

Final

Engineering Evaluation/Cost Analysis Site 6 (Fenced Area)

Naval Support Facility, Indian Head
Indian Head, Maryland

Contract Task Order 053

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Prepared by



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Executive Summary

This document presents an Engineering Evaluation and Cost Analysis (EE/CA) for a non-time-critical removal action (NTCRA) of silver-contaminated surface soil at Site 6 (Fenced Area) – Radiographic Facility, Building 1349 at the Naval Support Facility, Indian Head (NSF-IH) in Indian Head, Maryland. NSF-IH is a Navy facility located in northwestern Charles County, Maryland, approximately 25 miles southwest of Washington, D.C. Site 6 consists of the area around Building 1349 (the former control building, currently used for storage), Building 1718 (the current control building), and Building 1140 (the radiographic accelerator building).

This EE/CA will be completed as an NTCRA, as defined by Section 300.415(b)(4)(i) of the National Oil and Hazardous Substance Pollution Contingency Plan (NCP; 40 CFR Part 300). Submittal of this document fulfills the requirements for NTCRAs, as defined by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and the Superfund Amendments and Reauthorization Act of 1986. This EE/CA has been prepared in general accordance with the United States Environmental Protection Agency's (USEPA's) guidance document on conducting NTCRAs (USEPA, 1993).

A baseline human health risk assessment (HHRA) and screening ecological risk assessment were performed as part of the remedial investigation (RI) (HGL, 2004). The HHRA evaluated current and future human health risks associated to environmental media and conditions at Site 6. In summary, surface water and groundwater had maximum silver concentrations that were below the USEPA Region III risk-based concentrations (RBCs). Hence, they were not quantitatively evaluated in the risk assessment. The only environmental media quantitatively evaluated in the risk assessment were current and future surface soil. Under current conditions, soil does not represent an unacceptable risk to any of the receptors. Under future conditions, soil does not represent an unacceptable risk to the adult resident, adolescent trespassers/visitors, adult trespassers/visitors, and industrial workers. With respect to the reasonable maximum exposure (RME) scenarios, silver poses potentially unacceptable risks to the child resident (hazard index [HI] = 3.2) and construction worker (HI = 1.2), but it does not pose an unacceptable risk with respect to central tendency exposure (CTE) scenarios for the child resident (HI = 0.024) and construction worker (HI = 0.02). The unacceptable RME risks are primarily driven by the detection of high silver concentrations at locations IS06SS10 (southeast side of Building 1718) and IS06SD09 (adjacent to the culvert). Therefore, this EE/CA focuses on mitigating unacceptable risk to potential ecological receptors. To be conservative, the Indian Head Installation Restoration Team agreed to excavate the two discrete areas with the highest silver concentrations down to a depth of 4 feet below ground surface.

The ecological risk assessment results indicated that: (1) silver in surface soil may pose a potential risk to plants and invertebrates; (2) silver might have migrated off-site into the stream; and (3) if silver has migrated off-site, the magnitude of potential threat to ecological receptors is unknown. These potential ecological risks associated with silver in the surface soil are because of past activities at the site.

The Department of the Navy, therefore, proposes to remove and dispose of surface soil contaminated with unacceptable levels of silver to acceptable levels, thereby reducing risks to ecological receptors. As a result, this EE/CA presents only this removal alternative. The removal action is evaluated in terms of effectiveness, implementability, and cost. The effectiveness evaluation included reviewing the protectiveness of the alternative and its ability to meet the removal action objectives. Implementability included looking at the technical feasibility, availability, and administrative feasibility of the alternative. The evaluation of cost included a review of capital cost, operating cost, and present-worth cost.

Soil Excavation and Offsite Disposal is the recommended alternative for silver-contaminated soil inside the fenced area at Site 6 because it can achieve the removal action objective with a great certainty of success and because implementation is technically feasible. The estimated cost for implementation of this alternative is estimated to have a present worth range from \$116,060 to \$248,701.

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Acronyms and Abbreviations

ARAR	Applicable or Relevant and Appropriate Requirements
BERA	baseline ecological risk assessment
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	contaminants of concern
CTE	central tendency exposure
EE/CA	Engineering Evaluation/Cost Analysis
EPA	United States Environmental Protection Agency
HI	Hazard Index
HHRA	Human health risk assessment
IAS	Initial Assessment Study
IHIRT	Indian Head Installation Restoration Team
µg/L	microgram(s) per liter
mg/kg	milligram(s) per kilogram
MDE	Maryland Department of the Environment
msl	mean sea level
NAVFAC	Naval Facilities Engineering Command
Navy	United States Department of the Navy
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NSF-IH	Naval Support Facility, Indian Head
NTCRA	non-time-critical removal action
RAO	Removal Action Objective
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RFA	RCRA facility assessment
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
SARA	Superfund Amendments and Reauthorization Act of 1986
SRG	site remediation goal
TBC	to-be-considered
UCL	upper confidence limit
UXO	unexploded ordinance
VSI	visual site inspection

SECTION 1

Introduction

This Engineering Evaluation and Cost Analysis (EE/CA) was prepared by CH2M HILL under the U.S. Department of Navy (Navy), Naval Facilities Engineering Command (NAVFAC) Washington, Atlantic Division, Comprehensive Long-Term Environmental Action Navy (CLEAN) III Contract No. N62470-02-D-3052, Contract Task Order 0053.

Naval Support Facility, Indian Head (NSF-IH) is a Navy facility located in Indian Head, Maryland in northwestern Charles County, approximately 25 miles southwest of Washington, D.C. This report presents an EE/CA for a non-time-critical removal action (NTCRA) for surface soil at Site 6 (Fenced Area) – Radiographic Facility, Building 1349 at NSF-IH (Figure 1-1).

1.1 Regulatory Framework

This document is issued by the Navy, a lead federal agency authorized to conduct remediation at Site 6, with the assistance of the United States Environmental Protection Agency (USEPA) and the Maryland Department of the Environment (MDE), pursuant to Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA).

Section 104 of CERCLA and SARA allows an authorized agency to remove, or arrange for removal, and to provide for remedial action relating to hazardous substances, pollutants, or contaminants at any time, or to take any other response measures consistent with the National Oil and Hazardous Substance Pollution Contingency Plan (NCP) as deemed necessary to protect public health or welfare and the environment.

The NCP, Title 40 of the Code of Federal Regulations (40 CFR) Part 300, provides regulations for implementing CERCLA and SARA, and regulations specific to removal actions. The NCP defines a removal action as the “cleanup or removal of released hazardous substances from the environment, such actions as may be necessary to monitor, assess, and evaluate the threat of release of hazardous substances; the disposal of removed material; or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release.”

An NTCRA is being considered for Site 6. NTCRAs are defined in 40 CFR Part 300 Section 415(b)(4) as “actions pertaining to an imminent threat to human health and the environment and that have planning periods of 6 months or more.” Title 40 CFR 300.415 requires the lead agency to conduct an EE/CA when an NTCRA is planned for a site. The goals of an EE/CA are to identify the objectives of the removal action and to analyze the effectiveness, implementability, and cost of various alternatives that may satisfy these objectives. An EE/CA documents the removal action alternatives and selection process. Where the extent of the contamination is well-defined and limited in extent, NTCRAs also allow for the expedited cleanup of sites in comparison to the remedial action evaluated in a Feasibility

Study under the CERCLA process. This EE/CA has been prepared in general accordance with USEPA's document *Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA* (USEPA, 1993).

Community involvement requirements for NTCRAs include review and comment for a period of 30 days. An announcement of the 30-day public comment period on the EE/CA is required in a local newspaper. Written responses to significant comments will be summarized in an Action Memorandum and included in the Administrative Record.

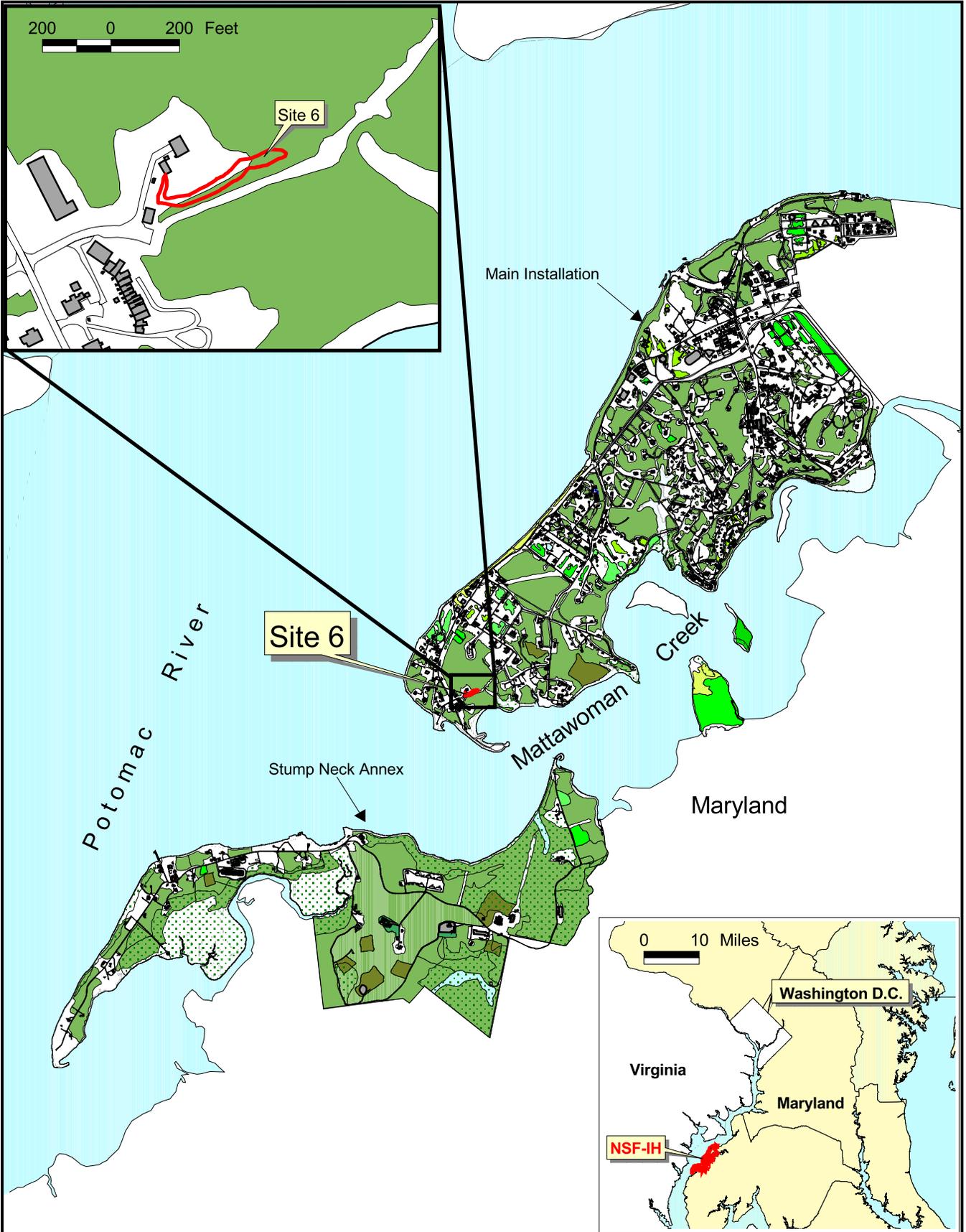
1.2 Objectives

The focus of this EE/CA is the surface soil (0 to 1 foot below ground surface [bgs]) from Building 1718 to the fence line (herein referred to as fenced area) at Site 6. The overall objectives of this EE/CA are to remove and dispose of surface soil contaminated with unacceptable levels of silver to ecological receptors and to mitigate the potential transport of silver from the surface soil to the soil and/or stream and sediment beyond the fence line. In addition, to mitigate unacceptable potential risk to construction workers and resident children based on RME scenarios, soil will be removed down to a depth of 4 feet bgs at locations IS06SS10 and IS06SD09 where silver concentrations were 1,160 milligrams per kilogram (mg/kg) and 867 mg/kg, respectively (Figure 2-1). Soil Excavation and Offsite Disposal is the only removal alternative presented in this EE/CA because the removal will decrease silver concentration in surface soil to acceptable levels, thereby, reducing risks to ecological receptors.

