocarbons analyzed by EPH and VPH exceeded the Maine DEP RAGs in the samples collected in 2017. There are no specific Maine RAGs for the TPH-GRO and TPH-DRO grouped petroleum hydrocarbon or the U.S. Environmental Protection Agency (all fractions) analyses. However, it is noted that TPH-GRO was not detected in 10 samples, EPH fractions were not detected in 4 samples, and TPH-DRO was detected in 8 of 46 samples.

5.0 SUMMARY AND CONCLUSIONS

5.1 Summary

The LO-13 Launch and Control Sites have been assessed under CERCLA for the individual constituents detected, as evaluated separately in **Appendix C** (Risk Assessment). Grouped petroleum hydrocarbons are not considered CERCLA contaminants and therefore grouped petroleum hydrocarbons and hydrocarbon fraction results are evaluated here in **Appendix D** by comparison to the Maine DEP RAGs (Maine DEP, 2023).

Considering the Maine DEP RAGs receptor categories, residential receptors for soil, groundwater, and indoor air; outdoor commercial workers for soil; and excavation/construction workers for soil were evaluated in this Petroleum Assessment. The Maine DEP RAGs consider accessible soil to be within the top 2 feet of soil. Soil data used in this Petroleum Assessment were from depths of 0 to 15 feet, based on the assumption that future construction on-site could mix soils to that depth.

Soil results for both Sites indicate there are no exceedances of the Maine DEP RAGs for the detected grouped petroleum analytes. Similarly, there were no exceedances of the Maine DEP RAGs for grouped petroleum analytes in groundwater. An exceedance of the indoor air residential Maine RAG for benzene is documented in this Appendix, using data collected in 1996 from an apartment with smokers, and thus considering the current soil result in this vicinity below the RAGs and duration since these results with likely natural attenuation of organic compounds, it is considered non-representative of current indoor air conditions.

5.2 Conclusions

Achievement of Objective

The objective of this Petroleum Assessment was to evaluate exposure to petroleum compounds/fractions that are not covered by CERCLA. There are sufficient grouped petroleum data for the Site to adequately evaluate the location, extent of soil contamination and scenarios where exposure may occur, which provide an adequate evaluation of potential exposures and risks. The objective has been achieved and this Petroleum Assessment concludes that there is no unacceptable risk of human exposure to petroleum posed by the Site.

Recommendations

A no further action determination is recommended for the Site.

6.0 REFERENCES

Maine DEP, 2023. *Remedial Action Guidelines (RAGs) for Sites Contaminated with Hazardous Substances.* Dated November 15, 2023.

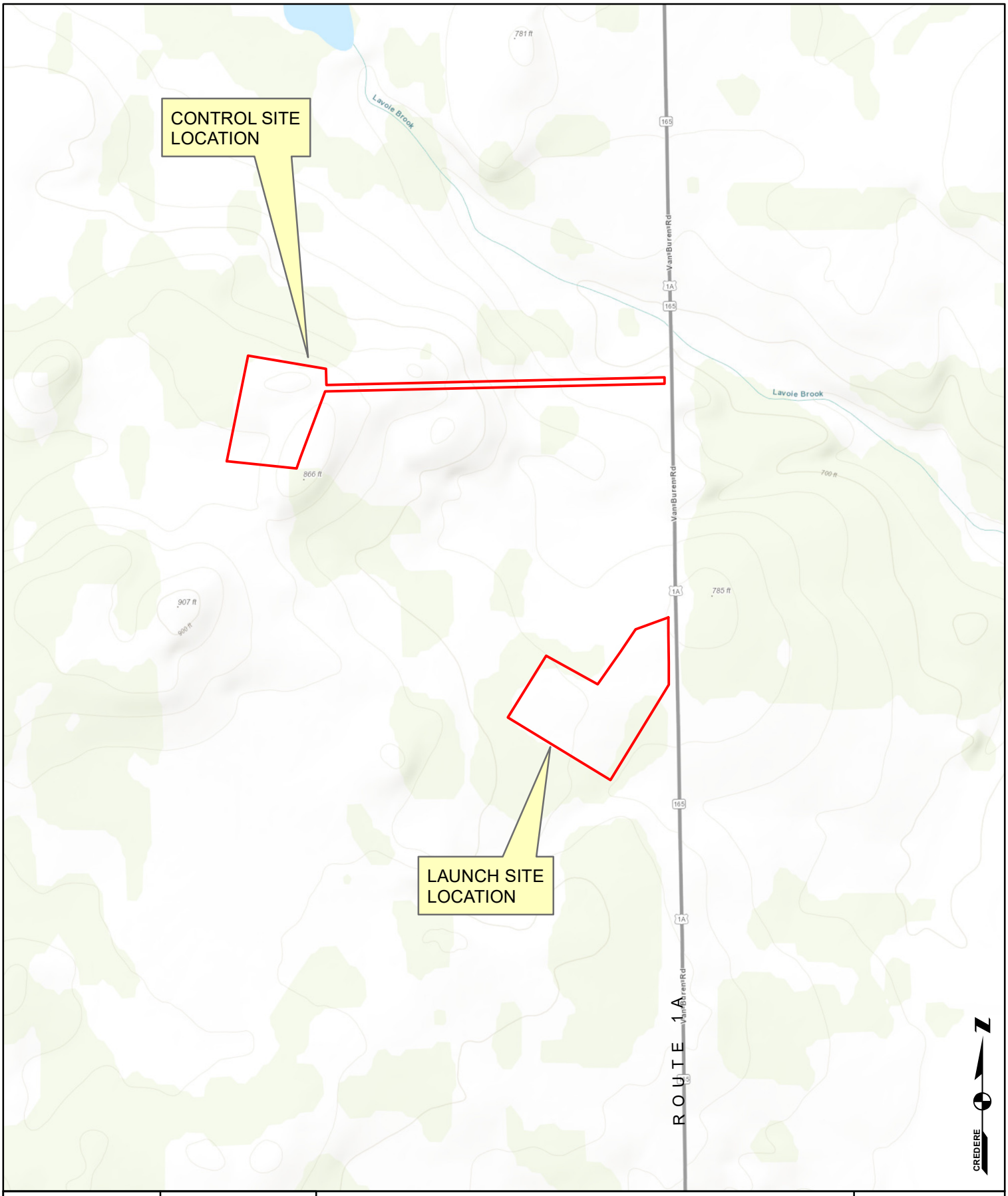
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Weston, 2000. *Site Investigation Report Addendum, at Four Defense Environmental Restoration Program Formerly Used Defense Sites (DERP-FUDS), Caswell, Perham, Presque Isle, Maine*.

FIGURES



DRAWN BY: **SCG**	DATE: **01/11/2024**
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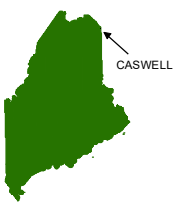
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FIGURE 1A
LO-13 LAUNCH AND CONTROL SITES
LOCATION PLAN - TOPOGRAPHIC

FORMER LORING AFB
LO-13 LAUNCH AND CONTROL SITES
ROUTE 1A
CASWELL, MAINE

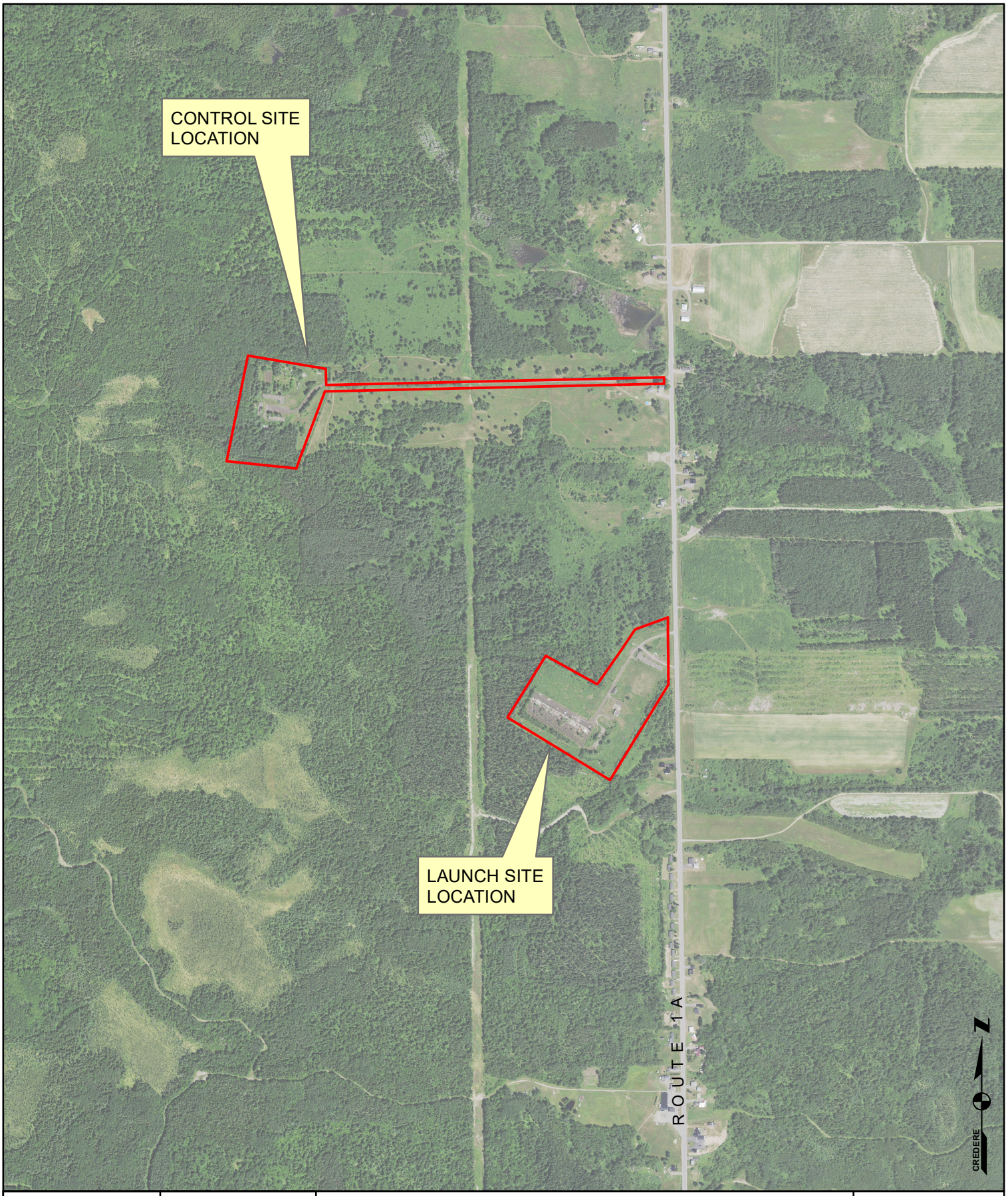
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1 inch = 1,000 feet



Topographic Map Data Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Document Path: T:\Data\ME\Town\Caswell\15001301 - LO-13 Launch and Control Sites\Figure 1A - LO-13 Location Plan_Topographic.mxd



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CHECKED BY: **ASD**	PROJECT: **15001301**

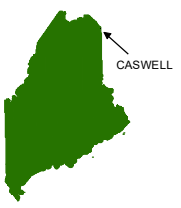
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FIGURE 1B
LO-13 LAUNCH AND CONTROL SITES
LOCATION PLAN - AERIAL VIEW

FORMER LORING AFB
LO-13 LAUNCH AND CONTROL SITES
ROUTE 1A
CASWELL, MAINE

500 0 1,000 Feet

1 inch = 1,000 feet



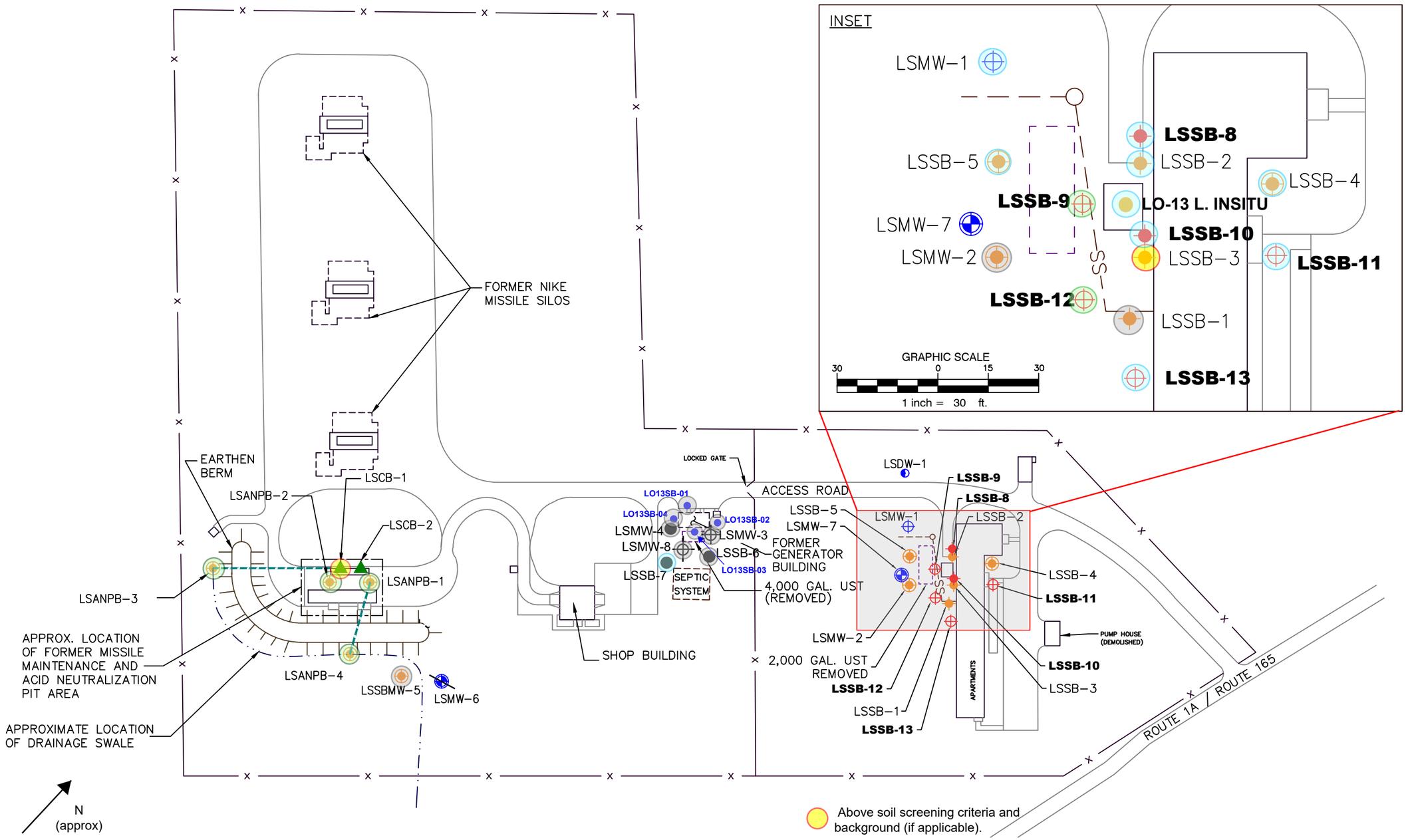
Topographic Map Data USDA FSA, MaineGIS

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FIGURE 2
SITE PLAN - LAUNCH SITE

FORMER NIKE LO-13 LAUNCH SITE
ROUTE 1A
CASWELL, MAINE

GRAPHIC SCALE
100 50 0 100
1 inch = 100 ft.



LEGEND

- **PROPOSED ANGLE SOIL BORING**
- **PROPOSED STRAIGHT SOIL BORING**
- FORMER ANGLE SOIL BORING
- FORMER STRAIGHT SOIL BORING
- FORMER BEDROCK MONITORING WELL
- FORMER OVERBURDEN MONITORING WELL
- FORMER RESIDENTIAL WATER SUPPLY WELL
- SEDIMENT SAMPLE FROM CATCH BASIN
- ACID NEUTRALIZATION PIT DRAINAGE PIPE
- —x— CHAIN LINK FENCE WITH BARB WIRE
- —SS— SANITARY SEWER

- Above soil screening criteria and background (if applicable).
- Above soil screening criteria but below background
- Below Soil Screening Criteria and background (if applicable).
- No detections in soil
- Soil not analyzed

NOTES:

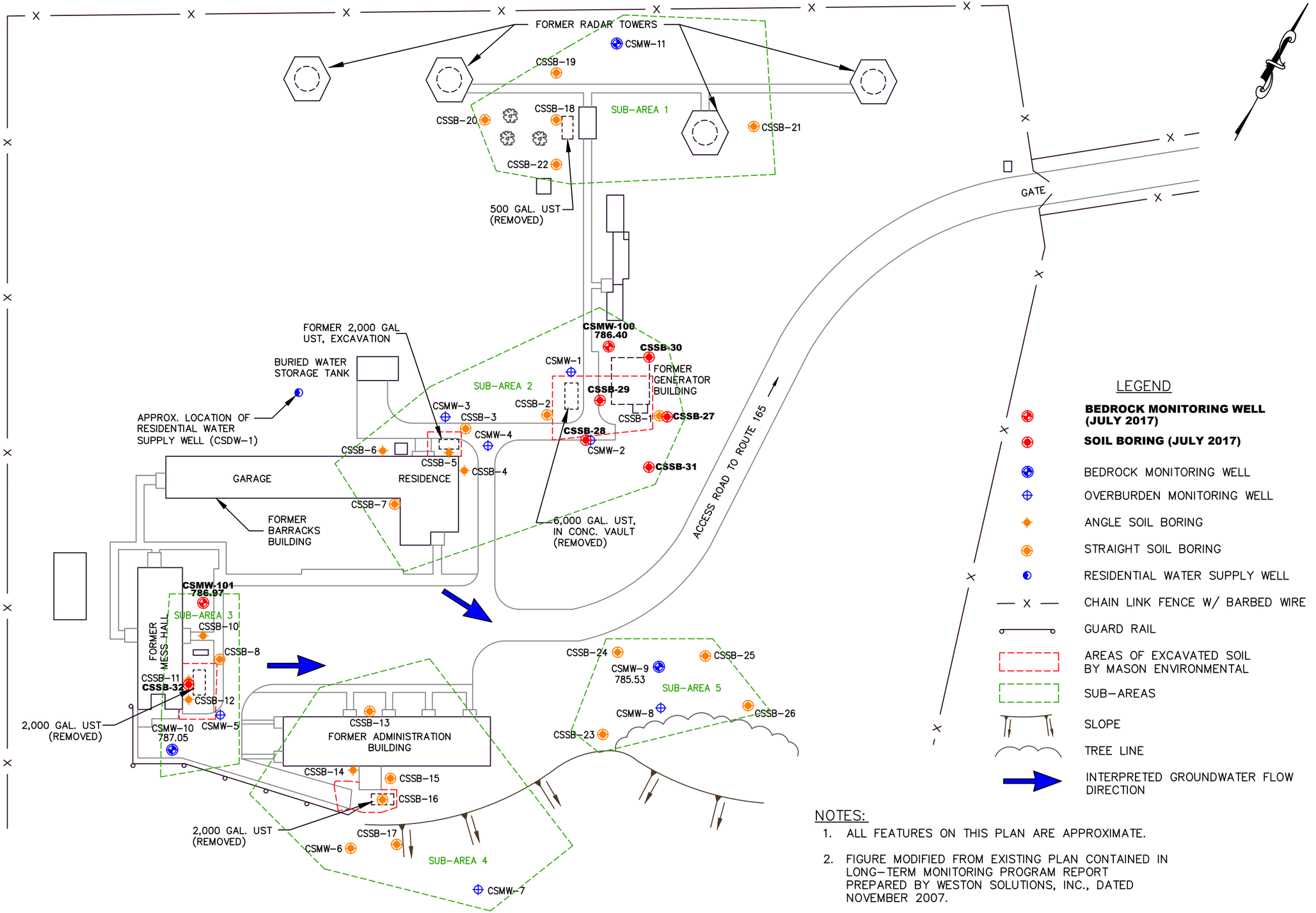
1. ALL FEATURES ON THIS PLAN ARE APPROXIMATE.
2. FIGURE MODIFIED FROM EXISTING PLAN CONTAINED IN LONG-TERM MONITORING PROGRAM REPORT PREPARED BY WESTON SOLUTIONS, INC., DATED NOVEMBER 2007.
3. RED OUTLINE REPRESENTS INSET AREA.