1.3 Organization of the EE/CA

This EE/CA includes the following sections:

- Section 1 – Introduction
- Section 2 – Site Characterization
- Section 3 – Identification of the Removal Action Objectives
- Section 4 – Description of the Removal Action Alternative
- Section 5 – Analysis of the Removal Action Alternative
- Section 6 – References



LEGEND

-  Approximate Site Boundary
-  Buildings
-  Road
-  Wooded Area
-  Dense Wooded Area



2000 0 2000 4000 Feet

Figure 1-1
Facility Map
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland

Site Characterization

This section presents information that forms the basis for the site characterization. This information includes site characteristics, previous investigations, and ecological risks at Site 6.

2.1 Site Characteristics

To reduce duplication of information, the information provided in this section is summarized from Section 5 of the *Final Remedial Investigation Report for Sites 6, 39, and 45* (herein referred to as RI Report) (HGL, 2004). Site 6 consists of the area around Building 1349 (the former control building, currently used for storage), Building 1718 (the current control building), and Building 1140 (the radiographic accelerator building) (Figure 1-1).

The topography at Site 6 is characterized to the north by a relatively steep hill on which Buildings 1350 and 1140 are located. The area from the hill to the south is moderately sloped. A drainage ditch extends south of Building 1718 to a low area in the southwest corner of the site where water tends to pond. In addition to the ditch discharging into this low area, storm water from areas offsite is carried by a culvert that crosses the access road and discharges into this low area. The ditch then extends in an eastward direction from the low area to the fence line.

Soil underlying the site, as determined from boring logs for the three monitoring wells (IS06MW01, IS06MW02, and IS06MW03) installed during the remedial investigation consists of light brown to grey silty clay to clay at the near surface. The clay is underlain by sand or sand with silt, which may be interbedded with clay.

The water table, as determined from the monitoring wells installed at the site, ranges in elevation from about 17.0 feet above mean sea level (msl) (monitoring wells IS06MW01 and IS06MW02) to 13.9 feet above msl (monitoring well IS06MW03). Based on these elevations, it appears that groundwater flow is to the east, which is consistent with the expected shallow groundwater flow toward surface drainages to the east, which then flow southward into the Mattawoman Creek.

2.2 Previous Investigations

2.2.1 Initial Assessment Study

The objective of the Initial Assessment Study (IAS) (Fred C. Hart Associates, 1983) was to identify and assess sites posing a threat to human health or to the environment owing to contamination from past hazardous materials operations at NSF-IH. The IAS report identified Site 6 as one of five sites exhibiting a potential threat. The IAS recommended a Confirmation Study for Site 6 only if silver at Site 5 was found to be a danger to aquatic life. Site 5 is the site of the Grain Manufacture and X-ray Building (Building 731). Site 6 is similar to Site 5 in that both sites discharged photographic developing wastes to open ditches.

Results of the Confirmation Study conducted at Site 5 showed elevated levels of silver in soil samples collected from a drainage ditch at Site 5 (CH2M HILL, 1985).

2.2.2 Phase II RCRA Facility Assessment

A Phase II RCRA Facility Assessment (RFA) (A.T. Kearney, Inc. and K.W Brown & Associates, Inc., 1988) was conducted in 1988 by USEPA and consisted of a Preliminary Review (PR) of available documents and a Visual Site Inspection (VSI). The report indicated that operations at Building 1140 included the development of X-ray photographs. Approximately 2,000 X-ray sheets were developed in a month, and spent fixer and developer were discharged to an open ditch. It also reported that spent solutions were discharged into a 200-gallon polyurethane tank that was located outside of Building 1140. Building 1140 was constructed in 1965, and the tank was installed in the late 1970s. The tank was observed to be covered and rested on bare soil.

The RFA report indicated that approximately 10 gallons of fixer was reportedly spilled behind Building 1349, and a previous site inspection noted bare soil and stressed vegetation in an area covering approximately 200 square feet in the area of the spill. Though areas of bare soil were observed during the VSI, there was no indication of what had caused it.

2.2.3 Remedial Investigation

As documented in Section 6.2.D of the Federal Facilities Agreement, the Navy, USEPA, and MDE decided in 1996 to move Site 6 into the remedial investigation phase because of potentially high risks associated with this site.

Because no sampling had been conducted at this site up to the Phase II RFA point, surface soil, surface soil from intermittently wet areas, subsurface soil, surface water, and groundwater were collected and analyzed for various parameters, as part of the RI conducted at Site 6 and two other sites (HGL, 2004). All samples were collected from within the fenced area of Site 6 (Figure 2-1). This investigation was conducted to determine whether suspected releases of photographic process wastewaters were the cause of silver contamination of the soil, intermittent surface water, and shallow groundwater at Site 6. Section 5 of the RI Report presents detailed information on the sampling and analytical results.

In general, surface soil, surface soil from intermittently wet areas, and subsurface soil contained silver at levels that exceeded the facility-wide and site-specific background concentrations. The results are summarized below:

- For surface soil, the maximum silver concentration (1,160 mg/kg) exceeded the 95 percent upper confidence limit (95%UCL) for facility-wide background (0.84 mg/kg) and the site-specific background concentration (nondetect above 0.56 mg/kg).
- For surface soil from intermittently wet areas, the maximum silver concentration (867 mg/kg) exceeded the 95%UCL for facility-wide background (0.92 mg/kg).
- For subsurface soil, the maximum silver concentration (1,100 mg/kg; collected at a depth of 30 to 36 inches bgs) exceeded the 95%UCL for facility-wide background (2.2 mg/kg) and the site-specific background concentration (nondetect above 0.47 mg/kg).
- Filtered (2 micrograms per liter [$\mu\text{g}/\text{L}$]) and nonfiltered (17.3 $\mu\text{g}/\text{L}$) silver were detected in one of the two surface water samples collected. There are no facility-wide background

values or site-specific background values against which to compare these concentrations. Silver in surface water was attributed to weathering of surface soil and the surface soil from intermittently wet areas.

- Silver was not detected in any of the three unfiltered groundwater samples collected. However, dissolved silver (4.8 µg/L) was detected in monitoring well IS06MW03. The detection of silver in a filtered sample but not in the corresponding unfiltered sample was attributed to the analytical variability that occurs when a concentration is close to the detection limit, which was 1.7 µg/L.

A baseline HHRA was performed to evaluate current and future human health risks associated to environmental media and conditions at Site 6. The receptors evaluated in the risk assessment for both current and future uses included:

- For current uses – adolescent trespassers/visitors, adult trespassers/visitors, and industrial worker
- For future uses – adult resident, child residents, adolescent trespassers/visitors, adult trespassers/visitors, industrial workers, and construction workers

The risk assessment initially screened the observed maximum concentration of silver in each medium against their respective USEPA Region III RBCs. Only the medium for which the maximum silver concentration exceeded the RBCs was evaluated quantitatively in the risk assessment. For surface water and groundwater, the maximum silver concentrations detected were below their respective RBCs. Hence, they were not quantitatively evaluated in the risk assessment. The only environmental media quantitatively evaluated in the risk assessment were current and future surface soil. For the future scenario, the surface soil concentration was estimated by pooling the results from the analyses of the surface soil, surface soil from intermittently wet areas, and subsurface soil, as it was assumed that construction or excavation activities in the future would result in mixing of surface and subsurface soils.

The risk assessment subsequently determined that, under current conditions, soil does not represent an unacceptable risk to any of the receptors. The risk assessment also determined that, under future conditions, soil does not represent an unacceptable risk to the adult resident, adolescent trespassers/visitors, adult trespassers/visitors, and industrial workers. Under future conditions, however, silver poses potentially unacceptable risks to the RME child resident (Hazardous Index [HI] = 3.2) and RME construction worker (HI = 1.2). Two discrete areas dominated the potentially unacceptable risks to these receptors. One area is in the location of sample IS06SS10 (southeast side of Building 1718), and the other area is in the location of sample IS06SD09 (adjacent to the culvert). The central tendency exposure (CTE) scenarios for the child resident (HI = 0.024) and construction worker (HI = 0.02) resulted in non-cancer hazards below the target value of one.

The ecological risk assessment results indicated that: (1) silver in surface soil may pose a potential risk to plants and invertebrates; (2) silver might have migrated offsite into the stream; and (3) if silver has migrated offsite, the magnitude of potential threat to ecological receptors is unknown.

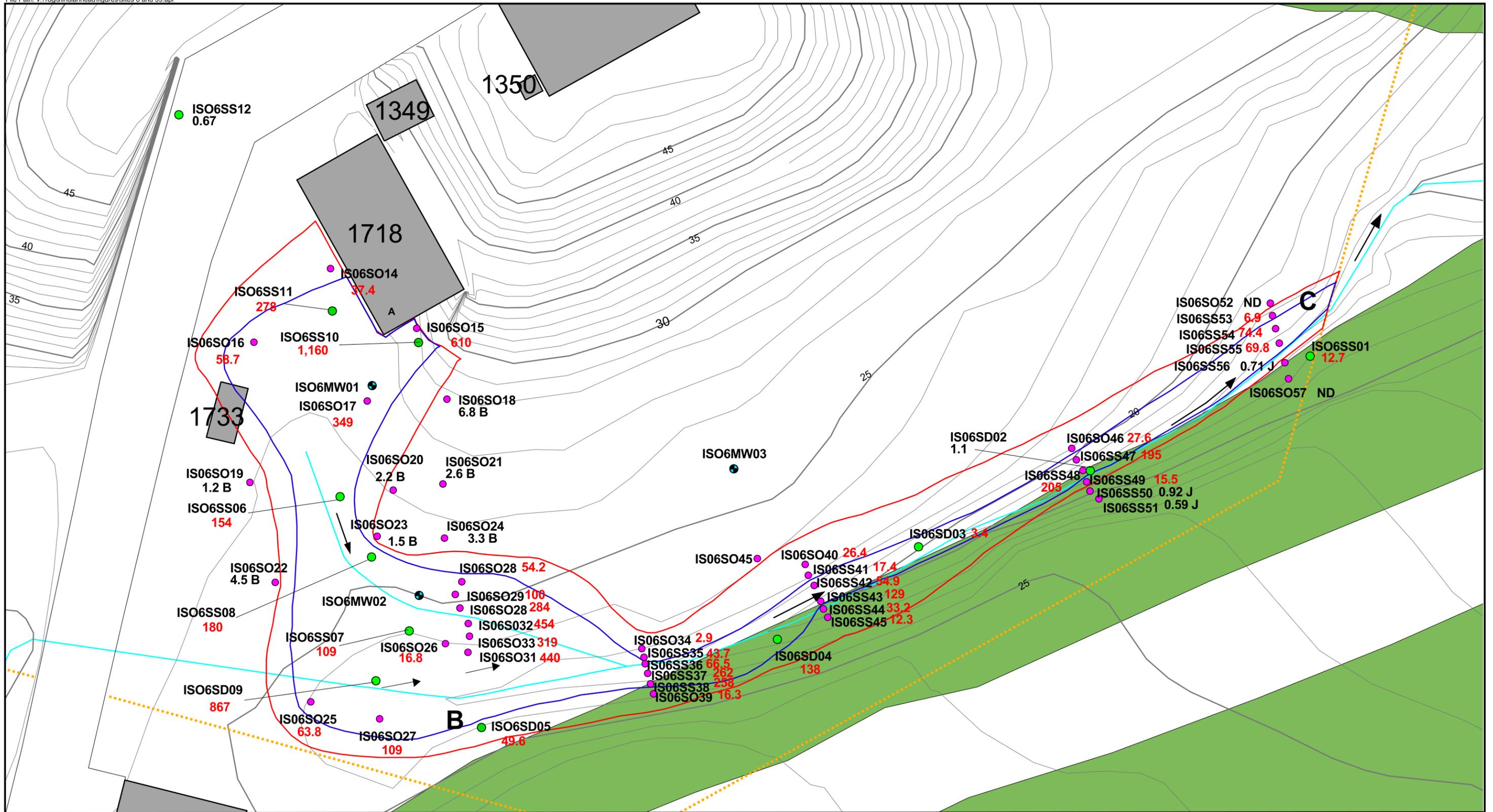
2.2.4 Site 6 Additional Investigation

Based on the findings and conclusions of the RI Report, a Baseline Ecological Risk Assessment (BERA) Technical Memorandum (CH2M HILL, 2004) was prepared to address data gaps identified in the RI. The only portion of the BERA Technical Memorandum that was executed was the collection of three collocated sediment and surface water samples along the drainage ditch beyond the fenced area in October 2005 to evaluate potential offsite migration of silver. The sediment samples were analyzed for silver and the surface water samples for total and dissolved silver. A comparison of the silver results to background levels and ecological screening values indicated that silver had potentially migrated offsite. The results were presented to the Indian Head Installation Restoration Team (IHIRT) at the January 2005 partnering meeting. The IHIRT agreed that an additional investigation was warranted and a sampling approach was presented in a work plan entitled *Work Plan for Additional Investigation at Site 6, NDWIH, Indian Head, MD* (CH2M HILL, 2005). The objectives for the investigation were to: (1) identify the lateral extent of silver contamination to support either a removal action or a finding of no further action inside the fenced area; and (2) assess the need for a baseline ecological risk assessment or remediation outside the fenced area.

The results are presented in a technical memorandum entitled *Site 6 Additional Investigation Results, NSF-IH, Indian Head, Maryland* (CH2M HILL, 2006a). Figures 2-1 and 2-2 show the analytical results for inside and outside of the fenced areas, respectively, at Site 6. The results were presented to the IHIRT during the March 2006, and a decision was made to prepare an EE/CA to address soil removal down to a depth of 1 foot bgs using a soil removal cleanup level of 2 mg/kg inside the fence. Furthermore, the IHIRT agreed that a BERA should be conducted outside the fenced area.

2.2.5 Pre-Excavation Silver Results for Subsurface Soil

The Draft EE/CA (CH2M HILL, 2006b) proposed post-excavation confirmatory sampling at Site 6. Through discussions with the IHIRT, the Team proposed to conduct pre-excavation sampling to delineate the vertical extent of silver at the site. Appendix A presents the objective and rationale for the sampling effort, the results, and the Team's decision for the site. In summary, the Team agreed to excavate down to a depth of 1 foot below ground surface over the area proposed for excavation and down to a depth of 4 feet bgs at locations IS06SS10 and IS06SD09 to address potential RME human health risk scenarios at these discrete areas due to elevated concentrations of silver observed during the Remedial Investigation.



LEGEND

- Sample Location
- 2.2 Silver Concentration in mg/kg
- Previously Sampled Location (HGL, 2004)
- Monitoring Well Location
- Surface Water Drainage
- Fence
- Flow of Water in Ditch

- Isoconcentration Line - 2 mg/kg
- Isoconcentration Line - 50 mg/kg
- ND - Not Detected
- J - Estimated
- B - Possible Blank Contamination

Notes:

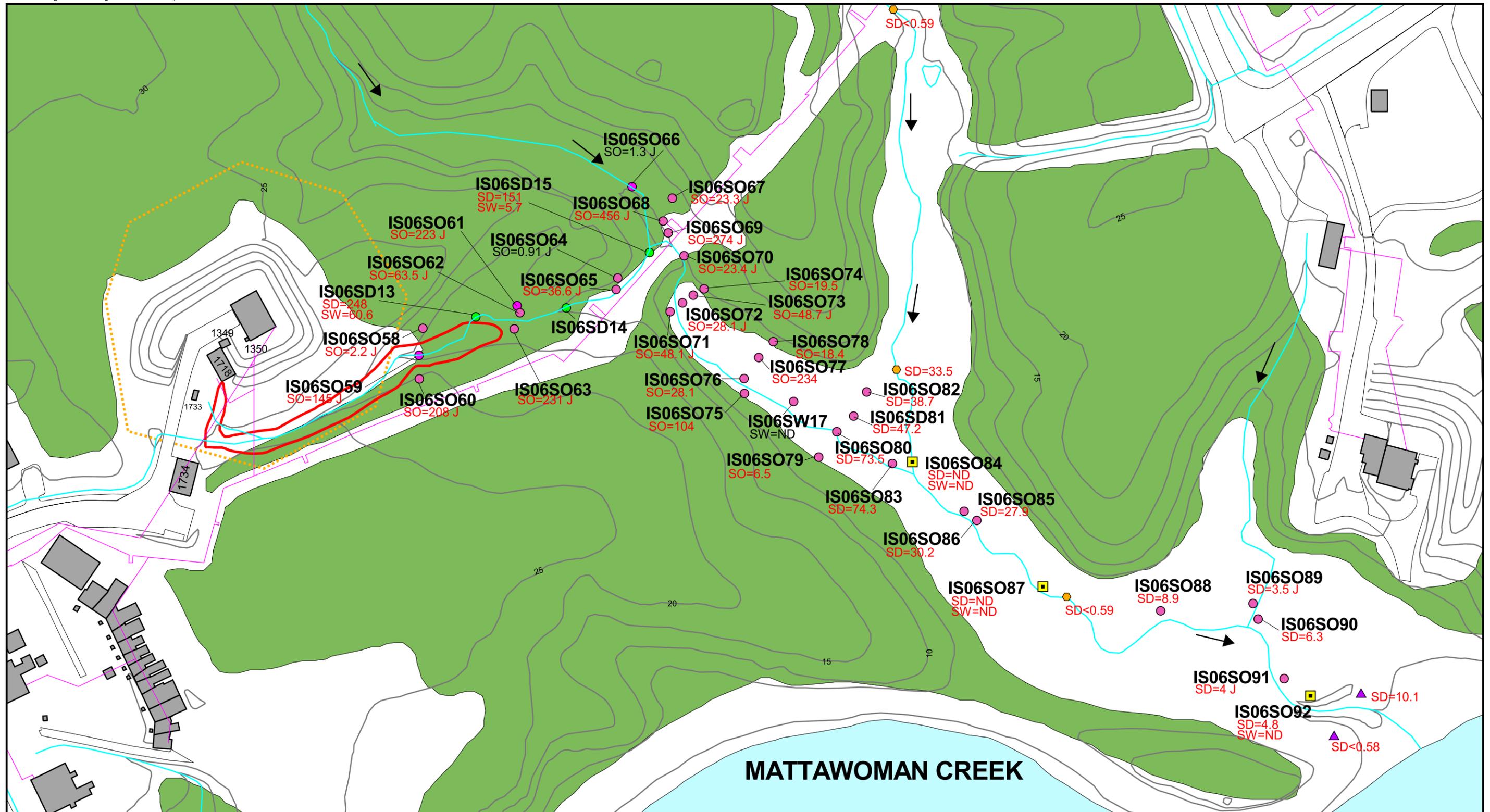
1. Concentrations in red indicate detection above the minimum ecologically based screening criteria of 2 mg/kg.
2. Isoconcentration lines are drawn using the October 2005 analytical data.
3. HGL, 2004 - Final Remedial Investigation for Sites 6, 39, and 45.
4. Figure is from "Results for Site 6 Additional Investigation" (CH2M Hill, 2006)

N

0 20 40 Feet

1 inch = 20 feet

Figure 2-1
Silver Detection Within the Fenced Area
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland



LEGEND

- Sample Location
- 2.2 Silver Concentration (unit for soil and sediment is mg/kg; unit for surface water is µg/L)
- Surface Water and Sediment Sample Location
- ▲ Previously Sampled Location (by SAIC in 2001)
- Previously Sampled Location (by TTNU in 2003)
- Previously Sampled Location (by CH2M HILL in 2004)
- Surface Water Drainage

- Fence
- SD - Sediment Analytical Result
- SO - Surface Soil Analytical Result
- SW - Surface Water Analytical Result
- J - Estimated

Note:

1. Concentrations in red indicate detection above the minimum ecologically based screening criteria of 2 mg/kg.
2. SAIC, 2001, Site Report for Sediment Toxicity Identification Evaluation Demonstration.
3. Figure is from "Results for Site 6 Additional Investigation (CH2M Hill, 2006)"

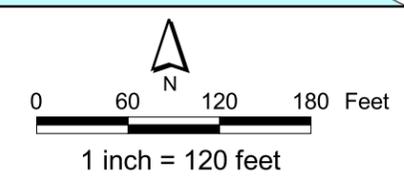


Figure 2-2
Silver Detection Outside the Fenced Area
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland

Identification of the Removal Action Objective

This section presents information that forms the basis for the site removal action objectives (RAOs). This information includes statutory authority regarding removal actions, the RAOs and scope, applicable or relevant and appropriate requirements (ARARs), and a discussion of the selection of cleanup criteria.

3.1 Statutory Authority on Removal Actions

The NCP (40 CFR Part 300.415) dictates statutory limits of \$2 million and 12 months per site on USEPA fund-financed removal actions, with statutory exemptions for emergencies and actions consistent with later removal action to be taken. This removal action will not be USEPA fund-financed. The Navy/Marine Corps Installation Restoration Manual does not limit the cost or duration of the removal action; however, cost effectiveness is a recommended criterion for evaluation of removal action alternatives. No other statutory limits exist for the proposed NTCRA.

3.2 Removal Action Objective

The RAO for Site 6 is to remove and dispose of silver-contaminated surface soil and subsurface soil associated with the site to make sure that soil left in place does not represent an unacceptable risk to human health and the environment, and does not provide a continuing source of silver contamination to soil, sediment, and surface water beyond the fence.

3.3 Applicable or Relevant and Appropriate Requirements

As set forth in the NCP and USEPA guidance, ARARs are either applicable to a situation or relevant and appropriate to a situation. The distinctions are critical to understanding the constraints imposed on remedial alternatives by environmental regulations. ARARs can include any promulgated standard, requirement, criterion, or limitation under a state environmental or facility-siting law that is more stringent than the associated federal standard, requirement, criterion, or limitation. Both the applicable requirements and the relevant and appropriate requirements pertain to a site, to the extent practicable. The definitions of ARARs below are from the document entitled "CERCLA Compliance with Other Laws Manual" (USEPA, 1988).

Applicable requirements are standards, standards of control, and other substantive environmental protection requirements, criteria, or limits promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, or other circumstance, as defined in the NCP, 40 CFR 300.5. For a requirement to be applicable, the remedial action or the circumstances at the site must satisfy all the jurisdictional prerequisites of that requirement. Only those state standards identified by a

state in a timely manner and that are more stringent than federal requirements may be considered as applicable requirements.