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J:\CREDERE\15001301 USACE Loring FUDS RI-RA\FIGURE 3B - LO-13 LAUNCH SITE SAMPLE LOCATION PLAN_MAK2.dwg plot date: 9/6/2016 11:29 AM



LEGEND

- **BEDROCK MONITORING WELL (JULY 2017)**
- **SOIL BORING (JULY 2017)**
- BEDROCK MONITORING WELL
- OVERBURDEN MONITORING WELL
- ANGLE SOIL BORING
- STRAIGHT SOIL BORING
- RESIDENTIAL WATER SUPPLY WELL
- CHAIN LINK FENCE W/ BARBED WIRE
- GUARD RAIL
- AREAS OF EXCAVATED SOIL BY MASON ENVIRONMENTAL
- SUB-AREAS
- SLOPE
- TREE LINE
- INTERPRETED GROUNDWATER FLOW DIRECTION

NOTES:

1. ALL FEATURES ON THIS PLAN ARE APPROXIMATE.
2. FIGURE MODIFIED FROM EXISTING PLAN CONTAINED IN LONG-TERM MONITORING PROGRAM REPORT PREPARED BY WESTON SOLUTIONS, INC., DATED NOVEMBER 2007.

FIGURE 3
SITE PLAN - CONTROL SITE

GRAPHIC SCALE
60 30 0 60
1 inch = 60 ft.

LO-13 CONTROL SITE
ROUTE 1A
CASWELL, MAINE

DRAWN BY: MAK/CMD
CHECKED BY: ASD
DATE: 02/27/2024
PROJECT: 15001301

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J:\1. Credere Projects\15001301 USACE Loring FUDS RI-RA\Old versions\FIGURE 2B - LO-13 CONTROL SITE SAMPLE LOCATION PLAN_SAF.dwg plot date: 2/28/2024 9:37 AM

TABLES

Appendix D
TABLE 1
Soil Analytical Data - Launch Site

Sample ID	Sample Depth	Sampling Date	TPH as Diesel Range Organics mg/kg	C_9-C_{12} Aliphatic Hydrocarbons mg/kg	C_9-C_{10} Aromatic Hydrocarbons mg/kg	C_9-C_{18} Aliphatic Hydrocarbons mg/kg	C_{19}-C_{36} Aliphatic Hydrocarbons mg/kg	C_{11}-C_{22} Aromatic Hydrocarbons mg/kg	Acetone mg/kg	2-Butanone mg/kg	Ethylbenzene mg/kg
LO-13 L. INSITU	Sidewall	09/14/94	**457** [1]	-	-	**356** [2]	**101** [2]	-	-	-	-
LSSB2-1	9-11'	09/24/96	5.8 U	-	-	4.5 U[2]	1.3 U[2]	-	**0.029**	0.006 U	0.006 U
LSSB3-1	4-6'	09/24/96	**2,300 J**	-	-	**1,794 J [2]**	**506 J [4][4]**	-	0.740 U	**3.10**	**0.085 J**
LSSB3-2	14-16'	09/24/96	**22 J**	-	-	**17.2 J [2]**	**4.8 J [4][4]**	-	0.006 U	0.006 U	0.006 U
LSSB5-2	10-12'	09/17/96	5.8 U	-	-	4.5 U[2]	1.3 U[2]	-	**0.010**	0.006 U	0.006 U
LSMW1-1	8-10'	09/17/96	5.8 U	-	-	4.5 U[2]	1.3 U[2]	-	0.006 U	0.006 U	0.006 U
L013SB-01A/Duplicate	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-
L013SB-01B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-02A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-02B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-03A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-03B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-04A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-04B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-
LSSB-8-1	4-8'	11/01/16	-	3.2 U	0.40 U	7.3 U	12 U	**11 J**	-	-	0.050 U
LSSB-8-2	12-13'	11/01/16	-	2.3 U	0.29 U	6.5 U	11 U	6.5 U	-	-	0.037 U
LSSB-9-1/ Duplicate	6-8'	11/01/16	-	2.2 U	0.27 U	6.3 U	11 U	6.3 U	-	-	0.034 U
LSSB-9-2	14-16'	11/01/16	-	3.7 U	0.46 U	6.5 U	11 U	6.5 U	-	-	0.058 U
LSSB-10-1	8-10'	11/01/16	**-**	**41**	**17**	**71 J**	11 UJ	**28**	**-**	**-**	0.038 U
LSSB-10-2	12-13'	11/01/16	-	2.4 U	**1.0 J**	6.2 U	10 U	6.2 U	-	-	0.038 U
LSSB-11-1	4-6'	11/01/16	-	2.2 UJ	0.28 UJ	6.5 U	11 U	**6.7 J**	-	-	0.034 U
LSSB-12-1	4-6'	11/01/16	-	2.5 U	0.31 U	6.5 U	11 U	6.5 U	-	-	0.038 U
LSSB-13-1	4-6'	11/01/16	-	2.5 U	0.31 U	6.9 U	**11 J**	**26**	-	-	0.039 U
Included - No detections											
LSSB1-1	6-8'	09/24/96	5.4 U	-	-	-	-	-	0.005 U	0.005 U	0.005 U
LSSB2-2	14-15.5'	09/24/96	5.7 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSSB4-1	12-14'	09/17/96	5.7 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSSB5-1	7-8'	09/17/96	5.6 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSSB6-1	6-8'	09/24/96	5.6 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSSB7-1	7-9'	09/17/96	5.5 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSMW2-1	6-8'	09/25/96	5.5 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSMW2-2	12-14'	09/25/96	5.5 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSMW3-1	6-8'	09/24/96	5.5 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSMW3-2	14-16'	09/24/96	5.7 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSMW4-1	6-8'	09/24/96	5.5 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSMW5-1	8-10'	09/24/96	6.4 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
Excluded: > 15 feet deep or former waste management structures											
LSSB1-2	16-18'	09/24/96	5.4 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSSB6-2	16-17.5'	09/24/96	5.2 U	-	-	-	-	-	0.005 U	0.005 U	0.005 U
LSSB4-2	17'	09/17/96	5.4 U	-	-	-	-	-	0.005 U	0.005 U	0.005 U
LSSB7-2	16-18'	09/17/96	5.6 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSMW1-2	18-18.3'	09/17/96	5.7 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSMW4-2	18-19.6'	09/24/96	5.1 U	-	-	-	-	-	0.005 U	0.005 U	0.005 U
LSMW5-2	18-18.8'	09/24/96	5.9 U	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSANPB1-1 (Acid pit)	0.9-2.9'	09/25/96	-	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSANPB1-2 (Acid pit)	6.9-8.9'	09/25/96	-	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSANPB2-1 (Acid pit)	0.9-2.9'	09/25/96	-	-	-	-	-	-	0.005 U	0.005 U	0.005 U
LSANPB2-2 (Acid pit)	4.9-6.9'	09/25/96	-	-	-	-	-	-	0.006 U	0.006 U	0.006 U
LSANPB3-1 (Acid pit)	4-6'	06/25/99	-	-	-	-	-	-	-	-	-
LSANPB3-2 (Acid pit)	18-20'	06/25/99	-	-	-	-	-	-	-	-	-
LSANPB4-2 (Acid pit)	18-19'	06/25/99	-	-	-	-	-	-	-	-	-
LSANPB4-1 /Duplicate (AP)	2-4'	06/25/99	-	-	-	-	-	-	-	-	-
LSCB-1	n/a	06/25/99	**289**	-	-	-	-	-	-	-	-
Excluded: Assumed removed and disposed											
LO-13 L. CSP1	Stockpile composite	09/14/94	**90.5** [1]	-	-	-	-	-	-	-	-
LO-13 L. CSP1 GEN	Assumed stockpile	09/14/94	**511** [1]	-	-	-	-	-	-	-	-
LO-13 L. CSP2 GEN	Assumed stockpile	09/14/94	**1,500** [1]	-	-	-	-	-	-	-	-

Appendix D
TABLE 1
Soil Analytical Data - Launch Site

Sample ID	Sample Depth	Sampling Date	1,1,1-Trichloro-ethane mg/kg	Trichloroethene mg/kg	Xylenes (total) mg/kg	Naphthalene (VPH) mg/kg	Naphthalene (EPH) mg/kg	Acenaphthene mg/kg	Anthracene mg/kg	Benzo(a)-anthracene mg/kg	Benzo(b)-fluoranthene mg/kg
LO-13 L. INSITU	Sidewall	09/14/94	-	-	-	-	-	-	-	-	-
LSSB2-1	9-11'	09/24/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSSB3-1	4-6'	09/24/96	0.740 U	0.740 U	**0.160 J**	-	-	-	-	-	-
LSSB3-2	14-16'	09/24/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSSB5-2	10-12'	09/17/96	**0.005 J**	0.006 U	0.006 U	-	-	-	-	-	-
LSMW1-1	8-10'	09/17/96	**0.004 J**	0.006 U	0.006 U	-	-	-	-	-	-
L013SB-01A/Duplicate	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-
L013SB-01B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-02A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-02B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-03A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-03B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-04A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-
LO13SB-04B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-
LSSB-8-1	4-8'	11/01/16	-	-	0.100 U	0.050 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
LSSB-8-2	12-13'	11/01/16	-	-	0.074 U	0.037 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-9-1/ Duplicate	6-8'	11/01/16	-	-	0.068 U	0.034 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-9-2	14-16'	11/01/16	-	-	0.116 U	0.058 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-10-1	8-10'	11/01/16	-	-	0.076 U	**0.15 J**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-10-2	12-13'	11/01/16	-	-	0.076 U	0.038 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
LSSB-11-1	4-6'	11/01/16	-	-	0.076 U	0.034 UB	0.11 UJ	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-12-1	4-6'	11/01/16	-	-	0.076 U	0.038 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-13-1	4-6'	11/01/16	-	-	0.078 U	0.039 U	0.12 U	**0.050 J**	**0.11 J**	**0.3**	**0.3**
Included - No detections											
LSSB1-1	6-8'	09/24/96	0.005 U	0.005 U	0.005 U	-	-	-	-	-	-
LSSB2-2	14-15.5'	09/24/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSSB4-1	12-14'	09/17/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSSB5-1	7-8'	09/17/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSSB6-1	6-8'	09/24/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSSB7-1	7-9'	09/17/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSMW2-1	6-8'	09/25/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSMW2-2	12-14'	09/25/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSMW3-1	6-8'	09/24/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSMW3-2	14-16'	09/24/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSMW4-1	6-8'	09/24/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSMW5-1	8-10'	09/24/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
Excluded: > 15 feet deep or former waste management structures											
LSSB1-2	16-18'	09/24/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSSB6-2	16-17.5'	09/24/96	0.005 U	0.005 U	0.005 U	-	-	-	-	-	-
LSSB4-2	17'	09/17/96	0.005 U	**0.003 J**	0.005 U	-	-	-	-	-	-
LSSB7-2	16-18'	09/17/96	**0.004 J**	**0.003 J**	0.006 U	-	-	-	-	-	-
LSMW1-2	18-18.3'	09/17/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSMW4-2	18-19.6'	09/24/96	0.005 U	0.005 U	0.005 U	-	-	-	-	-	-
LSMW5-2	18-18.8'	09/24/96	0.006 U	0.006 U	0.006 U	-	-	-	-	-	-
LSANPB1-1 (Acid pit)	0.9-2.9'	09/25/96	0.006 U	0.006 U	0.006 U	-	/ U	/ U	/ U	/ U	/ U
LSANPB1-2 (Acid pit)	6.9-8.9'	09/25/96	0.006 U	0.006 U	0.006 U	-	/ U	/ U	/ U	/ U	/ U
LSANPB2-1 (Acid pit)	0.9-2.9'	09/25/96	0.005 U	0.005 U	0.005 U	-	/ U	/ U	/ U	/ U	/ U
LSANPB2-2 (Acid pit)	4.9-6.9'	09/25/96	0.006 U	0.006 U	0.006 U	-	/ U	/ U	/ U	/ U	/ U
LSANPB3-1 (Acid pit)	4-6'	06/25/99	-	-	-	-	/ U	/ U	/ U	/ U	/ U
LSANPB3-2 (Acid pit)	18-20'	06/25/99	-	-	-	-	/ U	/ U	/ U	/ U	/ U
LSANPB4-2 (Acid pit)	18-19'	06/25/99	-	-	-	-	/ U	/ U	/ U	/ U	/ U
LSANPB4-1 /Duplicate (AP)	2-4'	06/25/99	-	-	-	-	/ U	/ U	/ U	/ U	/ U
LSCB-1	n/a	06/25/99	-	-	-	-	-	-	-	-	-
Excluded: Assumed removed and disposed											
LO-13 L. CSP1	Stockpile composite	09/14/94	-	-	-	-	-	-	-	-	-
LO-13 L. CSP1 GEN	Assumed stockpile	09/14/94	-	-	-	-	-	-	-	-	-
LO-13 L. CSP2 GEN	Assumed stockpile	09/14/94	-	-	-	-	-	-	-	-	-

Appendix D
TABLE 1
Soil Analytical Data - Launch Site

Sample ID	Sample Depth	Sampling Date	Benzo(k)-fluoranthene mg/kg	Benzo(g,h,i)-perylene mg/kg	Benzo(a)pyrene mg/kg	Chrysene mg/kg	Dibenzo(a,h)-anthracene mg/kg	Fluoranthene mg/kg	Fluorene mg/kg	Indeno(1,2,3-cd)-pyrene mg/kg	Phenanthrene mg/kg	Pyrene mg/kg
LO-13 L. INSITU	Sidewall	09/14/94	-	-	-	-	-	-	-	-	-	-
LSSB2-1	9-11'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSSB3-1	4-6'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSSB3-2	14-16'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSSB5-2	10-12'	09/17/96	-	-	-	-	-	-	-	-	-	-
LSMW1-1	8-10'	09/17/96	-	-	-	-	-	-	-	-	-	-
L013SB-01A/Duplicate	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-	-
L013SB-01B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-	-
LO13SB-02A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-	-
LO13SB-02B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-	-
LO13SB-03A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-	-
LO13SB-03B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-	-
LO13SB-04A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-	-
LO13SB-04B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-	-
LSSB-8-1	4-8'	11/01/16	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
LSSB-8-2	12-13'	11/01/16	0.11 U	0.11 U	**0.036 J**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-9-1/ Duplicate	6-8'	11/01/16	0.11 U	0.11 U	**0.040 J**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-9-2	14-16'	11/01/16	0.11 U	0.11 U	**0.034 J**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-10-1	8-10'	11/01/16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-10-2	12-13'	11/01/16	0.10 U	0.10 U	**0.035 J**	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
LSSB-11-1	4-6'	11/01/16	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-12-1	4-6'	11/01/16	0.11 U	0.11 U	**0.034 J**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
LSSB-13-1	4-6'	11/01/16	**0.2**	**0.19 J**	**0.3**	**0.4**	**0.10 J**	**0.7**	**0.043 J**	**0.18 J**	**0.5**	**0.6**
Included - No detections												
LSSB1-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSSB2-2	14-15.5'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSSB4-1	12-14'	09/17/96	-	-	-	-	-	-	-	-	-	-
LSSB5-1	7-8'	09/17/96	-	-	-	-	-	-	-	-	-	-
LSSB6-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSSB7-1	7-9'	09/17/96	-	-	-	-	-	-	-	-	-	-
LSMW2-1	6-8'	09/25/96	-	-	-	-	-	-	-	-	-	-
LSMW2-2	12-14'	09/25/96	-	-	-	-	-	-	-	-	-	-
LSMW3-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSMW3-2	14-16'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSMW4-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSMW5-1	8-10'	09/24/96	-	-	-	-	-	-	-	-	-	-
Excluded: > 15 feet deep or former waste management structures												
LSSB1-2	16-18'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSSB6-2	16-17.5'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSSB4-2	17'	09/17/96	-	-	-	-	-	-	-	-	-	-
LSSB7-2	16-18'	09/17/96	-	-	-	-	-	-	-	-	-	-
LSMW1-2	18-18.3'	09/17/96	-	-	-	-	-	-	-	-	-	-
LSMW4-2	18-19.6'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSMW5-2	18-18.8'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSANPB1-1 (Acid pit)	0.9-2.9'	09/25/96	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U
LSANPB1-2 (Acid pit)	6.9-8.9'	09/25/96	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U
LSANPB2-1 (Acid pit)	0.9-2.9'	09/25/96	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U
LSANPB2-2 (Acid pit)	4.9-6.9'	09/25/96	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U
LSANPB3-1 (Acid pit)	4-6'	06/25/99	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U
LSANPB3-2 (Acid pit)	18-20'	06/25/99	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U
LSANPB4-2 (Acid pit)	18-19'	06/25/99	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U
LSANPB4-1 /Duplicate (AP)	2-4'	06/25/99	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U
LSCB-1	n/a	06/25/99	-	-	-	-	-	-	-	-	-	-
Excluded: Assumed removed and disposed												
LO-13 L. CSP1	Stockpile composite	09/14/94	-	-	-	-	-	-	-	-	-	-
LO-13 L. CSP1 GEN	Assumed stockpile	09/14/94	-	-	-	-	-	-	-	-	-	-
LO-13 L. CSP2 GEN	Assumed stockpile	09/14/94	-	-	-	-	-	-	-	-	-	-