Relevant and appropriate requirements are standards, standards of control, and other substantive environmental protection requirements, criteria, or limits promulgated under federal or state law that, although not applicable to a hazardous substance, a pollutant, a contaminant, a remedial action, or other circumstances at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site so that their use is well suited to the particular site. Relevant and appropriate requirements also are defined in the NCP (40 CFR 300.5). For example, although Resource Conservation and Recovery Act (RCRA) regulations are not applicable to closing in-place hazardous waste that was disposed before 1980, RCRA regulations for landfill closure with hazardous substances in-place may be deemed relevant and appropriate. Only those state standards identified by a state in a timely manner and that are more stringent than federal requirements may be considered as relevant and appropriate requirements.

For this EE/CA, only promulgated federal and Maryland laws and regulations can be considered as ARARs. In addition to ARARs, proposed rules, guidance documents, directives, and similar documents that might affect a CERCLA remedial action are *to-be-considered* (TBC) documents. If the ARARs do not address a particular situation, remedial actions should be based on the TBC criteria or guidelines.

Three classifications of requirements are defined by USEPA in the ARAR determination process: chemical-specific, location-specific, and action-specific.

- *Chemical-specific* ARARs are health or risk management-based numbers or methodologies that result in the establishment of numerical values for a given media that would meet the NCP “threshold criterion” of overall protection of human health and the environment. These requirements generally set protective cleanup concentrations for the contaminants of concern (COCs) in the designated media, or set safe concentrations of discharge for remedial activity. Chemical-specific ARARs may be concentration-based cleanup goals or may provide the basis for calculating such levels. In cases where no chemical-specific ARAR exists, chemical advisories may be used to develop removal objectives. Chemical-specific ARARs are not listed in this document because only one chemical, silver, is the constituent of concern and a conservative site remediation goal (SRG) of 2 mg/kg will be used to guide the removal.
- *Location-specific* ARARs restrict activities based on the geographic location of the site or characteristics of the surrounding environments. These ARARs are intended to limit activities within designated areas. Location-specific ARARs may include restrictions on actions within wetlands or floodplains, near locations of known endangered species, or on protected waterways. Tables A-1 and A-2 in Appendix A provide the federal and state location-specific ARARs, respectively.
- *Action-specific* ARARs are requirements that define acceptable procedures related specifically to the type of activity being performed. These ARARs control or restrict hazardous substance- or pollutant-related activities. These controls are considered when specific removal activities are planned for a site. Tables A-3 and A-4 in Appendix A provide the federal and state action-specific ARARs, respectively.

3.4 Selection of the Site Cleanup Criterion

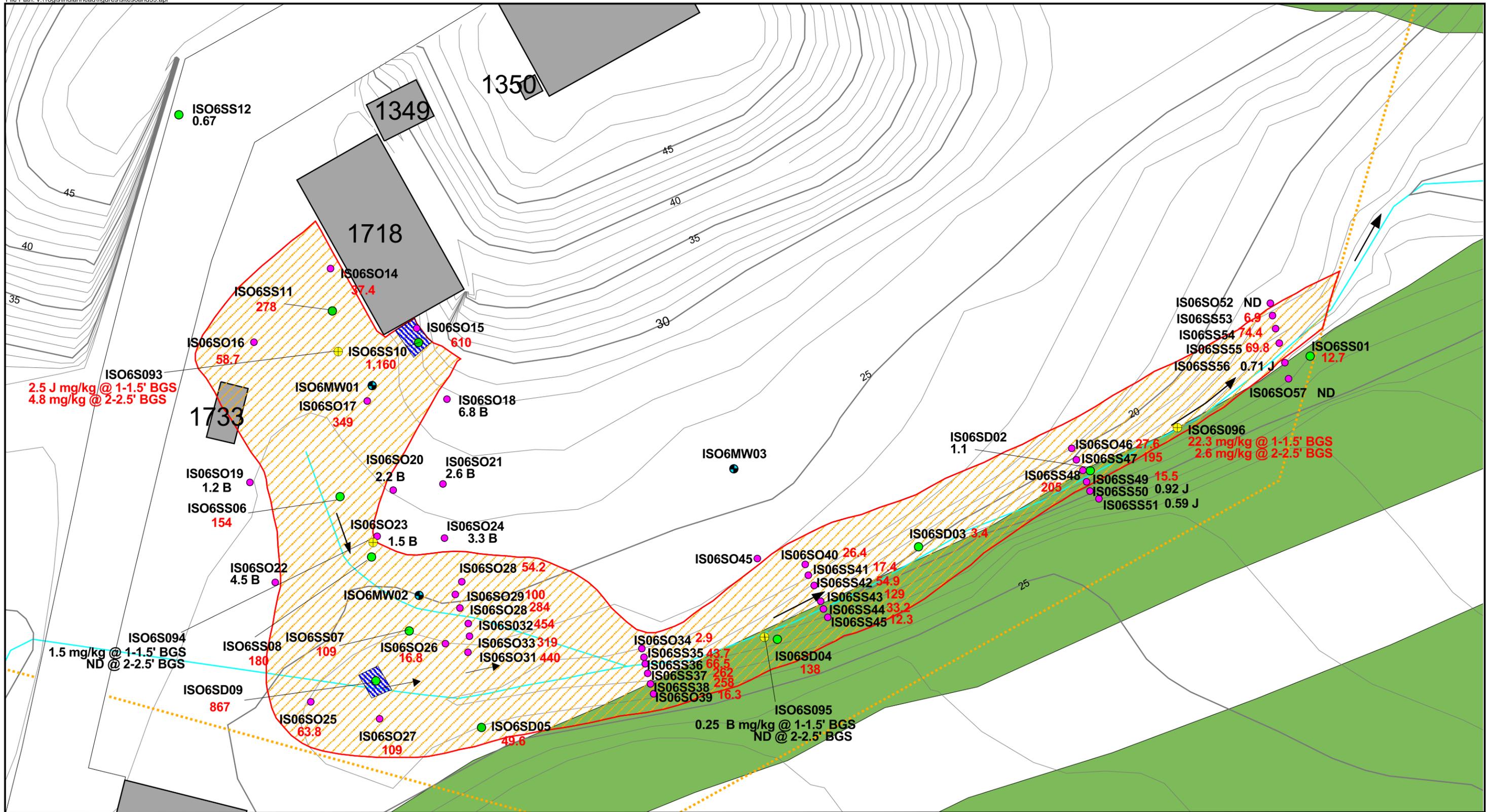
An ecological SRG of 2 mg/kg was established for silver following the risk assessment and additional investigation to define the extent of impacted surface soil along the drainage ditch requiring a removal action. Silver is the only constituent investigated at this site because of past activities. The cleanup level of 2 mg/kg was selected by the IHIRT during the March 2006 partnering meeting. This value is a literature-based value and is the lowest known ecologically based screening criterion, which is considered protective of terrestrial plants.

Description of the Removal Action

Soil Excavation and Offsite Disposal is recommended for the silver-contaminated surface soil in the fenced area at Site 6. Figure 4-1 shows the extent of the area proposed for excavation. The total excavation area is approximately 8,100 square feet (or 0.2 acres) with a depth of 1 foot bgs; this corresponds to approximately 300 cubic yards of material to be excavated. The figure also shows the two locations (IS06SS10 and IS06SD09) where soil will be excavated down to a depth of 4 feet bgs. To be conservative, excavation of each area will be about 10 feet by 10 feet. The excavation will be performed by qualified excavation personnel with Hazard Waste Operations and Emergency Response training. Because of risk for worker exposure to silver contamination, respirators and/or air monitoring may be required during excavation activities. The area will be cordoned off during excavation activities to prevent any trespassers from being exposed to contamination until the contaminated soil is removed.

This removal action considers site preparation, which will consist of clearing trees, brush, and any concrete open conduits along the swale to provide unobstructed equipment access to the proposed area for excavation. Appropriate erosion control and dust control measures will be installed and maintained in the excavation and staging areas until the excavated area has been re-vegetated or otherwise stabilized.

Because the IHIRT has reached a consensus on the lateral and vertical extents of excavation, post-excavation confirmatory sampling will not be necessary. The excavated area will be backfilled with an approved backfill material; it will meet specifications for cleanliness and structural stability, depending on the future use of the property. The area will be graded so that the slopes are similar to pre-excavation conditions. The backfill material will be analyzed before placement to ensure cleanliness and to ensure it is structurally suitable for final slope of the site. For cost estimating purposes for this EE/CA, it is assumed that an average of 1 foot will be placed in the location of the excavation to achieve the desired grade. The swale will be maintained as a feature of the site. After the final grade has been completed, the site will be re-vegetated using a native grass mix. Straw mulch will be placed over the entire area to minimize erosion of the grass seeds until they germinate.



LEGEND

- Sample Location
- 2.2 Silver Concentration in mg/kg
- Previously Sampled Location (HGL, 2004)
- Monitoring Well Location
- Pre-excavation Sample Location
- ND - Not Detected
- Surface Water Drainage
- Fence

- Flow of Water in Ditch
- Isoconcentration Line - 2 mg/kg
- Proposed Area for Excavation to 1 foot BGS
- Proposed Area for Excavation to 4 feet BGS (10"x10" each area; not to scale)
- ND - Not Detected
- J - Estimated
- B - Possible Blank Contamination

Notes:

1. Concentrations in red indicate detection above the minimum ecologically based screening criteria of 2 mg/kg.
2. Isoconcentration lines are drawn using the October 2005 analytical data.
3. HGL, 2004 - Final Remedial Investigation for Sites 6, 39, and 45.
4. Map features are approximate.
5. Figure is from "Draft Engineering Evaluation/Cost Analysis Site 6 (Fenced Area)" (CH2M HILL, 2006) and has been revised to reflect the pre-excavation sample locations and silver results.
6. Locations ISO6SO93, ISO6SO94, ISO6SO95, and ISO6SO96 were sampled during the pre-excavation sampling event and surveyed with a GPS unit on October 26, 2006.

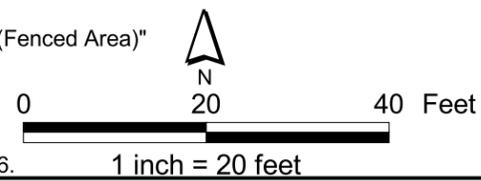


Figure 4-1
Proposed Area for Excavation
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland

Analysis of the Removal Action Alternative

The removal action for the surface soil inside the fenced area is evaluated in terms of effectiveness, implementability, and cost (USEPA, 1993).

5.1 Effectiveness

The overall effectiveness of the remedy is high. The level of effectiveness was assessed based on the number of “effectiveness criteria” that would be satisfied by the alternative. The “effectiveness criteria,” from the USEPA guidance (USEPA, 1993) are as follows:

1. Protection of public health
2. Protection of workers during implementation
3. Protection of environment
4. Compliance with ARARs
5. Level of treatment and containment expected
6. Residual effect concerns

Each criterion is addressed below with respect to the NTCRA.

Protection of Public Health: The NTCRA is being considered to protect ecological receptors. As discussed in Section 2, there is no unacceptable human health risk.

Protection of Public Health: Workers can be protected during implementation of this alternative using personal protection equipment (PPE) and construction controls, as necessary, and in accordance with the project-specific health and safety plan. The environment is protected through the removal of the potential source of contamination from the site. As potential unexploded ordinance (UXO) has not been detected at Site 6 during the remedial investigation or additional investigation, it is assumed that UXO clearance/avoidance will not be performed during the excavation. Hence, it is not included in the cost estimate.

Protection of the Environment: Excavation and disposal of the silver-contaminated surface soil within the fenced area will achieve the RAOs, which are protective of ecological receptors.

Compliance with ARARs: The remedy will comply with the location-specific, action-specific, and chemical-specific ARARs (outlined in Section 3.3 of this EE/CA), that apply to the implementation of the alternative. The removal action will not endanger groundwater or surface water, and it will comply with regulations regarding environmentally sensitive locations, excavations, air emissions, storage, transportation, and other ARARs.

Level of Treatment and Containment Expected and Residual Effect Concerns: Soil excavation with offsite disposal removes, treats as necessary, and contains the contaminated surface soil in a facility specifically designed to manage the medium. The potential toxicity to environmental receptors will be significantly reduced because the potential for exposures

will be prevented. The potential for future contamination of the clean fill to a level greater than the preliminary remedial goal (PRG) in the area of excavation would be eliminated.

5.2 Implementability

The level of implementability was assessed based on the number of “implementability criteria” satisfied by the alternative. The “implementability criteria,” from the USEPA guidance document, are as follows:

1. Construction and operational considerations
2. Demonstrated performance/useful life
3. Adaptable to environment conditions
4. Contributes to remedial performance
5. Can be completed in an acceptable timeframe
6. Availability of equipment, personnel and services, outside laboratory testing capacity, and offsite treatment and disposal capacity
7. Permits required
8. Easements or rights-of-way required
9. Impact on adjoining property
10. Ability to impose institutional controls

Evaluation of implementability essentially comes down to the evaluation of technical and administrative feasibility. The technical feasibility consists of items 1 through 6 above and administrative feasibility involves items 7 through 10. Implementation of an excavation project is straightforward and easily achievable.

5.3 Cost

The removal action is estimated to cost \$150,388, with a potential range between \$105,272 and \$225,582.¹ The detailed cost analysis for this alternative is presented in Appendix C.

5.4 Summary

Soil excavation with offsite disposal of silver-contaminated soil has been chosen as the preferred remedy for Site 6. Post-excavation sampling will not be conducted because the IHIRT agreed to excavate laterally to the 2 mg/kg isoconcentration line and vertically to a depth of 1 foot bgs. The excavated area will be backfilled with clean soil, regraded, and reseeded with native grasses. The excavated soil will be taken to an offsite landfill.

This alternative provides the Navy with a permanent solution that is potentially unhindered by future land use restrictions at the site. It will reduce silver concentrations at the site to a level that will eliminate ecological risk and eliminate the potential future concern or pathway for contaminant transport to ecological receptors beyond the fence line. It will also

¹ In accordance with USEPA guidance, costs are considered to be accurate within -30% to +50%

remove potential risks to the future child and future construction worker. This alternative can achieve the RAO with a great certainty of success and implementation is technically feasible.

References

- A.T. Kearny, Inc., and K.W. Brown & Associates, Inc., 1988. Phase II RCRA Facility Assessment, Indian Head, Maryland.
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- CH2M HILL, 2004. *Sampling Design and Rationale for Baseline Ecological Risk Assessment at Site 6, Naval District Washington, Indian Head.*
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- Fred C. Hart Associates, Inc., 1983. *Initial Assessment Study of Naval Ordnance Station, Indian Head, Maryland.*
- HydroGeologic, Inc. (HGL), 2004. *Final Remedial Investigation Report for Sites 6, 39, and 45, Naval District Washington, Indian Head, Maryland.*
- United States Code of Federal Regulations. *Title 40, Part 300, National Oil and Hazardous Substances Pollution Contingency Plan.*
- United States Environmental Protection Agency (USEPA), 1988. *CERCLA Compliance With Other Laws Manual: Interim Final.* EPA/540-G-89/006.
- United States Environmental Protection Agency (USEPA), 1993. *Memorandum: Final Revised Draft Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA.* EPA/540-R-93-057. OSWER Publication 9360.0-32, PB93-963402.

Appendix A
Pre-Excavation Silver Results for Subsurface
Soil at Site 6 (Fenced Area)

Pre-Excavation Silver Results in Subsurface Soil at Site 6 (Fenced Area), NSF-IH, Indian Head, MD

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DATE: March 23, 2007

1.1 Introduction

This technical memorandum presents the pre-excavation sampling activities and silver results at Site 6 (Inside the Fenced Area), Radiographic Facility Building 1349, at the Naval Support Facility, Indian Head (NSF-IH), Indian Head, Maryland. For background information and site history, refer to Section 1.5.1 of the *Final Remedial Investigation Report for Sites 6, 39, and 45, Naval District Washington, Indian Head* (HydroGeoLogic [HGL], 2004).

The primary objective of this investigation was to characterize the vertical extent of silver in soil along the ditch inside the fenced area. The discussions and rationale for this investigation are presented in the *Indian Head Installation Restoration Team (IHIRT) August 2006 Final Meeting Minutes*. In the *Draft Engineering Evaluation/Cost Analysis (EE/CA)* (CH2M HILL, 2006), vertical delineation was considered complete if silver concentrations in subsurface soil were equal to or less than the ecologically-based screening criterion of 2 milligrams per kilograms (mg/kg). During the August 2006 IHIRT meeting, the Navy, the United States Environmental Protection Agency (EPA), and the Maryland Department of the Environment (herein referred to as the "Team") agreed to the following:

1. Lateral excavation to the 2 mg/kg isoconcentration line was acceptable; hence, post-excavation sampling for lateral delineation will not be conducted.
2. Pre-excavation sampling will be conducted to determine the vertical extent of silver. The samples will be collected from the four locations along the drainage ditch proposed as confirmation sample locations in the Draft EE/CA.

1.2 Field Activities

On October 26, 2006, subsurface soil samples were collected from locations IS06SO93, IS06SO94, IS06SO95, and IS06SO96 (Figure 1). At each location, soil samples were collected from two depth intervals: 1 foot to 1.5 feet below ground surface (bgs) and 2 feet to 2.5 feet bgs (Table 1). Each sample was collected with a hand auger and homogenized in a stainless steel bowl. Each sample was placed into a 4-ounce glass jar and placed into a cooler with ice.

A total of eight primary samples and associated quality assurance/quality control samples, including a field blank, equipment blank, field duplicate, and matrix spike/matrix spike duplicate pair, were collected. The samples were packed and shipped priority overnight under chain-of-custody to GPL Laboratories, LLLP of Frederick, Maryland for silver analysis. Samples were analyzed on a standard 28 calendar-day turnaround time for silver by SW-846 6010B.

All sampling equipment were decontaminated prior to and after sampling, as well as between samples. The data were validated by E-Data, Inc. using Region III Modifications to the *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses*.

1.3 Analytical Results

Table 2 and Table 3 present the unvalidated and validated silver results for the subsurface soil samples, respectively. On December 13, 2006, unvalidated data were presented to the Team at a partnering meeting. The data were compared to the minimum ecologically based screening criterion of 2 mg/kg. The results indicate that at locations IS06SO94 and IS06SO95, silver concentrations at both sample intervals (1 foot to 1.5 feet bgs and 2 feet to 2.5 feet bgs) at each location were less than the 2 mg/kg screening level. At location IS06SO93, silver concentrations ranged from 2.5 mg/kg (1 foot to 1.5 feet bgs) to 4.8 mg/kg (2 feet to 2.5 feet bgs). At location IS06SO96, silver concentrations ranged from 22.3 mg/kg (1 foot to 1.5 feet bgs) to 2.6 mg/kg (2 feet to 2.5 feet bgs).

The results show that at a depth of 1 foot to 1.5 feet bgs, the 2 mg/kg target cleanup concentration was met at all sample locations except IS06S096 (22.3 mg/kg), which is nearest to the fence line. However, the average concentration of silver across the drainage ditch was less than 2 mg/kg. Therefore, the Team and EPA's Biological Technical Assistance Group representative agreed that excavation to 1 foot bgs was acceptable.

The baseline human health risk assessment results from the remedial investigation (HGL, 2004) were presented to the Team. The results indicate that an unacceptable risk to future receptors was present because of elevated silver concentrations in samples from locations IS06SS10 (1,160 mg/kg) and IS06SD09 (867 mg/kg). The human health risk-based concentration for silver in residential soil is 390 mg/kg. The Team agreed that excavation in these two discrete areas would extend to 4 feet bgs.

Following excavation, the site will be restored to maintain the drainage ditch and the excavated area will be revegetated. The restoration activities will be addressed by the remedial design.

The validated data (Table 3) show minor differences between the validated data and unvalidated data. The silver result for sample IS06SB930102 is J-qualified as "estimated"

because of field duplicate reproducibility and the silver result for sample IS06SB950102 is B-qualified as “attributable to blank contamination” because of the equipment blank. The decisions made by the Team are not affected by the qualifiers attached to the results.

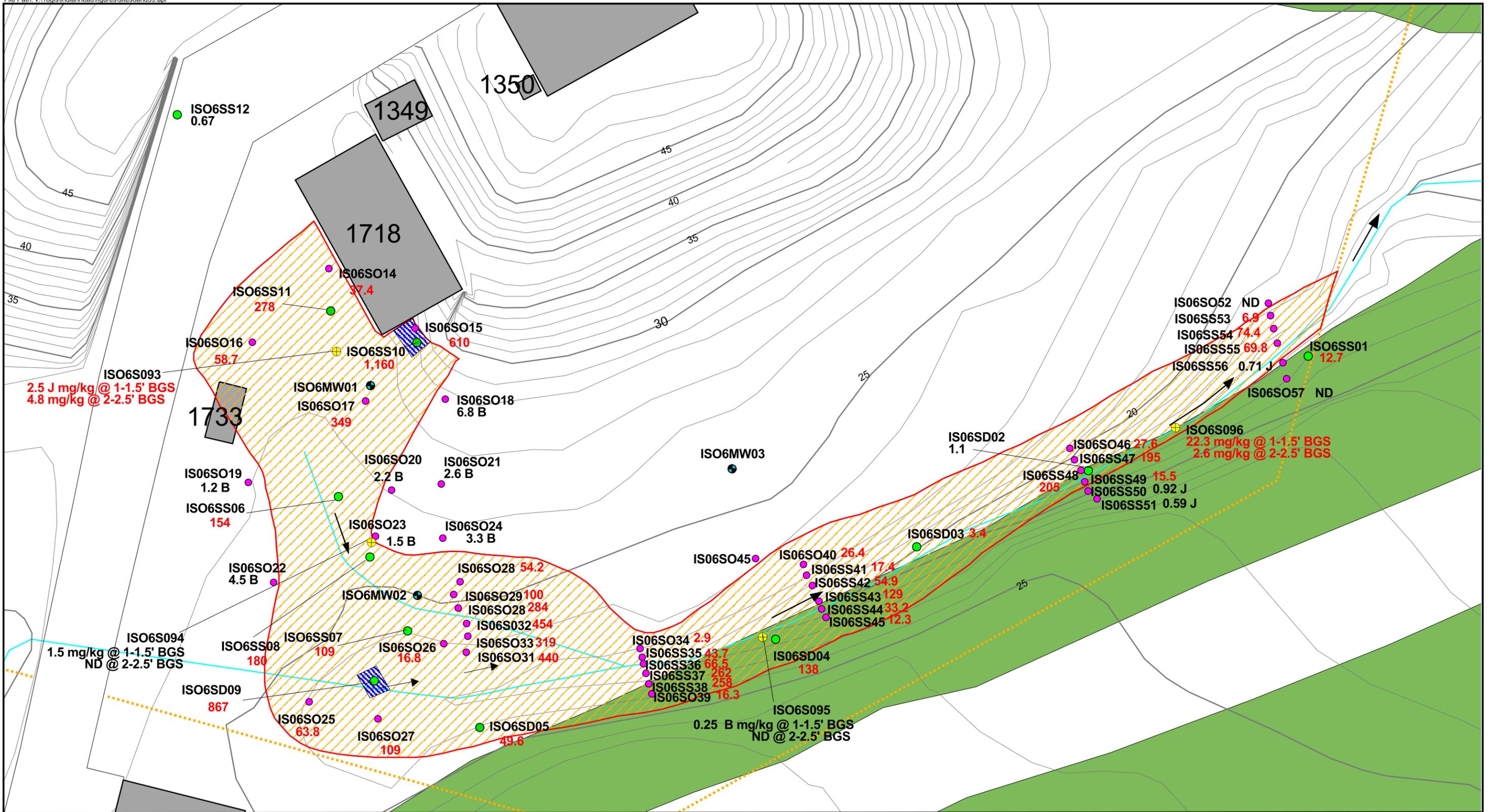
1.4 Conclusion

The Team agreed that the excavation will extend laterally to the 2 mg/kg isoconcentration line and vertically to a depth of 1 foot bgs. The areas around sample locations IS06SS10 and IS06SD09 will be excavated vertically to a depth of 4 feet bgs to address the elevated silver concentrations in these two discrete areas.