Appendix D
TABLE 1
Soil Analytical Data - Launch Site

Sample ID	Sample Depth	Sampling Date	Total Low Molecular Weight PAHs mg/kg	Total High Molecular Weight PAHs mg/kg	delta-BHC mg/kg	4,4'-DDE mg/kg	4.4'-DDD mg/kg	4.4'-DDT mg/kg	Total DDT and Metabolites mg/kg	Polychlorinated Biphenyls (PCBs) mg/kg	Arsenic mg/kg
LO-13 L. INSITU	Sidewall	09/14/94	-	-	-	-	-	-	-	-	-
LSSB2-1	9-11'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB3-1	4-6'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB3-2	14-16'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB5-2	10-12'	09/17/96	-	-	-	-	-	-	-	-	-
LSMW1-1	8-10'	09/17/96	-	-	-	-	-	-	-	-	-
L013SB-01A/Duplicate	0-0.5'	05/14/15	-	-	-	-	-	-	-	0.011 U	-
L013SB-01B	0.5-1'	05/14/15	-	-	-	-	-	-	-	0.011 U	-
LO13SB-02A	0-0.5'	05/14/15	-	-	-	-	-	-	-	0.01 U	-
LO13SB-02B	0.5-1'	05/14/15	-	-	-	-	-	-	-	0.012 U	-
LO13SB-03A	0-0.5'	05/14/15	-	-	-	-	-	-	-	0.012 U	-
LO13SB-03B	0.5-1'	05/14/15	-	-	-	-	-	-	-	0.012 U	-
LO13SB-04A	0-0.5'	05/14/15	-	-	-	-	-	-	-	0.014 U	-
LO13SB-04B	0.5-1'	05/14/15	-	-	-	-	-	-	-	0.012 U	-
LSSB-8-1	4-8'	11/01/16	0.12 U	0.12 U	-	-	-	-	-	-	-
LSSB-8-2	12-13'	11/01/16	0.11 U	**0.036 J**	-	-	-	-	-	-	-
LSSB-9-1/ Duplicate	6-8'	11/01/16	0.11 U	**0.040 J**	-	-	-	-	-	-	-
LSSB-9-2	14-16'	11/01/16	0.11 U	**0.034 J**	-	-	-	-	-	-	-
LSSB-10-1	8-10'	11/01/16	**0.15 J**	0.11 U	-	-	-	-	-	-	-
LSSB-10-2	12-13'	11/01/16	0.10 U	**0.035 J**	-	-	-	-	-	-	-
LSSB-11-1	4-6'	11/01/16	0.11 U	0.11 U	-	-	-	-	-	-	-
LSSB-12-1	4-6'	11/01/16	0.11 U	**0.034 J**	-	-	-	-	-	-	-
LSSB-13-1	4-6'	11/01/16	**2.19 J**	**1.78 J**	-	-	-	-	-	-	-
Included - No detections											
LSSB1-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB2-2	14-15.5'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB4-1	12-14'	09/17/96	-	-	-	-	-	-	-	-	-
LSSB5-1	7-8'	09/17/96	-	-	-	-	-	-	-	-	-
LSSB6-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB7-1	7-9'	09/17/96	-	-	-	-	-	-	-	-	-
LSMW2-1	6-8'	09/25/96	-	-	-	-	-	-	-	-	-
LSMW2-2	12-14'	09/25/96	-	-	-	-	-	-	-	-	-
LSMW3-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-
LSMW3-2	14-16'	09/24/96	-	-	-	-	-	-	-	-	-
LSMW4-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-
LSMW5-1	8-10'	09/24/96	-	-	-	-	-	-	-	-	-
Excluded: > 15 feet deep or former waste management structures											
LSSB1-2	16-18'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB6-2	16-17.5'	09/24/96	-	-	-	-	-	-	-	-	-
LSSB4-2	17'	09/17/96	-	-	-	-	-	-	-	-	-
LSSB7-2	16-18'	09/17/96	-	-	-	-	-	-	-	-	-
LSMW1-2	18-18.3'	09/17/96	-	-	-	-	-	-	-	-	-
LSMW4-2	18-19.6'	09/24/96	-	-	-	-	-	-	-	-	-
LSMW5-2	18-18.8'	09/24/96	-	-	-	-	-	-	-	-	-
LSANPB1-1 (Acid pit)	0.9-2.9'	09/25/96	/ U	/ U	**0.0018**	**0.011 J**	**0.058 J**	**0.0092 J**	**0.0782 J**	-	**7.7**
LSANPB1-2 (Acid pit)	6.9-8.9'	09/25/96	/ U	/ U	0.0045 U	0.0090 U	0.0090 U	0.0090 U	0.0090 U	-	**4.0**
LSANPB2-1 (Acid pit)	0.9-2.9'	09/25/96	/ U	/ U	0.0042 U	0.0085 U	**0.0014 J**	**0.0007 J**	**0.0021 J**	-	**6.9**
LSANPB2-2 (Acid pit)	4.9-6.9'	09/25/96	/ U	/ U	0.0044 U	0.0088 U	0.0088 U	0.0088 U	0.0088 U	-	**8.4**
LSANPB3-1 (Acid pit)	4-6'	06/25/99	/ U	/ U	0.015 U	0.0031 U	0.0031 U	0.0031 U	0.0031 U	-	**9.97**
LSANPB3-2 (Acid pit)	18-20'	06/25/99	/ U	/ U	0.015 U	0.0031 U	0.0031 U	0.0031 U	0.0031 U	-	**6.03**
LSANPB4-2 (Acid pit)	18-19'	06/25/99	/ U	/ U	0.015 U	0.0031 U	0.0031 U	0.0031 U	0.0031 U	-	**5.5**
LSANPB4-1 /Duplicate (AP)	2-4'	06/25/99	/ U	/ U	0.015 U	0.003 U	0.003 U	**0.0040**	**0.0040**	-	**6.15**
LSCB-1	n/a	06/25/99	-	-	0.017 U	0.034 U	**0.004**	**0.0390**	**0.0430**	-	**5.28**
Excluded: Assumed removed and disposed											
LO-13 L. CSP1	Stockpile composite	09/14/94	-	-	-	-	-	-	-	-	-
LO-13 L. CSP1 GEN	Assumed stockpile	09/14/94	-	-	-	-	-	-	-	-	-
LO-13 L. CSP2 GEN	Assumed stockpile	09/14/94	-	-	-	-	-	-	-	-	-

Appendix D
TABLE 1
Soil Analytical Data - Launch Site

Sample ID	Sample Depth	Sampling Date	Barium mg/kg	Beryllium mg/kg	Cadmium mg/kg	Chromium (total) mg/kg	Copper mg/kg	Lead mg/kg	Mercury mg/kg	Nickel mg/kg	Selenium mg/kg	Zinc mg/kg
LO-13 L. INSITU	Sidewall	09/14/94	-	-	-	-	-	-	-	-	-	-
LSSB2-1	9-11'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSSB3-1	4-6'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSSB3-2	14-16'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSSB5-2	10-12'	09/17/96	-	-	-	-	-	-	-	-	-	-
LSMW1-1	8-10'	09/17/96	-	-	-	-	-	-	-	-	-	-
L013SB-01A/Duplicate	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-	-
L013SB-01B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-	-
LO13SB-02A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-	-
LO13SB-02B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-	-
LO13SB-03A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-	-
LO13SB-03B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-	-
LO13SB-04A	0-0.5'	05/14/15	-	-	-	-	-	-	-	-	-	-
LO13SB-04B	0.5-1'	05/14/15	-	-	-	-	-	-	-	-	-	-
LSSB-8-1	4-8'	11/01/16	-	-	-	-	-	-	-	-	-	-
LSSB-8-2	12-13'	11/01/16	-	-	-	-	-	-	-	-	-	-
LSSB-9-1/ Duplicate	6-8'	11/01/16	-	-	-	-	-	-	-	-	-	-
LSSB-9-2	14-16'	11/01/16	-	-	-	-	-	-	-	-	-	-
LSSB-10-1	8-10'	11/01/16	-	-	-	-	-	-	-	-	-	-
LSSB-10-2	12-13'	11/01/16	-	-	-	-	-	-	-	-	-	-
LSSB-11-1	4-6'	11/01/16	-	-	-	-	-	-	-	-	-	-
LSSB-12-1	4-6'	11/01/16	-	-	-	-	-	-	-	-	-	-
LSSB-13-1	4-6'	11/01/16	-	-	-	-	-	-	-	-	-	-
Included - No detections												
LSSB1-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSSB2-2	14-15.5'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSSB4-1	12-14'	09/17/96	-	-	-	-	-	-	-	-	-	-
LSSB5-1	7-8'	09/17/96	-	-	-	-	-	-	-	-	-	-
LSSB6-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSSB7-1	7-9'	09/17/96	-	-	-	-	-	-	-	-	-	-
LSMW2-1	6-8'	09/25/96	-	-	-	-	-	-	-	-	-	-
LSMW2-2	12-14'	09/25/96	-	-	-	-	-	-	-	-	-	-
LSMW3-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSMW3-2	14-16'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSMW4-1	6-8'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSMW5-1	8-10'	09/24/96	-	-	-	-	-	-	-	-	-	-
Excluded: > 15 feet deep or former waste management structures												
LSSB1-2	16-18'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSSB6-2	16-17.5'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSSB4-2	17'	09/17/96	-	-	-	-	-	-	-	-	-	-
LSSB7-2	16-18'	09/17/96	-	-	-	-	-	-	-	-	-	-
LSMW1-2	18-18.3'	09/17/96	-	-	-	-	-	-	-	-	-	-
LSMW4-2	18-19.6'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSMW5-2	18-18.8'	09/24/96	-	-	-	-	-	-	-	-	-	-
LSANPB1-1 (Acid pit)	0.9-2.9'	09/25/96	**30.7**	-	-	**31.2**	-	**11.4**	**0.06**	-	0.19 U	-
LSANPB1-2 (Acid pit)	6.9-8.9'	09/25/96	**39.8** J	-	-	**33.0**	-	**11.8**	0.05 U	-	**0.38**	-
LSANPB2-1 (Acid pit)	0.9-2.9'	09/25/96	**32.1**	-	-	**30.9**	-	**11.6**	0.05 U	-	**0.35**	-
LSANPB2-2 (Acid pit)	4.9-6.9'	09/25/96	**39.6**	-	-	**41.8**	-	**15**	0.04 U	-	**0.55**	-
LSANPB3-1 (Acid pit)	4-6'	06/25/99	-	**0.399**	0.75 U	**22.0**	**14.5**	**7.8**	0.0659 U	**31.3**	1.88 U	**46.3**
LSANPB3-2 (Acid pit)	18-20'	06/25/99	-	**0.421**	0.77 U	**27.3**	**17.0**	7.7 U	0.069 U	**40.9**	1.91 U	**53.6**
LSANPB4-2 (Acid pit)	18-19'	06/25/99	-	**0.343**	0.71 U	**17.7**	**13.7**	7.1 U	0.0657 U	**25.8**	1.78 U	**47.3**
LSANPB4-1 /Duplicate (AP)	2-4'	06/25/99	-	**0.410**	**0.74**	**29.0**	**15.3**	**8.0**	0.0654 U	**36.6**	1.77 U	**52.8**
LSCB-1	n/a	06/25/99	-	**0.302**	**2.77**	**22.6**	**36.2**	**80.5**	0.0745 U	**23**	2.1 U	**237**
Excluded: Assumed removed and disposed												
LO-13 L. CSP1	Stockpile composite	09/14/94	-	-	-	-	-	-	-	-	-	-
LO-13 L. CSP1 GEN	Assumed stockpile	09/14/94	-	-	-	-	-	-	-	-	-	-
LO-13 L. CSP2 GEN	Assumed stockpile	09/14/94	-	-	-	-	-	-	-	-	-	-

Appendix D
TABLE 1
Soil Analytical Data - Launch Site

Notes

All 1996 and 1999 data results were obtained from summary tables prepared by previous consultants; laboratory reports not available.

	Grey highlight - not used in risk assessments
Bold	Detected value
mg/kg	Milligrams per kilogram
J	Estimated
U	Not detected at reporting limit shown
ND	Not detected
VPH	Volatile petroleum hydrocarbons
EPH	Extractable petroleum hydrocarbons
NA or "-"	Not analyzed
/	Reporting limits not available
1.	Typed as #2/#4/fuel oil or diesel
2.	TPH-DRO extrapolated to 78% C9-C18 and 22% C11-C22 aromatic hydrocarbons (MACTEC 2010).

Appendix D
TABLE 2
Subsurface Soil Analytical Data - Control Site

Sample ID	Sample Depth ft bgs	Sampling Date	TPH as Diesel-Range Organics mg/kg	C_5-C_8 Aliphatic Hydrocarbons mg/kg	C_9-C_{12} Aliphatic Hydrocarbons mg/kg	C_9-C_{10} Aromatic Hydrocarbons mg/kg	C_9-C_{18} Aliphatic Hydrocarbons mg/kg	C_{19}-C_{36} Aliphatic Hydrocarbons mg/kg	C_{11}-C_{22} Aromatic Hydrocarbons mg/kg	Benzene mg/kg	2-Butanone mg/kg
SUBAREA 1 - Former Radar Towers											
CSSB18-1	8-10	10/08/96	6.1 U	-	-	-	4.8 U[1]	-	1.3 U[1]	0.006 U	0.006 U
CSSB19-1	4-6	06/24/99	-	-	-	-	-	-	-	/ U	/ U
CSSB20-1	4-6	06/23/99	-	-	-	-	-	-	-	/ U	/ U
CSSB21-1	4-6	06/23/99	-	-	-	-	-	-	-	/ U	/ U
CSSB22-1/Dup	4-6	06/24/99	-	-	-	-	-	-	-	/ U	/ U
Maximum Detected Concentration			**ND**	**NA**	**NA**	**NA**	**ND**	**NA**	**ND**	**ND**	**ND**
SUBAREA 2 - Former Generating Building											
CSSB2-1	6-8	09/11/96	6.2 U	-	-	-	4.8 U[1]	-	1.4 U[1]	0.006 U	0.006 U
CSSB3-1	8-10	09/12/96	5.5 U	-	-	-	4.3 U[1]	-	1.2 U[1]	0.006 U	0.006 U
CSSB4-1	14-16	09/12/96	5.6 U	-	-	-	4.4 U[1]	-	1.2 U[1]	0.006 U	0.006 U
CSSB5-1	14-16	09/13/96	11 U	-	-	-	8.6 U[1]	-	2.4 U[1]	0.006 U	0.006 U
CSSB6-1	14-16	10/09/96	5.3 U	-	-	-	4.1 U[1]	-	1.2 U[1]	0.005 U	0.005 U
CSSB7-1	6-8	10/08/96	5.5 U	-	-	-	4.3 U[1]	-	1.2 U[1]	0.006 U	0.006 U
CSSB27-1/Dup	5-7	07/18/17	-	**5 J**	**120 J**	**98**	**1,400 J**	**280**	**1,100**	0.036 U	-
CSSB29-1	10-12	07/18/17	-	2.2 U	2.3 UB	**0.65 J**	6.6 U	11 U	6.6 U	0.045 U	-
CSSB29-2	12-14	07/18/17	-	2.1 U	1.8 UB	0.34 U	**48**	**63**	**23**	0.043 U	-
CSSB30-1	10-12	07/18/17	-	1.5 U	4 UB	**1.7 J**	6.5 U	11 U	6.5 U	0.031 U	-
CSSB30-2	12-14	07/18/17	-	1.7 UJ	**21 J**	**14 J**	**16 J**	**10 J**	**9.5 J**	0.036 UJ	-
CSSB31-1	5-7	07/18/17	-	2.3 U	1.8 UB	0.39 U	7.0 U	12 U	7.0 U	0.049 U	-
CSMW1-1	10-11	09/11/96	5.5 U	-	-	-	4.3 U[1]	-	1.2 U[1]	0.006 U	0.006 U
Maximum Detected Concentration			**94 J**	**5.0 J**	**120 J**	**98**	**1,400 J**	**280**	**1,100**	**ND**	**ND**
SUBAREA 3 - Former Mess Hall											
CSSB8-1	6-8	09/15/96	5.7 U	-	-	-	4.4 U[1]	-	1.3 U[1]	0.006 U	0.006 U
CSSB10-1/Dup	11-13	09/14/96	5.2 U	-	-	-	4.1 U[1]	-	1.1 U[1]	0.005 U	0.005 U
CSSB11-1	14-16	09/13/96	**8.6**	**-**	**-**	**-**	**6.7 [1]**	**-**	**1.9 [1]**	0.005 U	0.005 U
CSSB12-1	14-16	09/13/96	**5.6**	**-**	**-**	**-**	**4.4 [1]**	**-**	**1.2 [1]**	0.006 U	0.006 U
CSMW5-1	14.4-15.5	09/15/96	5.5 U	-	-	-	4.3 U[1]	-	1.2 U[1]	0.006 U	0.006 U
CSMW4-1	6-7	09/15/96	5.7 U	-	-	-	4.4 U[1]	-	1.3 U[1]	0.006 U	0.006 U
Maximum Detected Concentration			**8.6**	**NA**	**NA**	**NA**	**6.7**	**NA**	**1.9**	**ND**	**ND**
SUBAREA 4 - Former Administration Building											
CSSB13-1	8-10	09/16/96	5.5 U	-	-	-	4.3 U[1]	-	1.2 U[1]	0.006 U	0.006 U
CSSB14-1	8-10	09/15/96	8 U	-	-	-	6.2 U[1]	-	1.8 U[1]	0.006 U	**0.011**
CSSB15-1	8-10	10/08/96	5.4 U	-	-	-	4.2 U[1]	-	1.2 U[1]	0.006 U	0.006 U
CSSB16-1	10-12	10/08/96	5.8 U	-	-	-	4.5 U[1]	-	1.3 U[1]	0.006 U	0.006 U
CSSB17-1	6-8	10/09/96	5.6 U	-	-	-	4.4 U[1]	-	1.2 U[1]	0.006 U	0.006 U
CSMW6-1	6-8	10/09/96	5.7 U	-	-	-	4.4 U[1]	-	1.3 U[1]	0.006 U	0.006 U
CSMW7-1	6-8	10/08/96	5.6 U	-	-	-	4.4 U[1]	-	1.2 U[1]	0.006 U	0.006 U
Maximum Detected Concentration			**ND**	**NA**	**NA**	**NA**	**ND**	**NA**	**ND**	**ND**	**ND**
SUBAREA 5 - Northeast of Administrative Building											
CSSB23-1	4-6	06/22/99	-	-	-	-	--	-	--	/ U	/ U
CSSB24-1	4-6	06/22/99	-	-	-	-	--	-	--	/ U	/ U
CSSB25-1	4-6	06/23/99	-	-	-	-	--	-	--	/ U	/ U
CSSB26-1	4-6	06/25/99	-	-	-	-	--	-	--	/ U	/ U
CSMW8-1	6-8	09/16/96	5.8 U	-	-	-	4.5 U[1]	-	1.3 U[1]	0.006 U	0.006 U
Maximum Detected Concentration			**ND**	**NA**	**NA**	**NA**	**ND**	**NA**	**ND**	**ND**	**ND**