1.5 References

CH2M HILL, 2006. *Draft Engineering Evaluation/Cost Analysis, Site 6 (Fenced Area), NSF-IH, Indian Head, Maryland.*

HydroGeologic, Inc. (HGL). 2004. *Final Remedial Investigation Report for Sites 6, 39, and 45, Naval District Washington, Indian Head, Maryland.*



LEGEND

- Sample Location
- 2.2 Silver Concentration in mg/kg
- Previously Sampled Location (HGL, 2004)
- Monitoring Well Location
- Pre-excavation Sample Location
- Surface Water Drainage
- Fence
- Flow of Water in Ditch
- Isoconcentration Line - 2 mg/kg
- Proposed Area for Excavation to 1 foot BGS
- Proposed Area for Excavation to 4 feet BGS
- ND - Not Detected
- J - Estimated
- B - Possible Blank Contamination

Notes:

1. Concentrations in red indicate detection above the minimum ecologically based screening criteria of 2 mg/kg.
2. Isoconcentration lines are drawn using the October 2005 analytical data.
3. HGL, 2004 - Final Remedial Investigation for Sites 6, 39, and 45.
4. Map features are approximate.
5. Figure is from "Draft Engineering Evaluation/Cost Analysis Site 6 (Fenced Area)" (CH2M HILL, 2006) and has been revised to reflect the pre-excavation sample locations and silver results.
6. Locations ISO6SO93, ISO6SO94, ISO6SO95, and ISO6SO96 were sampled during the pre-excavation sampling event and surveyed with a GPS unit on October 26, 2006.

1 inch = 20 feet

Figure 1
 Sample Locations and Silver Results
 Pre-Excavation Silver Results in Subsurface Soil at Site 6 (Fenced Area)
 NSF-IH, Indian Head, Maryland

Table 1
Summary of Samples Collected and Analysis
Pre-Excavation Silver Results in Subsurface Soil at Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland

Station ID	Sample ID ¹	Sample Type	Sample Depth (feet bgs)	Silver by SW-846 6010B
IS06SO93	IS06SB930102	Subsurface Soil	1 - 1.5	X
	IS06SB930203	Subsurface Soil	2 - 2.5	X
IS06SO94	IS06SB940102	Subsurface Soil	1 - 1.5	X
	IS06SB940203	Subsurface Soil	2 - 2.5	X
IS06SO95	IS06SB950102	Subsurface Soil	1 - 1.5	X
	IS06SB950203	Subsurface Soil	2 - 2.5	X
IS06SO96	IS06SB960102	Subsurface Soil	1 - 1.5	X
	IS06SB960203	Subsurface Soil	2 - 2.5	X

QA/QC Samples

IS06SO93	IS06SB93P0102	Field Duplicate ²	1 - 1.5	X
IS06SO96	IS06SB960203	Matrix Spike ³	2 - 2.5	X
IS06SO96	IS06SB960203	Matrix Spike Duplicate ³	2 - 2.5	X
N/A	IS06EB102606	Equipment Blank ⁴	N/A	X
N/A	IS06FB102606	Field Blank ⁴	N/A	X

Notes

¹ Sample nomenclature incorporates base/site ID (IS06), sample type (SB for subsurface soil), last 2 digits of station ID, top depth (2 digits), and bottom depth (2 digits).

² A field duplicate has a "P" following the 2-digit station number.

³ MS/MSD pairs have the same sample ID as the primary sample.

⁴ Blank nomenclature incorporates base/site ID (IS06), sample type (SB for subsurface soil), last 2 digits of station ID, and date of collection (MMDDYY).

⁵ Samples were collected on October 26, 2006

Table 2
Summary of Unvalidated Silver Results for Subsurface Soil Samples
Pre-Excavation Silver Results in Subsurface Soil at Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland

Station ID	Sample ID	Sample Depth (feet bgs)	Silver Concentration (mg/kg)
IS06SO93	IS06SB930102	1-1.5'	2.5
	IS06SB930203	2-2.5'	4.8
IS06SO94	IS06SB940102	1-1.5'	1.5
	IS06SB940203	2-2.5'	ND
IS06SO95	IS06SB950102	1-1.5'	0.25 J
	IS06SB950203	2-2.5'	ND
IS06SO96	IS06SB960102	1-1.5'	22.3
	IS06SB960203	2-2.5'	2.6

Notes

ID = Identification

J = Concentration is below the reporting limit

ND = Non detect

bgs = below ground surface

Samples were collected on October 26, 2006

Results were presented to the Indian Head Installation Restoration Team on December 13, 2006

Table 3
Summary of Validated Silver Results for Subsurface Soil Samples
Pre-Excavation Silver Results in Subsurface Soil at Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland

Station ID	IS06SO93			IS06SO94		IS06SO95		IS06SO96	
Sample ID	IS06SB930102	IS06SB930203	IS06SB93P0102	IS06SB940102	IS06SB940203	IS06SB950102	IS06SB950203	IS06SB960102	IS06SB960203
Sample Date/Time	10/26/06 12:15	10/26/06 12:25	10/26/06 12:20	10/26/06 11:30	10/26/06 11:40	10/26/06 10:45	10/26/06 10:55	10/26/06 10:00	10/26/06 10:10
Total Metals (mg/kg)									
Silver	2.5 J	4.8	1.5 J	1.5	0.047 U	0.25 B	0.053 U	22.3	2.6
Wet Chemistry									
Percent Solids	80	80	80	78	84	84	76	78	83

Notes:

ID = Identification

U - Analyte not detected

J - Estimated result

B - Attributed to blank contamination

Sample nomenclature incorporates base/site ID (IS06), sample type (SB for subsurface soil), last 2 digits of station ID, top depth (2 digits), and bottom depth (2 digits).

A field duplicate has a "P" following the 2-digit station number. One field duplicate sample was collected from station IS06SO93.

Shaded cells indicate silver is detected

Appendix B
Applicable or Relevant and Appropriate
Requirements

Table B-1
Potential Federal Action-Specific ARARs
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
Handling and Disposal of Certain Hazardous Wastes					
Remediation, release, and disposal polychlorinated biphenyls (PCBs)	Requirements governing the remediation, release, and disposal of PCBs must be met.	Remediation, release, and disposal of PCBs.	40 CFR 761	Not Applicable	PCBs are not contaminants of concern on Site 6.
Resource Conservation and Recovery Act (RCRA) 42 USC 6901 et seq.*					
Onsite waste generation	Waste generator shall determine if that waste is hazardous waste.	Generator of hazardous waste.	40 CFR 262.10 (a), 262.11	Potentially applicable	Applicable for any operation where waste is generated. Portions of the extracted soil may be characteristic RCRA hazardous waste.
Hazardous waste accumulation	Generator may accumulate waste on-site for 90 days or less or must comply with requirements for operating a storage facility.	Accumulate hazardous waste.	40 CFR 262.34	Potentially applicable	If waste generated at Site 6 and is determined to be hazardous, any storage of the hazardous waste will not exceed 90 days. Accumulation of hazardous wastes onsite for longer than 90 days would be subject to the substantive RCRA requirements for storage facilities.
Recordkeeping	Generator must keep records.	Generate hazardous waste.	40 CFR 262.40	Not an ARAR	Administrative requirements are not ARARs for onsite CERCLA actions.
Container storage	Containers of RCRA hazardous waste must be: - Maintained in good condition. - Compatible with hazardous waste to be stored. - Closed during storage except to add or remove waste.	Storage of RCRA hazardous waste not meeting small quantity generator criteria held for a temporary period greater than 90 days before treatment, disposal or storage elsewhere, in a container.	40 CFR 264.171, 172, 173	Potentially applicable	Container storage requirements are applicable only if hazardous wastes are generated during remedial activities and are stored onsite for greater than 90 days.
	Inspect container storage areas weekly for deterioration.	Storage of RCRA hazardous waste not meeting small quantity generator criteria held for a temporary period greater than 90 days before treatment, disposal or storage elsewhere, in a container.	40 CFR 264.174	Potentially applicable	

**Table B-1
Potential Federal Action-Specific ARARs
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland**

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
Container storage	Place containers on a sloped, crack-free base, and protect from contact with accumulated liquid. Provide containment system with a capacity of 10 percent of the volume of containers of free liquids. Remove spilled or leaked waste in a timely manner to prevent overflow of the containment system.	Storage of RCRA hazardous waste not meeting small quantity generator criteria held for a temporary period greater than 90 days before treatment, disposal or storage elsewhere, in a container.	40 CFR 264.175(a) and (b)	Potentially applicable	Container storage requirements are applicable only if hazardous wastes are generated during remedial activities and are stored onsite for greater than 90 days. This may occur at Site 6.
	Keep containers of ignitable or reactive waste at least 50 feet from the facility property line.		40 CFR 264.176	Potentially applicable	
	Keep incompatible materials separate. Separate incompatible materials stored near each other by a dike or other barrier.		40 CFR 264.177	Potentially applicable	
	At closure, remove all hazardous waste and residues from the containment system, and decontaminate or remove all containers, liners.		40 CFR 264.178	Potentially applicable	
Excavation	Movement of excavated materials to new location and placement in or on land will trigger land disposal restrictions for the excavated waste or closure requirements for the unit in which the waste is being placed.	Materials containing RCRA hazardous wastes subject to land disposal restrictions are placed in another unit.	40 CFR 268.40	Potentially applicable	Applicable to disposal of soil containing land disposal restricted RCRA hazardous waste. The wastes generated from the response action at Site 6 may be RCRA hazardous wastes.
Waste pile	Use single liner and leachate collection system. Waste put into waste pile subject to land disposal restriction regulations.	RCRA hazardous waste, non-containerized accumulation of solid, nonflammable hazardous waste that is used for treatment or storage.	40 CFR 264.251 (except 251(j), 251(e)(11))	Relevant and appropriate	Wastes will not be managed in waste piles as part of the response action at Site 6. These wastes may be RCRA hazardous wastes, but will be placed in lined rolloffs.
Closure with no postclosure care	General performance standard requires elimination of need for further maintenance and control; elimination of postclosure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products.	Land based unit containing hazardous waste. RCRA hazardous waste placed at site, or placed in another unit. Cleanup to health-based standards that will not require long-term management. Not applicable to material treated, stored, or disposed only before the effective date of the requirements, or if treated in-situ, or consolidated within area of contamination.	40 CFR 264.111	Potentially applicable or relevant and appropriate	This requirement may apply to active (<i>insitu</i>) management of wastes if wastes at Site 6 are determined to be RCRA hazardous wastes. May be relevant to active management of wastes which are sufficiently similar to hazardous wastes. Though no <i>insitu</i> remedial actions are planned at Site 6.