Appendix D
TABLE 2
Subsurface Soil Analytical Data - Control Site

Sample ID	Sample Depth ft bgs	Sampling Date	1,2-Dichloroethene mg/kg		cis-1,2-Dichloroethene mg/kg		Ethylbenzene mg/kg		Methylene Chloride mg/kg		Toluene mg/kg		1,2,4-Trichloro-benzene mg/kg		1,1,1-Trichloroethane mg/kg		Trichlorothene mg/kg		Xylenes (total) mg/kg		Naphthalene (VPH) mg/kg	
SUBAREA 1 - Former Radar Towers																						
CSSB18-1	8-10	10/08/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB19-1	4-6	06/24/99	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U
CSSB20-1	4-6	06/23/99	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U
CSSB21-1	4-6	06/23/99	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U
CSSB22-1/Dup	4-6	06/24/99	/	U	/	U	/	U	/	U	/	U	/	U	/	U	**0.505**		/	U	/	U
Maximum Detected Concentration			**ND**		**ND**		**ND**		**ND**		**ND**		**ND**		**ND**		**0.505**		**ND**		**ND**	
SUBAREA 2 - Former Generating Building																						
CSSB2-1	6-8	09/11/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	**0.002**	**J**	0.006	U
CSSB3-1	8-10	09/12/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	**0.001**	**J**	0.006	U
CSSB4-1	14-16	09/12/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB5-1	14-16	09/13/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB6-1	14-16	10/09/96	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
CSSB7-1	6-8	10/08/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB27-1/Dup	5-7	07/18/17	-		-		0.036	U	-		0.036	U	-		-		-		0.072	U	**2.7**	
CSSB29-1	10-12	07/18/17	-		-		0.045	U	-		0.045	U	-		-		-		0.090	U	0.045	U
CSSB29-2	12-14	07/18/17	-		-		0.043	U	-		0.043	U	-		-		-		0.086	U	**0.0091**	**J**
CSSB30-1	10-12	07/18/17	-		-		0.031	U	-		0.031	U	-		-		-		0.062	U	**0.023**	**J**
CSSB30-2	12-14	07/18/17	-		-		0.036	UJ	-		0.036	UJ	-		-		-		0.072	UJ	**0.4**	**J**
CSSB31-1	5-7	07/18/17	-		-		0.049	U	-		0.049	U	-		-		-		0.098	U	0.049	U
CSMW1-1	10-11	09/11/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	**0.003**	**J**	**0.001**	**J**	0.006	U
Maximum Detected Concentration			**ND**		**ND**		**0.005**	**J**	**ND**		**ND**		**ND**		**ND**		**0.003**	**J**	**0.002**	**J**	**2.7**	
SUBAREA 3 - Former Mess Hall																						
CSSB8-1	6-8	09/15/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB10-1/Dup	11-13	09/14/96	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
CSSB11-1	14-16	09/13/96	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
CSSB12-1	14-16	09/13/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSMW5-1	14.4-15.5	09/15/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSMW4-1	6-7	09/15/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Maximum Detected Concentration			**ND**		**ND**		**ND**		**ND**		**ND**		**ND**		**ND**		**ND**		**ND**		**ND**	
SUBAREA 4 - Former Administration Building																						
CSSB13-1	8-10	09/16/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB14-1	8-10	09/15/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB15-1	8-10	10/08/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB16-1	10-12	10/08/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSSB17-1	6-8	10/09/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSMW6-1	6-8	10/09/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
CSMW7-1	6-8	10/08/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
Maximum Detected Concentration			**ND**		**ND**		**ND**		**ND**		**ND**		**ND**		**ND**		**ND**		**ND**		**ND**	
SUBAREA 5 - Northeast of Administrative Building																						
CSSB23-1	4-6	06/22/99	/	U	/	U	**0.021**	**J**	/	U	/	U	**0.03**	**J**	/	U	/	U	**0.078**	**J**	**0.029**	**J**
CSSB24-1	4-6	06/22/99	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	**0.033**	**J**
CSSB25-1	4-6	06/23/99	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U
CSSB26-1	4-6	06/25/99	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U	/	U
CSMW8-1	6-8	09/16/96	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	**0.003**	**J**	0.006	U	0.006	U
Maximum Detected Concentration			**ND**		**ND**		**0.021**	**J**	**ND**		**ND**		**0.03**	**J**	**ND**		**0.003**	**J**	**0.078**	**J**	**0.033**	**J**

Appendix D
TABLE 2
Subsurface Soil Analytical Data - Control Site

Sample ID	Sample Depth ft bgs	Sampling Date	Naphthalene (SVOC) mg/kg	2-Methyl-naphthalene mg/kg	Acenaph-thene mg/kg	Acenaph-thylene mg/kg	Anthracene mg/kg	Benzo(a)-anthracene mg/kg	Benzo(b)-fluoranthene mg/kg	Benzo(k)-fluoranthene mg/kg	Benzo(g,h,i)-perylene mg/kg	Benzo(a)-pyrene mg/kg
SUBAREA 1 - Former Radar Towers												
CSSB18-1	8-10	10/08/96	-	-	-	-	-	-	-	-	-	-
CSSB19-1	4-6	06/24/99	-	-	-	-	-	-	-	-	-	-
CSSB20-1	4-6	06/23/99	-	-	-	-	-	-	-	-	-	-
CSSB21-1	4-6	06/23/99	-	-	-	-	-	-	-	-	-	-
CSSB22-1/Dup	4-6	06/24/99	-	-	-	-	-	-	-	-	-	-
Maximum Detected Concentration			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
SUBAREA 2 - Former Generating Building												
CSSB2-1	6-8	09/11/96	-	-	-	-	-	-	-	-	-	-
CSSB3-1	8-10	09/12/96	-	-	-	-	-	-	-	-	-	-
CSSB4-1	14-16	09/12/96	-	-	-	-	-	-	-	-	-	-
CSSB5-1	14-16	09/13/96	-	-	-	-	-	-	-	-	-	-
CSSB6-1	14-16	10/09/96	-	-	-	-	-	-	-	-	-	-
CSSB7-1	6-8	10/08/96	-	-	-	-	-	-	-	-	-	-
CSSB27-1/Dup	5-7	07/18/17	**0.0598**	**0.110**	**0.0409**	0.0018 U	0.0018 U	**0.0015 J**	0.0018 U	0.0018 U	0.0018 U	0.0018 U
CSSB29-1	10-12	07/18/17	0.0019 U	**0.0013 J**	0.0019 U	0.0019 U	0.0019 U	**0.00084 J**	0.0019 U	0.0019 U	**0.00084 J**	0.0019 U
CSSB29-2	12-14	07/18/17	0.002 U	0.002 U	0.002 U	**0.00083 J**	**0.002 J**	**0.0277**	**0.0257**	**0.0085**	**0.0108**	**0.0195**
CSSB30-1	10-12	07/18/17	**0.0009 J**	**0.0028 J**	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U
CSSB30-2	12-14	07/18/17	**0.0076 J**	**0.0231 J**	**0.0024 J**	0.0019 U	0.0019 U	**0.0046 J**	**0.0044 J**	**0.0019 J**	**0.0015 J**	**0.0026 J**
CSSB31-1	5-7	07/18/17	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U
CSMW1-1	10-11	09/11/96	-	-	-	-	-	-	-	-	-	-
Maximum Detected Concentration			**0.0598**	**0.110**	**0.0409**	**0.00083 J**	**0.002 J**	**0.0277**	**0.0257**	**0.0085**	**0.0108**	**0.0195**
SUBAREA 3 - Former Mess Hall												
CSSB8-1	6-8	09/15/96	-	-	-	-	-	-	-	-	-	-
CSSB10-1/Dup	11-13	09/14/96	-	-	-	-	-	-	-	-	-	-
CSSB11-1	14-16	09/13/96	-	-	-	-	-	-	-	-	-	-
CSSB12-1	14-16	09/13/96	-	-	-	-	-	-	-	-	-	-
CSMW5-1	14.4-15.5	09/15/96	-	-	-	-	-	-	-	-	-	-
CSMW4-1	6-7	09/15/96	-	-	-	-	-	-	-	-	-	-
Maximum Detected Concentration			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
SUBAREA 4 - Former Administration Building												
CSSB13-1	8-10	09/16/96	-	-	-	-	-	-	-	-	-	-
CSSB14-1	8-10	09/15/96	-	-	-	-	-	-	-	-	-	-
CSSB15-1	8-10	10/08/96	-	-	-	-	-	-	-	-	-	-
CSSB16-1	10-12	10/08/96	-	-	-	-	-	-	-	-	-	-
CSSB17-1	6-8	10/09/96	-	-	-	-	-	-	-	-	-	-
CSMW6-1	6-8	10/09/96	-	-	-	-	-	-	-	-	-	-
CSMW7-1	6-8	10/08/96	-	-	-	-	-	-	-	-	-	-
Maximum Detected Concentration			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
SUBAREA 5 - Northeast of Administrative Building												
CSSB23-1	4-6	06/22/99	-	-	-	-	-	-	-	-	-	-
CSSB24-1	4-6	06/22/99	-	-	-	-	-	-	-	-	-	-
CSSB25-1	4-6	06/23/99	-	-	-	-	-	-	-	-	-	-
CSSB26-1	4-6	06/25/99	-	-	-	-	-	-	-	-	-	-
CSMW8-1	6-8	09/16/96	-	-	-	-	-	-	-	-	-	-
Maximum Detected Concentration			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Appendix D
TABLE 2
Subsurface Soil Analytical Data - Control Site

Sample ID	Sample Depth ft bgs	Sampling Date	Chrysene mg/kg	Dibenzo(a,h)-anthracene mg/kg	Fluoranthene mg/kg	Fluorene mg/kg	Indeno(1,2,3-cd)-pyrene mg/kg	Phenanthrene mg/kg	Pyrene mg/kg	Total Low Molecular Weight PAHs mg/kg	Total High Molecular Weight PAHs mg/kg
SUBAREA 1 - Former Radar Towers											
CSSB18-1	8-10	10/08/96	-	-	-	-	-	-	-	-	-
CSSB19-1	4-6	06/24/99	-	-	-	-	-	-	-	-	-
CSSB20-1	4-6	06/23/99	-	-	-	-	-	-	-	-	-
CSSB21-1	4-6	06/23/99	-	-	-	-	-	-	-	-	-
CSSB22-1/Dup	4-6	06/24/99	-	-	-	-	-	-	-	-	-
Maximum Detected Concentration			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
SUBAREA 2 - Former Generating Building											
CSSB2-1	6-8	09/11/96	-	-	-	-	-	-	-	-	-
CSSB3-1	8-10	09/12/96	-	-	-	-	-	-	-	-	-
CSSB4-1	14-16	09/12/96	-	-	-	-	-	-	-	-	-
CSSB5-1	14-16	09/13/96	-	-	-	-	-	-	-	-	-
CSSB6-1	14-16	10/09/96	-	-	-	-	-	-	-	-	-
CSSB7-1	6-8	10/08/96	-	-	-	-	-	-	-	-	-
CSSB27-1/Dup	5-7	07/18/17	**0.0013 J**	0.0018 U	**0.0057**	**0.0644**	0.0018 U	**0.210**	**0.0159**	**3.147**	**0.003**
CSSB29-1	10-12	07/18/17	0.0019 U	0.0019 U	**0.0013 J**	0.0019 U	**0.00081 J**	**0.0012 J**	**0.0015 J**	**0.006**	**0.002**
CSSB29-2	12-14	07/18/17	**0.0205**	**0.0032 J**	**0.0407**	0.002 U	**0.0109**	**0.0087**	**0.0409**	**0.111**	**0.116**
CSSB30-1	10-12	07/18/17	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	**0.0014 J**	0.0019 U	**0.027**	0.0019 U
CSSB30-2	12-14	07/18/17	**0.0039 J**	0.0019 UJ	**0.0035 J**	**0.0043 J**	**0.0017 J**	**0.0086 J**	**0.0042 J**	**0.448**	**0.019**
CSSB31-1	5-7	07/18/17	0.0019 U	0.0019 U	**0.0013 J**	0.0019 U	0.0019 U	0.0019 U	**0.0008 J**	**0.002**	0.0019 U
CSMW1-1	10-11	09/11/96	-	-	-	-	-	-	-	-	
Maximum Detected Concentration			**0.0205**	**0.0032 J**	**0.0407**	**0.0644**	**0.0109**	**0.210**	**0.0409**	**0.111**	**0.116**
SUBAREA 3 - Former Mess Hall											
CSSB8-1	6-8	09/15/96	-	-	-	-	-	-	-	-	-
CSSB10-1/Dup	11-13	09/14/96	-	-	-	-	-	-	-	-	-
CSSB11-1	14-16	09/13/96	-	-	-	-	-	-	-	-	-
CSSB12-1	14-16	09/13/96	-	-	-	-	-	-	-	-	-
CSMW5-1	14.4-15.5	09/15/96	-	-	-	-	-	-	-	-	-
CSMW4-1	6-7	09/15/96	-	-	-	-	-	-	-	-	-
Maximum Detected Concentration			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
SUBAREA 4 - Former Administration Building											
CSSB13-1	8-10	09/16/96	-	-	-	-	-	-	-	-	-
CSSB14-1	8-10	09/15/96	-	-	-	-	-	-	-	-	-
CSSB15-1	8-10	10/08/96	-	-	-	-	-	-	-	-	-
CSSB16-1	10-12	10/08/96	-	-	-	-	-	-	-	-	-
CSSB17-1	6-8	10/09/96	-	-	-	-	-	-	-	-	-
CSMW6-1	6-8	10/09/96	-	-	-	-	-	-	-	-	-
CSMW7-1	6-8	10/08/96	-	-	-	-	-	-	-	-	-
Maximum Detected Concentration			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
SUBAREA 5 - Northeast of Administrative Building											
CSSB23-1	4-6	06/22/99	-	-	-	-	-	-	-	-	-
CSSB24-1	4-6	06/22/99	-	-	-	-	-	-	-	-	-
CSSB25-1	4-6	06/23/99	-	-	-	-	-	-	-	-	-
CSSB26-1	4-6	06/25/99	-	-	-	-	-	-	-	-	-
CSMW8-1	6-8	09/16/96	-	-	-	-	-	-	-	-	-
Maximum Detected Concentration			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Appendix D
TABLE 2
Subsurface Soil Analytical Data - Control Site