**Table B-1
Potential Federal Action-Specific ARARs
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland**

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
Clean closure	Removal or decontamination of all waste residues, contaminated containment system components, contaminated subsoils, and structures and equipment contaminated with waste and leachate, and management of them as hazardous waste.	Surface impoundment, container of tank liners and hazardous waste residues, or contaminated soil (including soil from dredging or soil disturbed in the course of drilling or excavation) returned to land.	40 CFR 264.111 and 264.228 (a, b, e through k, m, o, p, q).	Potentially applicable	May be applicable if the excavated soil and/or sediment is determined to be a RCRA hazardous waste.
RCRA corrective action	An area at a RCRA facility may be designated as a corrective action management unit (CAMU). Placement of remediation wastes into or within a CAMU does not constitute land disposal of hazardous wastes nor creation of a unit subject to minimum technology requirements.	RCRA corrective action management unit.	40 CFR 264.552	Not applicable	Not an ARAR. No actions that would require designation of a CAMU are planned.
Placement of waste in land disposal unit	Attain land disposal treatment standards before putting waste into landfill in order to comply with land disposal restrictions.	Placement of RCRA hazardous waste in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, or underground mine or cave.	40 CFR 268.40	Potentially applicable	This requirement may apply if active disposal of RCRA restricted hazardous waste occurs as part of the response action at Site 6.
Use of equipment that contacts hazardous waste with organic concentrations greater than 10 percent by weight	Air emission standards for process vents or equipment leaks.	Equipment that contains or contacts hazardous waste with organic concentrations of at least 10 percent by weight or process vents associated with specified operations the manage hazardous wastes with organic concentrations of at least 10 percent by weight.	40 CFR 264.1030 through 1034 (excluding 1030(c), 1033(j), 1034(c)(2), 1034 (d)(2)); 40 CFR 264.1050 through 1063 (excluding 1015(c), 1050(d), 1057(g)(2), 1061(d), 1063(d)(3))	Not applicable	Organic contaminants of concern are not present at suitably high levels at Site 6 .

**Table B-1
Potential Federal Action-Specific ARARs
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland**

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
Discharge to groundwater from regulated unit	Groundwater Protection Standards: Owners/operators of RCRA treatment, storage, or disposal facilities must comply with conditions in this section that area designed to ensure that hazardous constituents entering the groundwater from a regulated unit do not exceed the concentration limits for contaminants of concern set forth under Section 264.94 in the uppermost aquifer underlying the waste management area beyond the point of compliance.	Uppermost aquifer underlying a waste management unit beyond the point of compliance; RCRA hazardous waste, treatment, storage, or disposal.	40 CFR 264.94(a)(1), (a)(3), (c), (d), and (e).	Not an ARAR	Site 6 is not a RCRA treatment, storage, or disposal facility.
Clean Water Act (CWA), 33 USC 1251 et seq.*					
Discharge to POTW	Pretreatment standards. Control the introduction of pollutants into POTWs so as to: prevent interference with the operation of a POTW; prevent pass through of pollutants through a treatment works; and improve opportunities to recycle and reclaim municipal and industrial wastewater and sludges.		40 CFR 403	Not an ARAR	Discharge to a POTW is not planned as part of the response action at Site 6 at .
Discharge of treatment system effluent	Best available technology. Use of Best Available Technology (BAT) economically achievable is required to control toxic and nonconventional pollutants. Use of best conventional pollutant control technology (BCT) is required to control conventional pollutants.	Point source discharge to waters of United States.	40 CFR 122.44(a)	Not an ARAR	Treatment system effluent is not planned as part of the response action at Site 6 .
Discharge of treatment system effluent (continued)	Best Management Practices. Develop and implement a Best Management Practice program to prevent the release of toxic constituents to surface waters.		40 CFR 125.100	Not an ARAR	Treatment system effluent is not planned as part of the response action at Site 6 .
	Monitoring Requirements. Discharge must be monitored to assure compliance. Comply with additional substantive requirements such as; mitigate any adverse effects of any discharge, and proper operation and maintenance of treatment systems.		40 CFR 122.41 (i), (j)	Not an ARAR	Treatment system effluent is not planned as part of the response action at Site 6 .

**Table B-1
Potential Federal Action-Specific ARARs
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland**

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
Clean Air Act (CAA) 40 USC 7401 et seq.*					
Operations generating pollution	Establishes requirements for the control of pollution from Federal facilities.	Operations generating pollution.	Section 118 of the CAA.	Not an ARAR	Response actions at Site 6. will not be generating these air emissions.
Discharge of Volatile Organic Compounds (VOCs) to air.	A prediction of total emissions of VOCs must be made to demonstrate that emissions do not exceed 450 lb/hr, 3,000 lb/day, 10 gal/day, or allowable emission levels from similar sources using Reasonably Available Control Technology (RACT).	Emissions of VOCs	40 CFR 52	Not an ARAR	Response actions at Site 6. will not be generating these air emissions.
Operations generating odors into the environment	Systems must be designed to provide an odor-free operation.	Operations generating odors into the environment.	Section 101 of the CAA, 40 CFR 52	Not an ARAR	Response actions at Site 6. will not be generating these air emissions.
Discharge to air	An Air Pollution Emission Notice (APEN) must be filed with the State of Virginia to include an estimation of emission rates for each pollutant expected.	Major sources of air pollutants	40 USC Section 7140; portions of 40 CFR 52.220	Not an ARAR	Response actions at Site 6. will not be generating these air emissions.
Discharge to air	Provisions of State Implementation Plan (SIP) approved by EPA under Section 110 of CAA.	Major sources of air pollutants	40 USC Section 7140; portions of 40 CFR 52.220	Not an ARAR	Response actions at Site 6. will not be generating these air emissions.
NAAQS Attainment areas	New major stationary sources shall apply best available control technology for each pollutant, subject to regulation under the Act, that the source would have potential to emit in significant amounts.	Major stationary sources as identified in 40 CFR 52.21(b)(1)(i)(a) that emits, or has the potential to emit, 100 tons per year or more of any regulated pollutant; any other stationary source that emits, or has the potential to emit, 250 tons per year or more of any regulated pollutant.	40 CFR 52.21(j) (CAA)	Not an ARAR	Response actions at Site 6. will not be generating these air emissions.
NAAQS non-Attainment areas	Source must obtain emission offsets in Air Quality Control Region of greater than one-to-one	Any stationary facility or source of air pollutants that directly emits, or has the potential to emit, 100 tons per year or more of any air pollutant (including any major emitting facility or source of fugitive emissions of any such pollutants).	CAA Part D, Section 173(1)	Not an ARAR	Response actions at Site 6. will not be generating these air emissions.
	Source subject to "lowest achievable emission rate (LAER)" as defined in 40 CFR 51.18(j)(xiii) All major stationary sources owned or operated by any person in the State are in compliance, or on a schedule for compliance, with all applicable emission standards.		CAA Part D, Section 173(2) CAA Part D, Section 173(3)		

**Table B-1
Potential Federal Action-Specific ARARs
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland**

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
Air Quality					
Emissions of mercury, vinyl chloride, and benzene	Requirements to verify that emissions of mercury, vinyl chloride, and benzene do not exceed levels expected from sources that are in compliance with hazardous air pollution regulation.	Emissions of mercury, vinyl chloride, and benzene from sources in compliance with hazardous air pollution regulation.	40 CFR 61	Not an ARAR	Response actions at Site 6 will not be generating these air emissions.
U.S. Department of Transportation, 49 USC 1802, et seq.*					
Hazardous Materials Transportation	No person shall represent that a container or package is safe unless it meets the requirements of 49 USC 1802, et seq. or represent that a hazardous material is present in a package or motor vehicle if it is not.	Interstate carriers transporting hazardous waste and substances by motor vehicle. Transportation of hazardous material under contract with any department of the executive branch of the Federal Government.	49 CFR 171.2(f)	Potentially applicable	To be determined. Substantive portions of these requirements would be ARARs for transport of hazardous materials onsite. Offsite transport of hazardous materials must comply with both substantive and administrative requirements.
	No person shall unlawfully alter or deface labels, placards, or descriptions, packages, containers, or motor vehicles used for transportation of hazardous materials.		49 CFR 171.2(g)	Potentially applicable	
Hazardous Materials Marking, Labeling, and Placarding	Each person who offers hazardous material for transportation or each carrier that transports it shall mark each package, container, and vehicle in the manner required.	Person who offers hazardous material for transportation; carries hazardous material; or packages, labels, or placards hazardous material.	49 CFR 172.300	Potentially applicable	To be determined. Substantive portions of these requirements would be ARARs for transport of hazardous materials onsite. Offsite transport of hazardous materials must comply with both substantive and administrative requirements.
	Each person offering non-bulk hazardous materials for transportation shall mark the proper shipping name and identification number (technical name) and consignee's name and address.		49 CFR 172.301	Potentially applicable	
	Hazardous materials for transportation in bulk packages must be labeled with proper identification (ID) number, specified in 49 CFR 172.101 table, with required size of print. Packages must remain marked until cleaned or refilled with material requiring other marking.	Person who offers hazardous material for transportation; carries hazardous material; or packages, labels, or placards hazardous material.	49 CFR 172.302	Potentially applicable	

**Table B-1
Potential Federal Action-Specific ARARs
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland**

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
Hazardous Materials Marking, Labeling, and Placarding (continued)	No package marked with a proper shipping name or ID number may be offered for transport or transported unless the package contains the identified hazardous material or its residue.		49 CFR 172.303	Potentially applicable	To be determined. Substantive portions of these requirements would be ARARs for transport of hazardous materials onsite. Offsite transport of hazardous materials must comply with both substantive and administrative requirements.
	The marking must be durable, in English, in contrasting colors, unobscured, and away from other markings.		49 CFR 172.304	Potentially applicable	
	Labeling of hazardous material packages shall be as specified in the list.	Person who offers hazardous material for transportation; carries hazardous material; or packages, labels, or placards hazardous material.	49 CFR 172.400	Potentially applicable	To be determined. Substantive portions of these requirements would be ARARs for transport of hazardous materials onsite. Offsite transport of hazardous materials must comply with both substantive and administrative requirements.
	Non-bulk combination packages containing liquid hazardous materials must be packed with closures upward, and marked with arrows pointing upward.		49 CFR 172.312	Potentially applicable	
	Each bulk packaging or transport vehicle containing any quantity of hazardous material must be placarded on each side and each end with the type of placards listed in Tables 1 and 2 of 49 CFR 172.504.		49 CFR 172.504	Potentially applicable	
Criteria for Classification of Solid Waste Disposal Facilities and Practices, 40 CFR Part 257*					
Solid Waste Disposal	A facility or practice shall not contaminate an underground drinking water source beyond the solid waste boundary or a court- or State-established alternative.	Solid waste disposal facility and practices except agricultural wastes, overburden resulting from mining operations, land application of domestic sewage, location and operations of septic tanks, solid or dissolved materials in irrigation return flows, industrial discharges that are point sources subject to permits under CWA, source special nuclear or by-product material as defined by the Atomic Energy Act, hazardous waste disposal facilities that are subject to regulation under RCRA subtitle C, disposal of solid waste by underground injection, and municipal solid waste landfill units.	40 CFR 257.3-4 and Appendix I	Potentially applicable	The response action may include the disposal of wastes in a solid waste disposal facility. Substantive requirements would be applicable to an onsite disposal facility for non-hazardous wastes.