Sample ID	Sample Depth ft bgs	Sampling Date	TPH as Diesel-Range Organics mg/kg	C_5-C_8 Aliphatic Hydrocarbons mg/kg	C_9-C_{12} Aliphatic Hydrocarbons mg/kg	C_9-C_{10} Aromatic Hydrocarbons mg/kg	C_9-C_{18} Aliphatic Hydrocarbons mg/kg	C_{19}-C_{36} Aliphatic Hydrocarbons mg/kg	C_{11}-C_{22} Aromatic Hydrocarbons mg/kg	Benzene mg/kg	2-Butanone mg/kg
Excluded: depths greater than 15 ft bgs											
CSSB1-2	18-20	09/11/96	**35**	**-**	**-**	**-**	**27.3** [1]	**-**	**7.7** [1]	0.005 U	0.005 U
CSSB2-2	18-20	09/11/96	5.2 U	-	-	-	4.1 U[1]	-	1.1 U[1]	0.005 U	0.005 U
CSSB3-2	18-20	09/12/96	5.6 U	-	-	-	4.4 U[1]	-	1.2 U[1]	0.006 U	0.006 U
CSSB4-2/Dup	19-21	09/12/96	6 U	-	-	-	4.7 U[1]	-	1.3 U[1]	0.006 U	0.006 U
CSSB5-2	19-21	09/13/96	5.9 U	-	-	-	4.6 U[1]	-	1.3 U[1]	0.006 U	0.006 U
CSSB6-2	19-21	10/09/96	6.2 U	-	-	-	4.8 U[1]	-	1.4 U[1]	0.006 U	0.006 U
CSSB7-2	18-20	10/08/96	**8.5**	**-**	**-**	**-**	**6.6** [1]	**-**	**1.9** [1]	0.006 U	0.006 U
CSSB8-2	18-20	09/15/96	6.1 U	-	-	-	4.8 U[1]	-	1.3 U[1]	0.006 U	0.006 U
CSSB10-2	19-21	09/14/96	6 U	-	-	-	4.7 U[1]	-	1.3 U[1]	0.006 U	0.006 U
CSSB11-2	19-21	09/13/96	**15**	**-**	**-**	**-**	**11.7** [1]	**-**	**3.3** [1]	0.006 U	0.006 U
CSSB12-2	19-21	09/13/96	**8.3**	**-**	**-**	**-**	**6.5** [1]	**-**	**1.8** [1]	0.006 U	0.006 U
CSSB13-2	18-20	09/16/96	5.5 U	-	-	-	4.3 U[1]	-	1.2 U[1]	0.006 U	0.006 U
CSSB14-2	18-20	09/15/96	5.5 U	-	-	-	4.3 U[1]	-	1.2 U[1]	0.006 U	0.006 U
CSSB15-2	18-20	10/08/96	5.4 U	-	-	-	4.2 U[1]	-	1.2 U[1]	0.006 U	0.006 U
CSSB16-2	18-20	10/08/96	5.9 U	-	-	-	4.6 U[1]	-	1.3 U[1]	0.006 U	0.006 U
CSSB17-2	18-20	10/09/96	6 U	-	-	-	4.7 U[1]	-	1.3 U[1]	0.006 U	0.006 U
CSSB18-2	18-20	10/08/96	5.5 U	-	-	-	4.3 U[1]	-	1.2 U[1]	0.006 U	0.006 U
CSSB19-2	38-40	06/24/99	-	-	-	-	--	-	--	/ U	/ U
CSSB20-2	38-40	06/24/99	-	-	-	-	--	-	--	/ U	/ U
CSSB21-2	38-40	06/24/99	-	-	-	-	-	-	-	/ U	/ U
CSSB22-2	38-40	06/25/99	-	-	-	-	--	-	--	/ U	/ U
CSSB23-2	38-40	06/22/99	-	-	-	-	--	-	--	/ U	/ U
CSSB24-2	38-40	06/22/99	-	-	-	-	--	-	--	/ U	/ U
CSSB25-2	38-40	06/23/99	-	-	-	-	--	-	--	/ U	/ U
CSSB26-2	38-40	06/25/99	-	-	-	-	--	-	--	/ U	/ U
CSSB27-2	20-22	07/18/17	-	2.2 U	**18**	**11**	**70** **J**	**21** **J**	**35**	0.046 U	-
CSSB28-1	19.5-20	07/18/17	-	2.4 U	1.8 UB	0.40 U	**6.7** **J**	**11** **J**	7.2 U	0.050 U	-
CSSB28-2	20-22	07/18/17	-	2.4 U	4.5 UB	**1.8** **J**	**4.7** **J**	12 U	7.1 U	0.051 U	-
CSSB32-1	19-21	07/18/17	-	1.8 U	1.8 UB	**0.56** **J**	6.9 U	11 U	6.9 U	0.039 U	-
CSSB32-2	21-23	07/18/17	-	2.4 U	2.1 UB	0.40 U	6.6 U	11 U	6.6 U	0.049 U	-
CSMW2-1	19.5-20	09/11/96	**200**	**-**	**-**	**-**	**156** [1]	**-**	**44** [1]	0.006 U	0.006 U
CSMW2-2	30-32	09/11/96	**7**	**-**	**-**	**-**	**5.46** [1]	**-**	**1.54** [1]	0.006 U	0.006 U
CSMW3-1	22-24	09/14/96	5.9 U	-	-	-	4.6 U[1]	-	1.3 U[1]	0.006 U	0.006 U
CSMW3-2	33-34.7	09/14/96	5.3 U	-	-	-	4.1 U[1]	-	1.2 U[1]	**0.002** **J**	0.005 U
CSMW4-2	32-34	09/15/96	5.2 U	-	-	-	4.1 U[1]	-	1.1 U[1]	0.005 U	0.005 U
CSMW5-2	28-30	09/15/96	5.1 U	-	-	-	4.0 U[1]	-	1.1 U[1]	0.005 U	0.005 U
CSMW6-2	32-34	10/09/96	5.9 U	-	-	-	4.6 U[1]	-	1.3 U[1]	0.006 U	0.006 U
CSMW7-2/Dup	25-27	10/08/96	5.6 U	-	-	-	4.4 U[1]	-	1.2 U[1]	0.006 U	0.006 U
CSMW8-2	32-34	09/16/96	5.5 U	-	-	-	4.3 U[1]	-	1.2 U[1]	0.006 U	0.006 U

Appendix D
TABLE 2
Subsurface Soil Analytical Data - Control Site

Sample ID	Sample Depth ft bgs	Sampling Date	1,2-Dichloroethene mg/kg	cis-1,2-Dichloroethene mg/kg	Ethylbenzene mg/kg	Methylene Chloride mg/kg	Toluene mg/kg	1,2,4-Trichloro-benzene mg/kg	1,1,1-Trichloroethane mg/kg	Trichlorothene mg/kg	Xylenes (total) mg/kg	Naphthalene (VPH) mg/kg
Excluded: depths greater than 15 ft bgs												
CSSB1-2	18-20	09/11/96	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
CSSB2-2	18-20	09/11/96	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
CSSB3-2	18-20	09/12/96	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
CSSB4-2/Dup	19-21	09/12/96	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
CSSB5-2	19-21	09/13/96	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
CSSB6-2	19-21	10/09/96	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
CSSB7-2	18-20	10/08/96	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
CSSB8-2	18-20	09/15/96	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
CSSB10-2	19-21	09/14/96	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
CSSB11-2	19-21	09/13/96	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
CSSB12-2	19-21	09/13/96	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
CSSB13-2	18-20	09/16/96	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
CSSB14-2	18-20	09/15/96	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
CSSB15-2	18-20	10/08/96	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
CSSB16-2	18-20	10/08/96	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
CSSB17-2	18-20	10/09/96	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
CSSB18-2	18-20	10/08/96	0.006 U	0.006 U	0.006 U	0.006 U	**0.001 J**	0.006 U	0.006 U	**0.018**	0.006 U	0.006 U
CSSB19-2	38-40	06/24/99	/ U	/ U	/ U	/ U	/ U	/ U	/ U	**0.17 J**	/ U	/ U
CSSB20-2	38-40	06/24/99	/ U	/ U	/ U	**0.026 J**	/ U	/ U	/ U	**0.117 J**	/ U	/ U
CSSB21-2	38-40	06/24/99	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	missing
CSSB22-2	38-40	06/25/99	/ U	/ U	/ U	**0.031 J**	/ U	/ U	/ U	/ U	/ U	/ U
CSSB23-2	38-40	06/22/99	/ U	**0.101 J**	/ U	/ U	/ U	/ U	/ U	**0.616**	/ U	/ U
CSSB24-2	38-40	06/22/99	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U
CSSB25-2	38-40	06/23/99	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U	/ U
CSSB26-2	38-40	06/25/99	/ U	/ U	/ U	**0.036 J**	**0.039 J**	/ U	/ U	**0.07 J**	/ U	/ U
CSSB27-2	20-22	07/18/17	-	-	0.046 U	-	0.046 U	-	-	-	0.092 U	**0.17 J**
CSSB28-1	19.5-20	07/18/17	-	-	0.050 U	-	0.050 U	-	-	-	0.100 U	0.050 U
CSSB28-2	20-22	07/18/17	-	-	0.051 U	-	0.051 U	-	-	-	0.102 U	0.051 U
CSSB32-1	19-21	07/18/17	-	-	0.039 U	-	0.039 U	-	-	-	0.078 U	0.039 U
CSSB32-2	21-23	07/18/17	-	-	0.049 U	-	0.049 U	-	-	-	0.098 U	0.049 U
CSMW2-1	19.5-20	09/11/96	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
CSMW2-2	30-32	09/11/96	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
CSMW3-1	22-24	09/14/96	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
CSMW3-2	33-34.7	09/14/96	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
CSMW4-2	32-34	09/15/96	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
CSMW5-2	28-30	09/15/96	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
CSMW6-2	32-34	10/09/96	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
CSMW7-2/Dup	25-27	10/08/96	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
CSMW8-2	32-34	09/16/96	**0.007**	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	**0.004 J**	**0.034 J**	0.006 U	0.006 U

Appendix D
TABLE 2
Subsurface Soil Analytical Data - Control Site

Sample ID	Sample Depth ft bgs	Sampling Date	Naphthalene (SVOC) mg/kg	2-Methyl-naphthalene mg/kg	Acenaph-thene mg/kg	Acenaph-thylene mg/kg	Anthracene mg/kg	Benzo(a)-anthracene mg/kg	Benzo(b)-fluoranthene mg/kg	Benzo(k)-fluoranthene mg/kg	Benzo(g,h,i)-perylene mg/kg	Benzo(a)-pyrene mg/kg
Excluded: depths greater than 15 ft bgs												
CSSB1-2	18-20	09/11/96	-	-	-	-	-	-	-	-	-	-
CSSB2-2	18-20	09/11/96	-	-	-	-	-	-	-	-	-	-
CSSB3-2	18-20	09/12/96	-	-	-	-	-	-	-	-	-	-
CSSB4-2/Dup	19-21	09/12/96	-	-	-	-	-	-	-	-	-	-
CSSB5-2	19-21	09/13/96	-	-	-	-	-	-	-	-	-	-
CSSB6-2	19-21	10/09/96	-	-	-	-	-	-	-	-	-	-
CSSB7-2	18-20	10/08/96	-	-	-	-	-	-	-	-	-	-
CSSB8-2	18-20	09/15/96	-	-	-	-	-	-	-	-	-	-
CSSB10-2	19-21	09/14/96	-	-	-	-	-	-	-	-	-	-
CSSB11-2	19-21	09/13/96	-	-	-	-	-	-	-	-	-	-
CSSB12-2	19-21	09/13/96	-	-	-	-	-	-	-	-	-	-
CSSB13-2	18-20	09/16/96	-	-	-	-	-	-	-	-	-	-
CSSB14-2	18-20	09/15/96	-	-	-	-	-	-	-	-	-	-
CSSB15-2	18-20	10/08/96	-	-	-	-	-	-	-	-	-	-
CSSB16-2	18-20	10/08/96	-	-	-	-	-	-	-	-	-	-
CSSB17-2	18-20	10/09/96	-	-	-	-	-	-	-	-	-	-
CSSB18-2	18-20	10/08/96	-	-	-	-	-	-	-	-	-	-
CSSB19-2	38-40	06/24/99	-	-	-	-	-	-	-	-	-	-
CSSB20-2	38-40	06/24/99	-	-	-	-	-	-	-	-	-	-
CSSB21-2	38-40	06/24/99	-	-	-	-	-	-	-	-	-	-
CSSB22-2	38-40	06/25/99	-	-	-	-	-	-	-	-	-	-
CSSB23-2	38-40	06/22/99	-	-	-	-	-	-	-	-	-	-
CSSB24-2	38-40	06/22/99	-	-	-	-	-	-	-	-	-	-
CSSB25-2	38-40	06/23/99	-	-	-	-	-	-	-	-	-	-
CSSB26-2	38-40	06/25/99	-	-	-	-	-	-	-	-	-	-
CSSB27-2	20-22	07/18/17	**0.0093**	**0.0236**	**0.0106**	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U
CSSB28-1	19.5-20	07/18/17	0.0019 U	**0.0011 J**	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U
CSSB28-2	20-22	07/18/17	**0.00092 J**	**0.0029 J**	**0.0015 J**	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U
CSSB32-1	19-21	07/18/17	0.0019 U	0.0019 U	0.0019 U	0.0019 U	**0.00092 J**	**0.0026 J**	**0.0022 J**	**0.0013 J**	**0.0017 J**	**0.0019 J**
CSSB32-2	21-23	07/18/17	0.0019 U	0.0019 U	0.0019 U	0.0019 U	**0.0011 J**	**0.0035 J**	**0.0037**	**0.0014 J**	**0.002 J**	**0.0027 J**
CSMW2-1	19.5-20	09/11/96	-	-	-	-	-	-	-	-	-	-
CSMW2-2	30-32	09/11/96	-	-	-	-	-	-	-	-	-	-
CSMW3-1	22-24	09/14/96	-	-	-	-	-	-	-	-	-	-
CSMW3-2	33-34.7	09/14/96	-	-	-	-	-	-	-	-	-	-
CSMW4-2	32-34	09/15/96	-	-	-	-	-	-	-	-	-	-
CSMW5-2	28-30	09/15/96	-	-	-	-	-	-	-	-	-	-
CSMW6-2	32-34	10/09/96	-	-	-	-	-	-	-	-	-	-
CSMW7-2/Dup	25-27	10/08/96	-	-	-	-	-	-	-	-	-	-
CSMW8-2	32-34	09/16/96	-	-	-	-	-	-	-	-	-	-

Appendix D
TABLE 2
Subsurface Soil Analytical Data - Control Site

Sample ID	Sample Depth ft bgs	Sampling Date	Chrysene mg/kg	Dibenzo(a,h)-anthracene mg/kg	Fluoranthene mg/kg	Fluorene mg/kg	Indeno(1,2,3-cd)-pyrene mg/kg	Phenanthrene mg/kg	Pyrene mg/kg	Total Low Molecular Weight PAHs mg/kg	Total High Molecular Weight PAHs mg/kg
Excluded: depths greater than 15 ft bgs											
CSSB1-2	18-20	09/11/96	-	-	-	-	-	-	-	-	-
CSSB2-2	18-20	09/11/96	-	-	-	-	-	-	-	-	-
CSSB3-2	18-20	09/12/96	-	-	-	-	-	-	-	-	-
CSSB4-2/Dup	19-21	09/12/96	-	-	-	-	-	-	-	-	-
CSSB5-2	19-21	09/13/96	-	-	-	-	-	-	-	-	-
CSSB6-2	19-21	10/09/96	-	-	-	-	-	-	-	-	-
CSSB7-2	18-20	10/08/96	-	-	-	-	-	-	-	-	-
CSSB8-2	18-20	09/15/96	-	-	-	-	-	-	-	-	-
CSSB10-2	19-21	09/14/96	-	-	-	-	-	-	-	-	-
CSSB11-2	19-21	09/13/96	-	-	-	-	-	-	-	-	-
CSSB12-2	19-21	09/13/96	-	-	-	-	-	-	-	-	-
CSSB13-2	18-20	09/16/96	-	-	-	-	-	-	-	-	-
CSSB14-2	18-20	09/15/96	-	-	-	-	-	-	-	-	-
CSSB15-2	18-20	10/08/96	-	-	-	-	-	-	-	-	-
CSSB16-2	18-20	10/08/96	-	-	-	-	-	-	-	-	-
CSSB17-2	18-20	10/09/96	-	-	-	-	-	-	-	-	-
CSSB18-2	18-20	10/08/96	-	-	-	-	-	-	-	-	-
CSSB19-2	38-40	06/24/99	-	-	-	-	-	-	-	-	-
CSSB20-2	38-40	06/24/99	-	-	-	-	-	-	-	-	-
CSSB21-2	38-40	06/24/99	-	-	-	-	-	-	-	-	-
CSSB22-2	38-40	06/25/99	-	-	-	-	-	-	-	-	-
CSSB23-2	38-40	06/22/99	-	-	-	-	-	-	-	-	-
CSSB24-2	38-40	06/22/99	-	-	-	-	-	-	-	-	-
CSSB25-2	38-40	06/23/99	-	-	-	-	-	-	-	-	-
CSSB26-2	38-40	06/25/99	-	-	-	-	-	-	-	-	-
CSSB27-2	20-22	07/18/17	0.0018 U	0.0018 U	**0.0011 J**	**0.0134**	0.0018 U	**0.0352**	**0.0025 J**	**0.256 J**	0.0018 U
CSSB28-1	19.5-20	07/18/17	0.0019 U	0.0019 U	**0.0009 J**	0.0019 U	0.0019 U	**0.00087 J**	0.0019 U	**0.003** J	0.0019 U
CSSB28-2	20-22	07/18/17	**0.00096 J**	0.0019 U	**0.0059**	0.0019 U	0.0019 U	**0.0051**	**0.0023 J**	**0.019 J**	**0.003 J**
CSSB32-1	19-21	07/18/17	**0.0023 J**	**0.0011 J**	**0.0031 J**	0.0019 U	**0.0016 J**	**0.0013 J**	**0.0037 J**	**0.011 J**	**0.013 J**
CSSB32-2	21-23	07/18/17	**0.0029 J**	0.0019 U	**0.0067**	0.0019 U	**0.0018 J**	**0.005**	**0.0055**	**0.020 J**	**0.016 J**
CSMW2-1	19.5-20	09/11/96	-	-	-	-	-	-	-	-	-
CSMW2-2	30-32	09/11/96	-	-	-	-	-	-	-	-	-
CSMW3-1	22-24	09/14/96	-	-	-	-	-	-	-	-	-
CSMW3-2	33-34.7	09/14/96	-	-	-	-	-	-	-	-	-
CSMW4-2	32-34	09/15/96	-	-	-	-	-	-	-	-	-
CSMW5-2	28-30	09/15/96	-	-	-	-	-	-	-	-	-
CSMW6-2	32-34	10/09/96	-	-	-	-	-	-	-	-	-
CSMW7-2/Dup	25-27	10/08/96	-	-	-	-	-	-	-	-	-
CSMW8-2	32-34	09/16/96	-	-	-	-	-	-	-	-	-

Appendix D
TABLE 2
Subsurface Soil Analytical Data - Control Site

Notes

Soil data from well borings previously referenced as "CSSW-X-X; modified to CSMW-X-X to match site figures.

1996 and 1999 soil data from summary tables; lab reports unavailable.

	Grey highlight - not used in risk assessments
Bold	Detected value
mg/kg	Milligrams per kilogram
ft bgs	Feet below ground surface
NE	Not established
ND	Not detected
U	Not detected at reporting limit shown
UJ	Not detected at estimated reporting limit shown
UB	Detected in blank sample; result
J	Estimated concentration below reporting limit or due to quality control limitations.
CSSB-X/Du	Highest detected concentration from original sample and duplicate presented.
NA or "-"	Not analyzed
/	Reporting limit not available.
1.	TPH-DRO extrapolated to 78% aliphatic hydrocarbons and 22% C11-C22 aromatic hydrocarbons based on No.2 fuel oil and MACTEC approach (2010).

Appendix D
TABLE 3
Groundwater Analytical Data - Launch Site

Well ID	Sampling Date	Groundwater Depth	Total Petroleum Hydrocarbons - Gasoline-Range Organics (TPH-GRO)		Total Petroleum Hydrocarbons - Diesel-Range Organics (TPH-DRO)		cis-1,2-Dichloro-ethene		Toluene		Trichloroethene	
		Feet BTIC	µg/L		µg/L		µg/L		µg/L		µg/L	
LSMW-1	11/03/96	7.90	50	U	**210**		0.5	U	0.5	U	0.5	U
	05/29/97	6.69	50	U	50	U	0.5	U	0.5	U	0.5	U
LSMW-3	11/03/96	14.92	50	U	**52**		0.5	U	0.5	U	0.5	U
	05/29/97	17.32	50	U	50	U	0.5	U	0.5	U	0.5	U
LSMW-6	11/03/96	18.5	50	U	50	U	0.5	U	0.5	U	**0.8**	
	05/29/97	17.08	50	U	50	U	**0.5**		0.5	U	**2.0**	
LSMW-7	11/02/96	27.3	50	U	**150**		0.5	U	**1.0**		0.5	U
	05/29/97	23.98	50	U	**70**		0.5	U	0.5	U	0.5	U
	10/26/99	--	-		**180**	**J**	**-**		-		-	
	05/17/00	--	-		50	U	-		-		-	
	12/05/02	28.78	-		50	U	-		-		-	
	04/23/03	23.02	-		50	U	-		-		-	
	09/18/03	27.4	-		50	U	-		-		-	
	05/11/04	25.72	-		50	U	-		-		-	
LSMW-8	11/02/96	--	50	U	**173**		0.5	U	0.5	U	0.5	U
	05/29/97	--	50	U	50	U	0.5	U	0.5	U	0.5	U
LSDW-1	11/01/96	--	/	U	/	U	/	U	/	U	/	U
	05/19/97	--	/	U	/	U	/	U	/	U	/	U
	09/18/03	--	-		50	U	-		-		-	
	10/02/08	--	-		50	U	-		-		-	
	04/30/09	--	-		50	U	-		-		-	
	10/31/09	--	-		50	U	-		-		-	
	05/25/10	--	-		50	U	-		-		-	

Notes:
All data obtained from summary tables prepared by previous consultants; original laboratory reports not available.

Bold	Detected analyte
µg/L	micrograms per liter
J	Estimated concentration
U	Not detected at reporting limit shown
BTIC	Below top of inner well casing
/	Reporting limit unavailable
-	Not analyzed

Appendix D
TABLE 4
Groundwater Analytical Data - Control Site

Sample ID	Depth to Groundwater Feet BTIC	Sampling Date	Total Petroleum Hydrocarbons as Gasoline-Range Organics (GRO) µg/L	Total Petroleum Hydrocarbons as Diesel-Range Organics (DRO) µg/L	C5-C8 Aliphatic Hydrocarbons µg/L	C9-C12 Aliphatic Hydrocarbons µg/L	C9-C10 Aromatic Hydrocarbons µg/L	Extractable Petroleum Hydrocarbons (All Fractions) µg/L	C9-C18 Aliphatic Hydrocarbons µg/L	C11-C22 Aromatic Hydrocarbons µg/L	Acetone µg/L	cis-1,2-Dichloro-ethene µg/L
CSMW3-2	n/a	05/28/97	50 U	50 U	-	-	-	-	39 U[1]	11 U[1]	2 U	0.5 U
CSMW5-1	n/a	11/04/96	50 U	**230**	**-**	**-**	**-**	-	**179.4 [1]**	**50.6 [1]**	2 U	0.5 U
CSMW5-2/Dup	n/a	05/28/97	50 U	**180**	**-**	**-**	**-**	-	**140.4 [1]**	**39.6 [1]**	2 U	0.5 U
CSMW5-3	n/a	10/26/99	-	**220 J**	**-**	**-**	**-**	-	**171.6 [1]**	**48.4 [1]**	-	-
CSMW5-4	n/a	05/17/00	-	**120 J**	**-**	**-**	**-**	-	**93.6 [1]**	**26.4 [1]**	-	-
CSMW5-1202	n/a	12/04/02	-	-	-	-	-	-	--	--	-	-
CSMW5-0403	n/a	04/23/03	-	-	-	-	-	-	--	--	-	-
CSMW5-0903	n/a	09/18/03	-	**88**	**-**	**-**	**-**	-	**68.6 [1]**	**19.4 [1]**	-	-
CSMW5-0504	n/a	05/11/04	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-0904	n/a	09/30/04	-	**250**	**-**	**-**	**-**	-	**195 [1]**	**55 [1]**	-	-
CSMW5-0405	n/a	04/25/05	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-0905	n/a	09/15/05	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-0506	n/a	05/23/06	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-1006	n/a	10/24/06	-	**260 J**	**-**	**-**	**-**	-	**202.8 [1]**	**57.2 [1]**	-	-
CSMW5-0507	n/a	05/24/07	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-1007	n/a	10/24/07	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-0408	n/a	04/30/08	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-1008	n/a	10/28/08	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-0409	n/a	04/30/09	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-1009	n/a	10/30/09	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-0510	n/a	05/25/10	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW5-1110	n/a	11/02/10	-	-	-	-	-	100 U	100 U	100 U	-	-
CSMW5-0511	n/a	05/25/11	-	-	-	-	-	100 U	100 U	100 U	-	-
CSMW5-1111	n/a	11/16/11	-	-	-	-	-	100 U	100 U	100 U	-	-
CSMW5-0512	n/a	05/23/12	-	-	-	-	-	100 U	100 U	100 U	-	-
CSMW9-3 /Dup	n/a	10/26/99	50 U	80 U	-	-	-	-	62.4 U[1]	17.6 U[1]	**20 J**	**1.6 J**
CSMW9-4 /Dup	n/a	05/17/00	40 U	50 U	-	-	-	-	39 U[1]	11 U[1]	20 U	**1.6**
CSMW9-1202	n/a	04/14/02	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW9-0403	n/a	04/23/03	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW9-0903	n/a	09/18/03	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW9-0504	n/a	05/11/04	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW9	68.4	07/21/17	-	-	-	-	-	-	-	-	-	-
CSMW10-3	n/a	10/26/99	50 U	**120 J**	**-**	**-**	**-**	-	**93.6 [1]**	**26.4 [1]**	**20 J**	2 *U*
CSMW10-4	n/a	05/17/00	40 U	50 U	-	-	-	-	39 U[1]	11 U[1]	20 U	1 U
CSMW10-1202	n/a	12/04/02	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW10-0403	n/a	04/23/03	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW10-0903	n/a	09/18/03	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW10-0504	n/a	05/11/04	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW10	66.83	07/21/17	-	-	-	-	-	-	-	-	-	-
CSMW11-3	n/a	10/26/99	50 U	60 U	-	-	-	-	46.8 U[1]	13.2 U[1]	**20 J**	2 *U*
CSMW11-4	n/a	05/17/00	40 U	50 U	-	-	-	-	39 U[1]	11 U[1]	20 U	1 U
CSMW11-1202	n/a	12/05/02	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW11-0403	n/a	04/23/03	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW11-0903	n/a	09/18/03	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW11-0504	n/a	05/11/04	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSMW-100-0717/Dup	69.95	07/21/17	-	-	60 U	**56 J**	**13 J**	-	66 U	85 U [5]	-	-
CSMW-101-0717	67.01	07/21/17	-	-	60 U	**57 J**	**12 J**	-	66 U	85 U [5]	-	-
CSTAP-1 / Dup	tap water	11/04/96	50 U	50 U	-	-	-	/ U	/ U	/ U	0.5 U	0.5 U
CSTAP-2	tap water	05/28/97	50 U	50 U	-	-	-	/ U	/ U	/ U	0.5 U	0.5 U
CSDW1-0903	n/a	09/19/03	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSDW1-0504	n/a	05/11/04	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSDW1-0904	n/a	09/30/04	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSDW1-0405	n/a	04/25/05	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSDW1-0905	n/a	09/22/05	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSDW1-0506	n/a	05/23/06	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-
CSDW1-1006	n/a	10/24/06	-	50 U	-	-	-	-	39 U[1]	11 U[1]	-	-

Appendix D
TABLE 4
Groundwater Analytical Data - Control Site

Sample ID	Depth to Groundwater Feet BTIC	Sampling Date	1,1,1-Trichloro-ethane µg/L	Trichloroethene µg/L	Naphthalene (SVOC) µg/L	2-Methyl-naphthalene µg/L	Acenaphthene µg/L	Acenaphthylene µg/L	Anthracene µg/L	Benzo(a)-anthracene µg/L	Benzo(b)-fluoranthene µg/L	Benzo(k)-fluoranthene µg/L
CSMW3-2	n/a	05/28/97	**0.6**	*0.5 U*	-	-	-	-	-	-	-	-
CSMW5-1	n/a	11/04/96	**0.8**	*0.5 U*	-	-	-	-	-	-	-	-
CSMW5-2/Dup	n/a	05/28/97	**1.0**	*0.5 U*	-	-	-	-	-	-	-	-
CSMW5-3	n/a	10/26/99	-	-	-	-	-	-	-	-	-	-
CSMW5-4	n/a	05/17/00	-	-	-	-	-	-	-	-	-	-
CSMW5-1202	n/a	12/04/02	-	-	-	-	-	-	-	-	-	-
CSMW5-0403	n/a	04/23/03	-	-	-	-	-	-	-	-	-	-
CSMW5-0903	n/a	09/18/03	-	-	-	-	-	-	-	-	-	-
CSMW5-0504	n/a	05/11/04	-	-	-	-	-	-	-	-	-	-
CSMW5-0904	n/a	09/30/04	-	-	-	-	-	-	-	-	-	-
CSMW5-0405	n/a	04/25/05	-	-	-	-	-	-	-	-	-	-
CSMW5-0905	n/a	09/15/05	-	-	-	-	-	-	-	-	-	-
CSMW5-0506	n/a	05/23/06	-	-	-	-	-	-	-	-	-	-
CSMW5-1006	n/a	10/24/06	-	-	-	-	-	-	-	-	-	-
CSMW5-0507	n/a	05/24/07	-	-	-	-	-	-	-	-	-	-
CSMW5-1007	n/a	10/24/07	-	-	-	-	-	-	-	-	-	-
CSMW5-0408	n/a	04/30/08	-	-	-	-	-	-	-	-	-	-
CSMW5-1008	n/a	10/28/08	-	-	-	-	-	-	-	-	-	-
CSMW5-0409	n/a	04/30/09	-	-	-	-	-	-	-	-	-	-
CSMW5-1009	n/a	10/30/09	-	-	-	-	-	-	-	-	-	-
CSMW5-0510	n/a	05/25/10	-	-	-	-	-	-	-	-	-	-
CSMW5-1110	n/a	11/02/10	-	-	-	-	-	-	-	-	-	-
CSMW5-0511	n/a	05/25/11	-	-	-	-	-	-	-	-	-	-
CSMW5-1111	n/a	11/16/11	-	-	-	-	-	-	-	-	-	-
CSMW5-0512	n/a	05/23/12	-	-	-	-	-	-	-	-	-	-
CSMW9-3 /Dup	n/a	10/26/99	2 U	**1.4 J**	-	-	-	-	-	-	-	-
CSMW9-4 /Dup	n/a	05/17/00	1 U	**1.6**	-	-	-	-	-	-	-	-
CSMW9-1202	n/a	04/14/02	-	-	-	-	-	-	-	-	-	-
CSMW9-0403	n/a	04/23/03	-	-	-	-	-	-	-	-	-	-
CSMW9-0903	n/a	09/18/03	-	-	-	-	-	-	-	-	-	-
CSMW9-0504	n/a	05/11/04	-	-	-	-	-	-	-	-	-	-
CSMW9	68.4	07/21/17	-	-	-	-	-	-	-	-	-	-
CSMW10-3	n/a	10/26/99	**1.3 J**	*2 U*	-	-	-	-	-	-	-	-
CSMW10-4	n/a	05/17/00	**1.3**	*1 U*	-	-	-	-	-	-	-	-
CSMW10-1202	n/a	12/04/02	-	-	-	-	-	-	-	-	-	-
CSMW10-0403	n/a	04/23/03	-	-	-	-	-	-	-	-	-	-
CSMW10-0903	n/a	09/18/03	-	-	-	-	-	-	-	-	-	-
CSMW10-0504	n/a	05/11/04	-	-	-	-	-	-	-	-	-	-
CSMW10	66.83	07/21/17	-	-	-	-	-	-	-	-	-	-
CSMW11-3	n/a	10/26/99	**2.9**	**0.8 J**	-	-	-	-	-	-	-	-
CSMW11-4	n/a	05/17/00	**1.8**	**0.8 J**	-	-	-	-	-	-	-	-
CSMW11-1202	n/a	12/05/02	-	-	-	-	-	-	-	-	-	-
CSMW11-0403	n/a	04/23/03	-	-	-	-	-	-	-	-	-	-
CSMW11-0903	n/a	09/18/03	-	-	-	-	-	-	-	-	-	-
CSMW11-0504	n/a	05/11/04	-	-	-	-	-	-	-	-	-	-
CSMW-100-0717/Dup	69.95	07/21/17	-	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
CSMW-101-0717	67.01	07/21/17	-	-	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
CSTAP-1 / Dup	tap water	11/04/96	0.5 U	*0.5 U*	-	-	-	-	-	-	-	-
CSTAP-2	tap water	05/28/97	0.5 U	*0.5 U*	-	-	-	-	-	-	-	-
CSDW1-0903	n/a	09/19/03	-	-	-	-	-	-	-	-	-	-
CSDW1-0504	n/a	05/11/04	-	-	-	-	-	-	-	-	-	-
CSDW1-0904	n/a	09/30/04	-	-	-	-	-	-	-	-	-	-
CSDW1-0405	n/a	04/25/05	-	-	-	-	-	-	-	-	-	-
CSDW1-0905	n/a	09/22/05	-	-	-	-	-	-	-	-	-	-
CSDW1-0506	n/a	05/23/06	-	-	-	-	-	-	-	-	-	-
CSDW1-1006	n/a	10/24/06	-	-	-	-	-	-	-	-	-	-

Appendix D
TABLE 4
Groundwater Analytical Data - Control Site

Sample ID	Depth to Groundwater Feet BTIC	Sampling Date	Benzo(g,h,i)-perylene µg/L	Benzo(a)pyrene µg/L	Chrysene µg/L	Dibenzo(a,h)-anthracene µg/L	Fluoranthene µg/L	Fluorene µg/L	Indeno(1,2,3-cd)-pyrene µg/L	Phenanthrene µg/L	Pyrene µg/L
CSMW3-2	n/a	05/28/97	-	-	-	-	-	-	-	-	-
CSMW5-1	n/a	11/04/96	-	-	-	-	-	-	-	-	-
CSMW5-2/Dup	n/a	05/28/97	-	-	-	-	-	-	-	-	-
CSMW5-3	n/a	10/26/99	-	-	-	-	-	-	-	-	-
CSMW5-4	n/a	05/17/00	-	-	-	-	-	-	-	-	-
CSMW5-1202	n/a	12/04/02	-	-	-	-	-	-	-	-	-
CSMW5-0403	n/a	04/23/03	-	-	-	-	-	-	-	-	-
CSMW5-0903	n/a	09/18/03	-	-	-	-	-	-	-	-	-
CSMW5-0504	n/a	05/11/04	-	-	-	-	-	-	-	-	-
CSMW5-0904	n/a	09/30/04	-	-	-	-	-	-	-	-	-
CSMW5-0405	n/a	04/25/05	-	-	-	-	-	-	-	-	-
CSMW5-0905	n/a	09/15/05	-	-	-	-	-	-	-	-	-
CSMW5-0506	n/a	05/23/06	-	-	-	-	-	-	-	-	-
CSMW5-1006	n/a	10/24/06	-	-	-	-	-	-	-	-	-
CSMW5-0507	n/a	05/24/07	-	-	-	-	-	-	-	-	-
CSMW5-1007	n/a	10/24/07	-	-	-	-	-	-	-	-	-
CSMW5-0408	n/a	04/30/08	-	-	-	-	-	-	-	-	-
CSMW5-1008	n/a	10/28/08	-	-	-	-	-	-	-	-	-
CSMW5-0409	n/a	04/30/09	-	-	-	-	-	-	-	-	-
CSMW5-1009	n/a	10/30/09	-	-	-	-	-	-	-	-	-
CSMW5-0510	n/a	05/25/10	-	-	-	-	-	-	-	-	-
CSMW5-1110	n/a	11/02/10	-	-	-	-	-	-	-	-	-
CSMW5-0511	n/a	05/25/11	-	-	-	-	-	-	-	-	-
CSMW5-1111	n/a	11/16/11	-	-	-	-	-	-	-	-	-
CSMW5-0512	n/a	05/23/12	-	-	-	-	-	-	-	-	-
CSMW9-3 /Dup	n/a	10/26/99	-	-	-	-	-	-	-	-	-
CSMW9-4 /Dup	n/a	05/17/00	-	-	-	-	-	-	-	-	-
CSMW9-1202	n/a	04/14/02	-	-	-	-	-	-	-	-	-
CSMW9-0403	n/a	04/23/03	-	-	-	-	-	-	-	-	-
CSMW9-0903	n/a	09/18/03	-	-	-	-	-	-	-	-	-
CSMW9-0504	n/a	05/11/04	-	-	-	-	-	-	-	-	-
CSMW9	68.4	07/21/17	-	-	-	-	-	-	-	-	-
CSMW10-3	n/a	10/26/99	-	-	-	-	-	-	-	-	-
CSMW10-4	n/a	05/17/00	-	-	-	-	-	-	-	-	-
CSMW10-1202	n/a	12/04/02	-	-	-	-	-	-	-	-	-
CSMW10-0403	n/a	04/23/03	-	-	-	-	-	-	-	-	-
CSMW10-0903	n/a	09/18/03	-	-	-	-	-	-	-	-	-
CSMW10-0504	n/a	05/11/04	-	-	-	-	-	-	-	-	-
CSMW10	66.83	07/21/17	-	-	-	-	-	-	-	-	-
CSMW11-3	n/a	10/26/99	-	-	-	-	-	-	-	-	-
CSMW11-4	n/a	05/17/00	-	-	-	-	-	-	-	-	-
CSMW11-1202	n/a	12/05/02	-	-	-	-	-	-	-	-	-
CSMW11-0403	n/a	04/23/03	-	-	-	-	-	-	-	-	-
CSMW11-0903	n/a	09/18/03	-	-	-	-	-	-	-	-	-
CSMW11-0504	n/a	05/11/04	-	-	-	-	-	-	-	-	-
CSMW-100-0717/Dup	69.95	07/21/17	0.05 U	0.05 U	0.05 U	*0.05 U*	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
CSMW-101-0717	67.01	07/21/17	0.05 U	0.05 U	0.05 U	*0.05 U*	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
CSTAP-1 / Dup	tap water	11/04/96	-	-	-	-	-	-	-	-	-
CSTAP-2	tap water	05/28/97	-	-	-	-	-	-	-	-	-
CSDW1-0903	n/a	09/19/03	-	-	-	-	-	-	-	-	-
CSDW1-0504	n/a	05/11/04	-	-	-	-	-	-	-	-	-
CSDW1-0904	n/a	09/30/04	-	-	-	-	-	-	-	-	-
CSDW1-0405	n/a	04/25/05	-	-	-	-	-	-	-	-	-
CSDW1-0905	n/a	09/22/05	-	-	-	-	-	-	-	-	-
CSDW1-0506	n/a	05/23/06	-	-	-	-	-	-	-	-	-
CSDW1-1006	n/a	10/24/06	-	-	-	-	-	-	-	-	-

Appendix D
TABLE 4
Groundwater Analytical Data - Control Site

Notes:

All detected and other selected constituents presented.

Bold	Detected analyte
BTIC	Below top of inner well casing
µg/L	Micrograms per liter.
U	Not detected at reporting limit shown
J	Estimated concentration
2 U	(Italics) Reporting limit above screening level
NA; "-"	Not analyzed or not applicable
n/a	Not available
ND	Not detected
CSMW-X/I	Highest detected concentration in either original or duplicate sample.
1.	TPH-DRO extrapolated to 78% C_9-C_{18} aliphatic hydrocarbons and 22% C_{11}-C_{22} aromatic hydrocarbons (MACTEC 2010).

Appendix D
TABLE 5
Launch Site Indoor Air Analytical Data and Comparison to Maine DEP RAGs

Sample Location	Sample Date	Benzene [1] µg/m³	Ethylbenzene [1] µg/m³	Toluene [1] µg/m³	m,p-Xylene [1] µg/m³	o-Xylene [1] µg/m³	Comments
Apartment 1	01/19/95	BRL	BRL	**12.82**	NA	BRL	
Apartment 1	01/19/95	BRL	BRL	BRL	NA	BRL	
Apartment 2	01/19/95	BRL	BRL	**6.03**	NA	BRL	
Apartment 2	01/19/95	BRL	BRL	**10.25**	NA	BRL	
Apartment 3	01/19/95	**11.17**	BRL	**23.00**	NA	BRL	
Apartment 3	01/19/95	**11.52**	**29.12**	**25.64**	NA	**29.69**	
Apartment 1 - Living Room	09/30/96	**6.06**	*0.87 U*	**22.24**	**5.21**	*0.87 U*	Smoker, fuel oil furnace in operation.
Apartment 1 - Bedroom	09/30/96	**5.10**	*0.87 U*	**19.60**	**5.64**	*0.87 U*	
Apartment 2 - Living Room	09/30/96	*0.64 U*	*0.87 U*	**5.66**	*0.87 U*	*0.87 U*	Unoccupied; recently painted.
Apartment 2- Bedroom	09/30/96	*0.64 U*	*0.87 U*	**3.24**	*0.87 U*	*0.87 U*	
Apartment 3 - Living Room	09/30/96	**20.42**	**5.21**	**67.86**	**17.36**	**6.08**	Smoker; recently renovated (new flooring and painted walls).
Apartment 3- Bedroom	09/30/96	**18.50**	**6.08**	**64.09**	**19.96**	**8.25**	
Outdoor Background -1	09/30/96	*0.64 U*	*0.87 U*	0.75 U	*0.87 U*	*0.87 U*	
Outdoor Background -2	09/30/96	*0.64 U*	*0.87 U*	0.75 U	*0.87 U*	*0.87 U*	
Screening Level [2]		0.36	1.1	520	10	10	

All detected analytes shown.

Value	Exceeds screening criterion
µg/m³	Micrograms per cubic meter
BRL	Below report limit [reporting limit not shown for 1995 indoor air sampling]
NA	Not analyzed
U	Not detected at reporting limit shown
2.93 U	(Italics) Reporting limit above screening level
/	Laboratory report missing for Apartment 1 samples; results from previously-prepared summary tables; reporting limits for ethylbenzene are not known.

1. Originally reported in parts per billion by volume (ppbv); converted to µg/m³ using the following conversions:
[CDC (2007) NIOSH Pocket Guide for Chemical Hazards (3rd Edition) (https://www.cdc.gov/niosh/npg/default.html)]

Benzene: 1 ppbv =	3.19	µg/m³
Ethylbenzene: 1 ppbv =	4.34	µg/m³
Toluene: 1 ppbv =	3.77	µg/m³
Xylenes: 1 ppbv =	4.34	µg/m³

2. US EPA (Nov 2023). *Regional Screening Levels for Chemical Contaminants at Superfund Sites* (TR = 1E-06, HQ = 0.1), Residential Air. Xylene criteria for Total Xylenes

Appendix D
TABLE 6
Launch Site Soil Petroleum Data Comparison to Maine DEP RAGs

	TPH as Diesel Range Organics mg/kg	**C_9-C_{12} Aliphatic Hydrocarbons** mg/kg	**C_9-C_{10} Aromatic Hydrocarbons** mg/kg	**C_9-C_{18} Aliphatic Hydrocarbons** mg/kg	**C_{19}-C_{36} Aliphatic Hydrocarbons** mg/kg	**C_{11}-C_{22} Aromatic Hydrocarbons** mg/kg	**Acetone** mg/kg	**2-Butanone** mg/kg	**Ethylbenzene** mg/kg
Number of Samples	18	9	9	15	15	9	17	17	26
Number of Detections	3	1	2	4	4	4	2	1	1
Maximum Detected Concentration	**2,300 J**	**41**	**17**	**1,794 J**	**506 J**	**28**	**0.029**	**3.1**	**0.085 J**
Project-Specific Screening Levels	NE	NE [1]	NE [1]	NE [1]	NE [1]	NE [1]	7,000 [2]	2,700 [2]	5.8 [2]
Maine Background Values (Rural values when available) [3]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Plants [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Soil Invertebrates [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Avian [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Mammalian [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE
Region 4 Ecological Soil Screening Values [7]	NE	NE	NE	NE	NE	NE	1.2	1.0	0.27

Appendix D
TABLE 6
Launch Site Soil Petroleum Data Comparison to Maine DEP RAGs

	1,1,1-Trichloro-ethane mg/kg	Trichloroethene mg/kg	Xylenes (total) mg/kg	Naphthalene (VPH) mg/kg	Naphthalene (EPH) mg/kg	Acenaphthene mg/kg	Anthracene mg/kg	Benzo(a)-anthracene mg/kg	Benzo(b)-fluoranthene mg/kg	Benzo(k)-fluoranthene mg/kg
Number of Samples	17	17	26	9	9	9	9	9	9	9
Number of Detections	2	0	1	1	0	1	1	1	1	1
Maximum Detected Concentration	**0.005**	**ND**	**0.16 J**	**0.15 J**	**ND**	**0.050 J**	**0.11 J**	**0.3**	**0.3**	**0.2**
Project-Specific Screening Levels	810 [2]	0.41 [2]	58 [2]	2 [2]	2 [2]	360 [2]	1,800 [2]	1.1 [2]	1.1 [2]	11 [2]
Maine Background Values (Rural values when available) [3]	NE	NE	NE	5	5	0.22	2.3	17	6.9	3.6
EPA EcoSSL - Plants [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Soil Invertebrates [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Avian [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Mammalian [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Region 4 Ecological Soil Screening Values [7]	0.04	0.06	0.10	See Total LMW-29	See Total LMW-29	See Total LMW-29	See Total LMW-29	See Total HMW-1.1	See Total HMW-1.1	See Total HMW-1.1

Appendix D
TABLE 6
Launch Site Soil Petroleum Data Comparison to Maine DEP RAGs

	Benzo(g,h,i)-perylene mg/kg	**Benzo(a)pyrene** mg/kg	**Chrysene** mg/kg	**Dibenzo(a,h)-anthracene** mg/kg	**Fluoranthene** mg/kg	**Fluorene** mg/kg	**Indeno(1,2,3-cd)-pyrene** mg/kg	**Phenanthrene** mg/kg	**Pyrene** mg/kg	**Total Low Molecular Weight PAHs** mg/kg
Number of Samples	9	9	9	9	9	9	9	9	9	9
Number of Detections	1	6	1	1	1	1	1	1	1	2
Maximum Detected Concentration	**0.19 J**	**0.3**	**0.4**	**0.10 J**	**0.7**	**0.043 J**	0.18 J	**0.5**	**0.6**	**2.19 J**
Project-Specific Screening Levels	NE	0.11 [2]	110 [2]	0.11 [2]	240 [2]	240 [2]	1.1 [2]	NE	180 [2]	NE
Maine Background Values (Rural values when available) [3]	3	5.4	32	0.73	59	0.67	7.3	54	33	NE
EPA EcoSSL - Plants [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Soil Invertebrates [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE	29
EPA EcoSSL - Avian [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Mammalian [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE	100
Region 4 Ecological Soil Screening Values [7]	See Total HMW-1.1	See Total HMW-1.1	See Total HMW-1.1	See Total HMW-1.1	See Total LMW-29	See Total LMW-29	See Total HMW-1.1	See Total LMW-29	See Total LMW-29	29

Appendix D
TABLE 6
Launch Site Soil Petroleum Data Comparison to Maine DEP RAGs

	Total High Molecular Weight PAHs mg/kg	**delta-BHC** mg/kg	**4,4'-DDE** mg/kg	**4.4'-DDD** mg/kg	**4.4'-DDT** mg/kg	**Total DDT and Metabolites** mg/kg	**Polychlorinated Biphenyls (PCBs)** mg/kg	**Arsenic** mg/kg	**Barium** mg/kg
Number of Samples	9	0	0	0	0	0	8	0	0
Number of Detections	6	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**1.78 J**	**NA**	**NA**	**NA**	**NA**	**NA**	**ND**	**NA**	**NA**
Project-Specific Screening Levels	NE	NE	2.0 [2]	2.3 [2]	1.9 [2]	NE	0.12 [2,4]	0.68 [2]	1,500 [2]
Maine Background Values (Rural values when available) [3]	NE	NE	NE	NE	NE	NE	NE	28	79
EPA EcoSSL - Plants [6]	NE	NE	NE	NE	NE	NE	NE	18	NE
EPA EcoSSL - Soil Invertebrates [6]	18	NE	NE	NE	NE	NE	NE	NE	330
EPA EcoSSL - Avian [6]	NE	NE	NE	NE	NE	0.093	NE	43	NE
EPA EcoSSL - Mammalian [6]	1.1	NE	NE	NE	NE	0.021	NE	46	2,000
Region 4 Ecological Soil Screening Values [7]	1.1	NE	NE	NE	NE	0.021	0.041	18	330

Appendix D
TABLE 6
Launch Site Soil Petroleum Data Comparison to Maine DEP RAGs

	Beryllium mg/kg	**Cadmium** mg/kg	**Chromium (total)** mg/kg	**Copper** mg/kg	**Lead** mg/kg	**Mercury** mg/kg	**Nickel** mg/kg	**Selenium** mg/kg	**Zinc** mg/kg
Number of Samples	0	0	0	0	0	0	0	0	0
Number of Detections	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Project-Specific Screening Levels	16 [2]	0.7 [2]	12,000 [2,5]	310 [2]	200 [8]	1.1 [2]	140 [2]	39 [2]	2,300 [2]
Maine Background Values (Rural values when available) [3]	NE	0.62	32 ChrVI	23	52	NE	35	NE	98
EPA EcoSSL - Plants [6]	NE	32	NE	70	120	NE	38	0.52	160
EPA EcoSSL - Soil Invertebrates [6]	40	140	NE	80	1700	NE	280	4.1	120
EPA EcoSSL - Avian [6]	NE	0.77	26	28	11	NE	210	1.2	46
EPA EcoSSL - Mammalian [6]	21	0.36	34	49	56	NE	130	0.63	79
Region 4 Ecological Soil Screening Values [7]	10	0.36	18	28	11	0.1	38	0.52	46

Appendix D
TABLE 6
Launch Site Soil Petroleum Data Comparison to Maine DEP RAGs

Notes

Value	Above human health screening criteria
Value	Above human health screening criteria but below background
Value	Above ecological screening level
mg/kg	Milligrams per kilogram
J	Estimated
U	Not detected at reporting limit shown
ND	Not detected
NE	Not established
VPH	Volatile petroleum hydrocarbons.
EPH	Extractable petroleum hydrocarbons.
NA or "-"	Not analyzed.
/	Reporting limits not available
1.	Evaluated in Appendix D, Petroleum Assessment
2.	US EPA (Nov 2023) Regional
3.	MaineDEP (2023)
4.	Screening level for Aroclor 1254.
5.	For trivalent chromium, insoluble salts.
6.	EPA EcoSSLs from individual chemical documents (https://www.epa.gov/risk/ecological-soil-screening-level-eco-ssl-guidance-and-documents.
7.	EPA Region 4 Ecological Soil Screening Levels, from EPA Region 4 (2018) Ecological Risk Assessment Supplemental Guidance, Interim Draft.

Appendix D
TABLE 7
Control Site Data Comparison to Maine DEP RAGs

	TPH as Diesel-Range Organics mg/kg	C_5-C_8 Aliphatic Hydrocarbons mg/kg	C_9-C_{12} Aliphatic Hydrocarbons mg/kg	C_9-C_{10} Aromatic Hydrocarbons mg/kg	C_9-C_{18} Aliphatic Hydrocarbons mg/kg	C_{19}-C_{36} Aliphatic Hydrocarbons mg/kg	C_{11}-C_{22} Aromatic Hydrocarbons mg/kg	Benzene mg/kg	2-Butanone mg/kg
DATA SUMMARY AND SELECTION OF COPCs									
SUBAREA 1 - Former Radar Towers									
Number of Samples	1	0	0	0	1	0	1	5	5
Number of Detections	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**ND**	**NA**	**NA**	**NA**	**ND**	**NA**	**ND**	**ND**	**ND**
SUBAREA 2 - Former Generating Building									
Number of Samples	7	6	6	6	13	6	13	13	7
Number of Detections	0	1	2	4	3	3	3	0	0
Maximum Detected Concentration	**ND**	**5.0 J**	**120 J**	**98**	**1,400 J**	**280**	**1,100**	**ND**	**ND**
SUBAREA 3 - Former Mess Hall									
Number of Samples	6	0	0	0	6	0	6	6	6
Number of Detections	2	0	0	0	2	0	2	0	0
Maximum Detected Concentration	**8.6**	**NA**	**NA**	**NA**	**6.7**	**NA**	**1.9**	**ND**	**ND**
SUBAREA 4 - Former Administration Building									
Number of Samples	7	0	0	0	7	0	7	7	7
Number of Detections	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**ND**	**NA**	**NA**	**NA**	**ND**	**NA**	**ND**	**ND**	**ND**
SUBAREA 5 - Northeast of Administrative Building									
Number of Samples	1	0	0	0	1	0	1	1	1
Number of Detections	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**ND**	**NA**	**NA**	**NA**	**ND**	**NA**	**ND**	**ND**	**ND**
Project-Specific Screening Level	NE	NE [1]	NE [1]	NE [1]	NE [1]	NE [1]	NE [1]	1.2 [2]	2,700 [2]
Maine Background Values (Rural values when available) [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Plants [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Soil Invertebrates [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Avian [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Mammalian [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE
Region 4 Ecological Soil Screening Values [5]	NE	NE	NE	NE	NE	NE	NE	0.12	1.0

Appendix D
TABLE 7
Control Site Data Comparison to Maine DEP RAGs

	1,2-Dichloroethene mg/kg	cis-1,2-Dichloroethene mg/kg	Ethylbenzene mg/kg	Methylene Chloride mg/kg	Toluene mg/kg	1,2,4-Trichloro-benzene mg/kg	1,1,1-Trichloroethane mg/kg	Trichlorothene mg/kg	Xylenes (total) mg/kg
DATA SUMMARY AND SELECTION OF COPCs									
SUBAREA 1 - Former Radar Towers									
Number of Samples	5	5	5	5	5	5	5	5	5
Number of Detections	0	0	0	0	0	0	0	1	0
Maximum Detected Concentration	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**0.505**	**ND**
SUBAREA 2 - Former Generating Building									
Number of Samples	7	7	13	7	13	7	7	7	13
Number of Detections	0	0	0	0	0	0	0	0	3
Maximum Detected Concentration	**ND**	**ND**	**0.005 J**	**ND**	**ND**	**ND**	**ND**	**0.003 J**	**0.002 J**
SUBAREA 3 - Former Mess Hall									
Number of Samples	6	6	6	6	6	6	6	6	6
Number of Detections	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
SUBAREA 4 - Former Administration Building									
Number of Samples	7	7	7	7	7	7	7	7	7
Number of Detections	0	0	1	0	0	1	0	1	1
Maximum Detected Concentration	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
SUBAREA 5 - Northeast of Administrative Building									
Number of Samples	1	1	2	1	1	2	1	1	2
Number of Detections	0	0	1	0	0	1	0	1	1
Maximum Detected Concentration	**ND**	**ND**	**0.021 J**	**ND**	**ND**	**0.03 J**	**ND**	**0.003 J**	**0.078 J**
Project-Specific Screening Level	6.3 [2,3]	6.3 [2]	5.8 [2]	35 [2]	490 [2]	5.8 [2]	810 [2]	0.41 [2]	58 [2]
Maine Background Values (Rural values when available) [6]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Plants [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Soil Invertebrates [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Avian [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Mammalian [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE
Region 4 Ecological Soil Screening Values [5]	0.04	0.04	0.27	0.21	0.15	0.27	0.04	0.06	0.10

Appendix D
TABLE 7
Control Site Data Comparison to Maine DEP RAGs

	Naphthalene (VPH) mg/kg	Naphthalene (SVOC) mg/kg	2-Methyl-naphthalene mg/kg	Acenaph-thene mg/kg	Acenaph-thylene mg/kg	Anthracene mg/kg	Benzo(a)-anthracene mg/kg	Benzo(b)-fluoranthene mg/kg	Benzo(k)-fluoranthene mg/kg	Benzo(g,h,i)-perylene mg/kg
DATA SUMMARY AND SELECTION OF COPCs										
SUBAREA 1 - Former Radar Towers										
Number of Samples	5	0	0	0	0	0	0	0	0	0
Number of Detections	0	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**ND**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
SUBAREA 2 - Former Generating Building										
Number of Samples	13	6	6	6	6	6	6	6	6	6
Number of Detections	4	3	4	2	1	1	4	2	2	3
Maximum Detected Concentration	**2.7**	**0.0598**	**0.110**	**0.0409**	**0.00083 J**	**0.002 J**	**0.0277**	**0.0257**	**0.0085**	**0.0108**
SUBAREA 3 - Former Mess Hall										
Number of Samples	6	0	0	0	0	0	0	0	0	0
Number of Detections	0	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**ND**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
SUBAREA 4 - Former Administration Building										
Number of Samples	7	0	0	0	0	0	0	0	0	0
Number of Detections	2	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**ND**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
SUBAREA 5 - Northeast of Administrative Building										
Number of Samples	3	0	0	0	0	0	0	0	0	0
Number of Detections	2	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**0.033 J**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Project-Specific Screening Level	2 [2]	2 [2]	24 [2]	360 [2]	NE [2]	1,800 [2]	1.1 [2]	1.1 [2]	11 [2]	NE [2]
Maine Background Values (Rural values when available) [6]	5	5	0.15	0.22	1.9	2.3	17	6.9	3.6	3
EPA EcoSSL - Plants [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Soil Invertebrates [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Avian [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Mammalian [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Region 4 Ecological Soil Screening Values [5]	See Total LMW-29	See Total LMW-29	See Total LMW-29	See Total LMW-29	See Total LMW-29	See Total LMW-29	See Total HMW-1.1	See Total HMW-1.1	See Total HMW-1.1	See Total LMW-29

Appendix D
TABLE 7
Control Site Data Comparison to Maine DEP RAGs

	Benzo(a)-pyrene mg/kg	Chrysene mg/kg	Dibenzo(a,h)-anthracene mg/kg	Fluoranthene mg/kg	Fluorene mg/kg	Indeno(1,2,3-cd)-pyrene mg/kg	Phenanthrene mg/kg	Pyrene mg/kg	Total Low Molecular Weight PAHs mg/kg	Total High Molecular Weight PAHs mg/kg
DATA SUMMARY AND SELECTION OF COPCs										
SUBAREA 1 - Former Radar Towers										
Number of Samples	0	0	0	0	0	0	0	0	0	0
Number of Detections	0	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
SUBAREA 2 - Former Generating Building										
Number of Samples	6	6	6	6	6	6	6	6	6	6
Number of Detections	2	3	1	5	2	3	5	5	6	4
Maximum Detected Concentration	**0.0195**	**0.0205**	**0.0032 J**	**0.0407**	**0.0644**	**0.0109**	**0.210**	**0.0409**	**0.111**	**0.116**
SUBAREA 3 - Former Mess Hall										
Number of Samples	0	0	0	0	0	0	0	0	0	0
Number of Detections	0	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
SUBAREA 4 - Former Administration Building										
Number of Samples	0	0	0	0	0	0	0	0	0	0
Number of Detections	0	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
SUBAREA 5 - Northeast of Administrative Building										
Number of Samples	0	0	0	0	0	0	0	0	0	0
Number of Detections	0	0	0	0	0	0	0	0	0	0
Maximum Detected Concentration	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Project-Specific Screening Level	0.11 [2]	110 [2]	0.11 [2]	240 [2]	240 [2]	1.1 [2]	NE [2]	180 [2]	NE [2]	NE [2]
Maine Background Values (Rural values when available) [6]	5.4	32	0.73	59	0.67	7.3	54	33	NE	NE
EPA EcoSSL - Plants [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Soil Invertebrates [4]	NE	NE	NE	NE	NE	NE	NE	NE	29	18
EPA EcoSSL - Avian [4]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
EPA EcoSSL - Mammalian [4]	NE	NE	NE	NE	NE	NE	NE	NE	100	1.1
Region 4 Ecological Soil Screening Values [5]	See Total HMW-1.1	See Total HMW-1.1	See Total HMW-1.1	See Total HMW-1.1	See Total LMW-29	See Total HMW-1.1	See Total LMW-29	See Total LMW-29	29	1.1

Appendix D
TABLE 7
Control Site Data Comparison to Maine DEP RAGs

Notes:

Value	Above human health screening criteria
Value	Above human health screening
Value	Exceeds ecological screening criteria
Bold	Detected value
mg/kg	Milligrams per kilogram
ft bgs	Feet below ground surface
NE	Not established
ND	Not detected
U	Not detected at reporting limit shown
UJ	Not detected at estimated reporting limit shown
UB	Detected in blank sample; result
J	Estimated concentration below repo
CSSB-X/Du	Highest detected concentration from
NA or "-"	Not analyzed.
1.	Evaluated in Appendix D, Petroleum Assessment
2.	US EPA (Nov 2023) Regional
3.	RAG values applied to non-
4.	EPA EcoSSLs from individual
5.	EPA Region 4 Ecological Soil
6.	MaineDEP (2023)

Appendix D
Table 8
Launch Site Groundwater Petroleum Data Comparison to Maine

	Total Petroleum Hydrocarbons - Gasoline-Range Organics (TPH-GRO) **µg/L**	**Total Petroleum Hydrocarbons - Diesel-Range Organics (TPH-DRO)** **µg/L**
Number of Samples	10	21
Number of Detections	0	6
Maximum Detected Concentration	NA	**210**
Maine RAGs Water Residential [1]	NE	NE

Notes:

Bold	Detected analyte
J	Estimated concentration
U	Not detected at reporting limit shown
NE	Not established.
NA or "-"	Not analyzed
1.	MaineDEP (2023), Table 6
	Maine DEP Remedial Action Guidelines for Contaminated Sites (RAGs)

Appendix D
Table 9
Control Site Groundwater Petroleum Data Comparison to Maine DEP RAGs

	Total Petroleum Hydrocarbons as Gasoline-Range Organics (GRO) µg/L	Total Petroleum Hydrocarbons as Diesel-Range Organics (DRO) µg/L	C5-C8 Aliphatic Hydrocarbons µg/L	C9-C12 Aliphatic Hydrocarbons µg/L	C9-C10 Aromatic Hydrocarbons µg/L	Extractable Petroleum Hydrocarbons (All Fractions) µg/L	C9-C18 Aliphatic Hydrocarbons µg/L	C11-C22 Aromatic Hydrocarbons µg/L
Number of Samples	11	46	2	2	2	4	50	50
Number of Detections	0	8	0	2	2	0	8	7
Maximum Detected Concentration	ND	**260**	ND	**57 J**	**13 J**	ND	**202.8**	**57.2**
Maine RAGs Water Residential [1]	NE	NE	180	350	71	NE	350	600

Notes:

Bold	Detected analyte
Value	Exceeds screening level
µg/L	Micrograms per liter
U	Not detected at reporting limit
J	Estimated concentration
ND	Not detected
NE	Not established

1 MaineDEP (2023), Table 6
Maine DEP Remedial Action Guidelines for Contaminated Sites (RAGs)

APPENDIX E

HISTORICAL TABLES/LABORATORY REPORTS FOR DATA QUALITY REFERENCE (Available Upon Request due to Size)

APPENDIX F

PFAS RESPONSE MEMO FOR LO-13 NIKE BATTERY FUDS

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

CENAE-EDG 12 February 2026
MEMORANDUM

TO: Bureau of Remediation and Waste Management, Maine Department of Environmental Protection

FROM: U.S. Army Corps of Engineers, New England District, Geo Environmental Engineering Branch and Formerly Used Defense Site Program

SUBJECT: Response to Maine Department of Environmental Protection's request for information regarding historical use of Per- and Polyfluoroalkyl Substances at the Nike Battery LO-13 Formerly Used Defense Site

PROJECT STATUS

The U.S. Army Corps of Engineers (USACE), New England District (CENAE) is developing the Remedial Investigation (RI) Report and moving towards a No Further Action Record of Decision (ROD) for the Nike Battery LO-13 (Former Loring Air Force Base's Launch and Control Site) Formerly Used Defense Site (FUDS), Property Number D01ME0028, Project Number 02 (the "Site"). The Site is in Caswell, Aroostook County, Maine.

On February 2, 2026, Maine Department of Environmental Protection (Maine DEP) requested that CENAE attest that, per our records, Per- and Polyfluoroalkyl Substances (PFAS), including Aqueous Film-Forming Foam (AFFF), were never used at the Site. The request was made in relation to Maine DEP's review of the Draft Final RI Report.

BACKGROUND

The Nike Battery LO-13 FUDS consists of two distinct parcels in Caswell, Maine: a 17-acre Launch Site and an 11-acre Control Site (Figure 1). Previously undeveloped land, the Site was acquired by the Department of Defense (DoD) starting in 1955 and operated as a surface-to-air anti-aircraft missile facility until it was declared excess in 1967. The Launch Site, which included three missile silos and maintenance buildings, and the Control Site, which housed administration, barracks, and radar towers, were subsequently sold to various private owners. The barracks at the Launch Site have since been converted for residential use, while a building at the Control Site sees seasonal residential use.

A Hazardous, Toxic, and Radioactive Waste (HTRW) project was initiated to address potential environmental concerns following the Site's operational history. Early investigations in 1992 identified multiple underground storage tanks (USTs) and areas of concern, such as an acid neutralization pit. Subsequent remedial work in 1994 included the removal of several USTs at the Control Site, one of which required the demolition of a generator building and the excavation of

approximately 840 cubic yards of petroleum-contaminated soil (USACE, 1996a, 1996b, 1997, 1999).

The Draft Final Remedial Investigation (USACE, 2025) has been completed, evaluating the nature and extent of contamination across both parcels. Risk assessments concluded that the Site does not pose an unacceptable risk to human health or the environment under current or future residential scenarios. As a result, the current recommendation is for No Further Action under CERCLA for the Nike Battery LO-13 FUDS project.

RESPONSE TO MAINE DEP

In response to the recent inquiry from the Maine DEP, the CENAE Project Delivery Team (PDT) conducted a review of available records to assess the potential for historical use of PFAS at the referenced Site. Based on this comprehensive assessment, the PDT has concluded that there is no evidence that AFFF or other PFAS-containing materials were used or released during the Site's operational period.

This determination is supported by multiple, converging lines of evidence:

1. Operational history indicates that LO-13 functioned as a missile storage and readiness installation from approximately 1955 to 1967 and was not used for missile testing or firing. Missiles were never launched from the Site. As a result, routine Site operations did not involve activities or scenarios typically associated with PFAS releases such as fire suppression training, large-scale firefighting events, specific industrial and manufacturing processes, or the dedicated landfilling of PFAS-containing materials (U.S. EPA, 2026).
2. Per a Nike Environmental Conditions Assessment Guide (USACE, 2003), “Fuel was handled and stored onsite in a limestone gravel floor shed. Although the collection system discharged to the exterior swale, any discharges were reportedly neutralized with water and acetic acid immediately to prevent fire. Other excess quantities or waste propellants were disposed of by burning” (USACE, 2003). A systematic search of historical Site files was conducted using keywords recommended by the USACE Environmental and Munitions Center of Expertise (EM CX), including "AFFF," "fire," "burn," and "foam," which yielded no relevant results. Site documents and past use do not indicate disposal by burning occurred at LO-13, and if burning did occur, it pre-dated the widespread use of AFFF, as discussed below.
3. This determination is consistent with historical USACE Site documents (USACE, 1996a, 1996b, 1997, 1999), as well as a definitive Operational History Review performed by the EM CX in 2016 (USACE, 2016). The 2016 review specifically studied and addressed the potential for AFFF, perfluorooctanoic acid (PFOA), and perfluorooctanesulfonic acid (PFOS) usage at former Nike and Atlas missile facilities and found no basis for their suspected use at such Sites.
4. The operational timeline of the facility further corroborates this conclusion. The EM CX review concluded that widespread Department of Defense (DoD) use of AFFF did not occur until issuance of military specification MIL-F-24385 in 1969 (USACE, 2016). The Nike Battery LO-13 FUDS was utilized as an anti-aircraft missile facility until it was

declared excess and ceased operations in 1967. The widespread adoption of AFFF did not occur until after the Site's active period.

While PFAS were historically used in certain industrial and military applications, available Site-specific information does not indicate that such uses occurred at the Nike Battery LO-13 Launch and Control Sites. Based on the Site’s operational history, timing of decommissioning relative to AFFF adoption, and findings from prior reviews, there is no evidence of the use or release of PFAS at LO-13.

Please contact the CENAE Project Manager (Grace Carmichael at 978-580-3140; e-mail: allison.g.carmichael@usace.army.mil) should you have any questions.

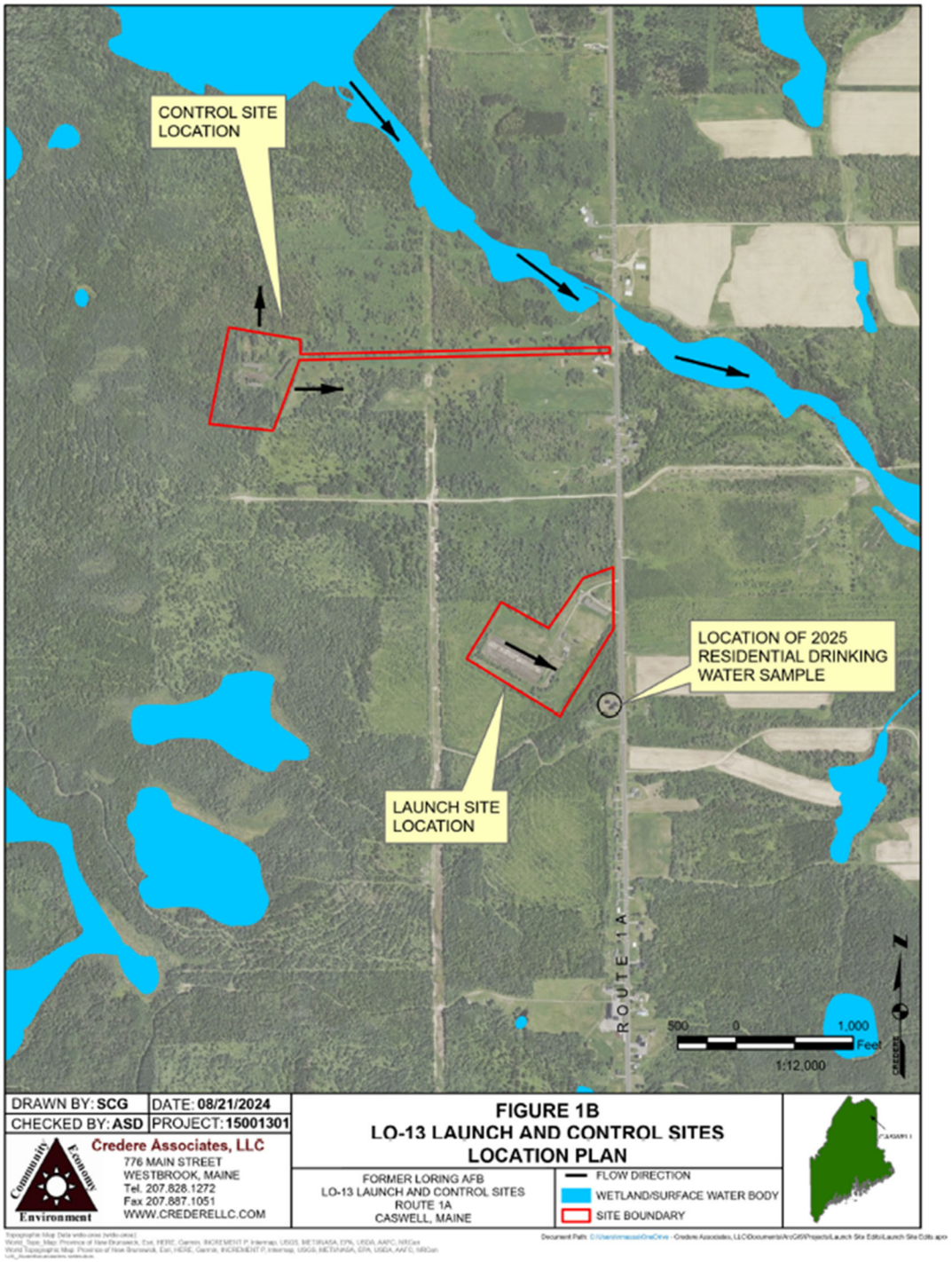


Figure 1
LO-13 FUDS project locations

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