Table B-1
Potential Federal Action-Specific ARARs
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
	A facility shall not cause a discharge of pollutants into waters of the U.S. that is in violation of the <u>substantive</u> requirements of the NPDES under CWA Section 402, as amended.		40 CFR 257.3-3(a)	Potentially applicable	
	A facility shall not cause discharge of dredged material or fill material to waters of the U.S. that is in violation of the <u>substantive</u> requirements of CWA Section 404.		40 CFR 257.3-3	Not an ARAR	The response action at Site 6 will not include the disposal of dredge or fill material into the river.
	A facility or practice shall not cause nonpoint source pollution of waters of the U.S. that violates applicable legal <u>substantive</u> requirements implementing an areawide or Statewide water quality management plan approved by the Administrator under CWA Section 208, as amended.		40 CFR 257.3-3(a)	Potentially applicable	The response action may include the disposal of wastes in a solid waste disposal facility. Substantive requirements would be applicable to an onsite disposal facility for non-hazardous wastes.
Solid Waste Disposal (continued)	The facility or practice shall not engage in open burning of residential, commercial, institutional, or industrial solid waste.	Not applicable to infrequent burning of agricultural wastes in the field, silvicultural wastes for forest management purposes, land clearing debris from emergency cleanup operations, and ordnance.	40 CFR 257.3-7(a)	Not an ARAR	No open burning is planned as part of the response action at Site 6.
	The facility shall not violate applicable requirements developed under a State Implementation Plan (SIP) approved or promulgated by the Administrator pursuant to CAA Section 110, as amended.		40 CFR 257.3-7(b)	Not an ARAR	No solid waste management units that would impact the SIP are planned.

**Table B-1
Potential Federal Action-Specific ARARs
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland**

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
Occupational Safety and Health Administration (OSHA)					
Hazardous waste work	Requirements for hazardous waste workers such as training, personal protective equipment (PPE), and clothing must be met.	Hazardous waste work.	29 CFR 1904, 29 CFR 1910, 29 CFR 1926	Potentially Applicable Applicable	The remedial action at Site 6 at the may involve hazardous waste workers, therefore the requirements of OSHA must be met.
<p>Statutes and policies, and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader. Listing the statutes and policies does not indicate that EPA considers the entire statutes or policies as potential ARARs; only substantive requirements of the specific citations are considered potential ARARs. Specific potential ARARs are addressed in the table below each general heading.</p> <p> ACLS - Alternate concentration limits. APEN - Air Pollution Emission Notice. ARAR - Applicable or relevant and appropriate requirement. BACT - Best available control technology BDAT - Best demonstrated available technologies. CAA - Clean Air Act. CAMU - Correction action management unit. RCRA - Resource Conservation and Recovery Act. CFR - Code for Federal Regulations. CWA - Clean Water Act DOT - U.S. Department of Transportation. EPA - U.S. Environmental Protection Agency. LAER - Lowest achievable emission rate. MCLs - Maximum contaminant levels. MCLGs - Maximum contaminant level goals. NAAQS - National Ambient Air Quality Standards (primary and secondary). NESHAP - National emission standards for hazardous air pollutants. NCP - National Contingency Plan. NPDES - National Pollutant discharge elimination system. </p> <p> OSHA - Occupational Safety and Health Administration PCBs - Polychlorinated Biphenyls POTW - Publicly owned treatment works. ppm - Parts per million. ppmw - Parts per million by weight. RA - Relevant and appropriate. RACT - Reasonably Available Control Technology. CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act. SDWA - Safe Drinking Water Act. SIP - State Implementation Plan SMCLs - Secondary maximum contaminant levels. TBC - To be considered. TSCA - Toxic Substances Control Act UIC - Underground injection control. USC - United States Code. USDW - Underground source of drinking water. VOCs - Volatile Organic Compounds. </p>					

**Table B-2
Potential State Action-Specific ARARs
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland**

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
Transportation, Disposal of Hazardous Waste					
Storage, treatment or disposal, and transportation of hazardous waste	Regulations and procedures for the identifications, listing, transportation, treatment, storage and disposal of hazardous wastes must be met.	hazardous wastes.	COMAR 26.13.02, COMAR 26.13.04, Annotated Code of Maryland Title 7	Potentially Applicable	Any hazardous waste found during site remediation will be disposed of according to regulations. Any residues or by-products from treatment systems which are hazardous will be disposed of properly
Construction, Alteration, and Extension of Sanitary Landfills					
Altering, extending or constructing sanitary landfills, determination of permit requirements	Regulation and permitting for the material alteration of proposed and former sanitary landfills.	Disposal and radioactive hazardous substances.	COMAR 26.04.07.04	Potentially Applicable	The Drum Removal at Site 6 may be subject to the substantive portions of this regulation.
Disposal of Controlled Hazardous Substances-Radioactive Hazardous Substances					
Handling of radioactive hazardous substances	Provides for the disposal and transport of radioactive hazardous substances (low-level nuclear waste and low-level radioactive waste) in an appropriate manner.	Disposal and radioactive hazardous substances.	COMAR 26.15.02	Not an ARAR	Radioactive hazardous substances will not be disposed of or transported as part of the remedial actions at Site 6.
Stormwater Management					
Design and construction	Regulations require the design and construction of a system necessary to control stormwater.	Design and construction	COMAR 26.09.02 COMAR 26.09.02.01 COMAR 26.09.02.03(A&B) COMAR 26.09.02.05(A) COMAR 26.09.02.06 COMAR 26.09.02.08 COMAR 26.09.02.10	Applicable	The remedial action will incorporate measures to control and manage stormwater (i.e. erosion control measures will be implemented.
Erosion and Sediment Control					
Land clearing, grading, and earth disturbances	Regulations require the preparation and implementation of a plan to control erosion and sediment for activities involving land clearing, and grading and earth disturbances. Erosion and sediment control criteria are also established.	Land clearing, and earth	COMAR 26.09.01 COMAR 26.09.01.04 COMAR 26.09.01.05 COMAR 26.09.01.06 COMAR 26.09.01.07 COMAR 26.09.01.11	Applicable	The remedial action will incorporate the standards required for clearing, grading, and other earth disturbances, including compliance with County and Municipal erosion and sediment control ordinances, and the Commission's erosion and sedimentation control regulations.
Oil Pollution and Tank Management					
Disposal of oil or other matter containing oil	Provides that oil or other matter containing oil or matter containing oil may not be discharged, dumped, spilled, drained, thrown, or deposited near, or in an area likely to pollute the waters of the State (surface and underground waters the boundaries of the State, including the Chesapeake Bay and its tributaries, and all lakes, rivers, streams, public ditches, and public drainage systems within the State other than designed to collect, convey, or dispose of sanitary sewer).	Disposal of oil or matter containing oil.	COMAR 26.10.01.02, Annotated Code of Maryland Title 5	Not Applicable	Oil products are not anticipated to be present at Site 6.
Air Quality					
Ambient Air Quality Control	Maintains the degree of purity of air necessary to protect the health, the general welfare, and property of people of the State.	Action that will affect air quality standards.	Annotated Code of Maryland Title 2	Applicable	These regulations are applicable at NSF-IH in connection with activities that move debris, soil, etc.

**Table B-2
Potential State Action-Specific ARARs
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland**

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
Air emissions	Provides State-adopted, National Ambient Air Quality Standards and Guidelines.	Action that will affect air quality standards.	COMAR 26.11.03	Not an ARAR	Remedial actions at Site 6 will not be generating these air emissions.
Visible air emissions	Provides Emission Standards for Visible Air Emissions.	Action resulting in air emissions.	COMAR 26.11.06.02	Applicable	These regulations are applicable at Site 6 in connection with activities that remove/transport/survey debris and/or excavated materials; disturb the soil during excavation; disturb soil or other exposed surfaces during construction.
Particulate air emissions	Provides General Emission Standards, Prohibitions, and Restrictions for particulates.	Action that will result emission of particulates.	COMAR 26.11.06.03	Applicable	These regulations are applicable at Site 6 in connection with activities that remove/transport/survey debris and/or excavated materials; disturb the soil during excavation; disturb soil or other exposed surfaces during construction.
Emissions of Volatile Organic Compounds (VOCs) into the ambient air	Provides General Emission Standards for VOCs.	Action that will result emission of VOCs air, where the VOC has a vapor greater than 0.002 per square inch	COMAR 26.11.06.06	Not an ARAR	Remedial actions at Site 6 will not be generating these air emissions.
Nuisance Control	Prohibits nuisance or air pollution.	Action causing a or air pollution.	COMAR 26.11.06.08	Potentially Applicable	May be applicable for remedial actions at Site 6, measures will be implemented to mitigate impacts if needed.
Odor Control	May not cause or permit the discharge into the atmosphere of gases, vapors, or odors beyond the property line in such a manner that a nuisance or air pollution is created.	Action causing odors, nuisance, or air	COMAR 26.11.06.09	Not Applicable	Will not be applicable for remedial actions at Site 6.
Emissions of Toxic Air Pollutants (TAPs) into the ambient air	Provides air quality standards, emission standards from construction activities, treatment technologies, and vents.		COMAR 26.11.15 COMAR 26.11.15.04 COMAR 26.11.15.05 COMAR 26.11.15.06 COMAR 26.11.15.07 COMAR 26.11.15.08 COMAR 26.11.15.11 COMAR 26.11.15.12 COMAR 26.11.15.13 COMAR 26.11.15.19.02(G)	Not an ARAR	Remedial actions at Site 6 will not be generating these air emissions.
Occupational, Industrial, and Residential Hazards					
Action that will generate noise	Limits set on the levels of noise must be met; these limits are protective of the health, welfare, and property of the people in the State of Maryland. The maximum permitted levels for construction activities may not exceed 90 dBA during the day and 75 dBA during night.	Action that will noise.	COMAR 26.02.03.02A (2) and B(2), COMAR 26.02.03.02.03A, Annotated Code of Maryland Title 3	Applicable	During the site remediation work, the maximum allowable noise levels will not be exceeded at Site 6 IHDIV-NSWC boundaries.
ARAR - Applicable or relevant and appropriate requirement TAP - Toxic Air Pollutant.		USTs - Underground Storage Tanks. VOCs - Volatile Organic Compounds.			

**Table B-3
Potential Federal Location-Specific ARARs
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland**

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
National Archaeological and Historical Preservation Act					
Within area where action may cause irreparable harm, loss, or destruction of significant artifacts.	Construction on previously undisturbed land would require an archaeological survey of the area.	Alteration of terrain that threatens significant scientific, prehistoric, historic, or archaeological data.	Substantive requirements of 36 CFR 65; 16 USC 469	Not applicable	None of the remedial actions being considered for Site 6 include the disturbance of previously undisturbed land.
Federal National Historic Preservation Act, Section 106					
Historic project owned or controlled by federal agency.	Action to preserve historic properties; planning of action to minimize harm to properties listed on or eligible for listing on the National Register of Historic Places.	Property included in or eligible for the National Register of Historic Places.	Substantive Requirements of 36 CFR 800; 16 USC 470	To be considered	An archaeological study/investigation has not been performed at Site 6. If during remedial activities potential artifacts are found, appropriate actions will be taken to preserve these objects and the site. No historic buildings are located at NSF-IH.
Historic Sites, Buildings, and Antiquities Act					
Historic sites	Avoid undesirable impacts on landmarks.	Areas designated as historic sites.	16 USC 461-467; 40 CFR 6.301 (a)	Not applicable	There are no historical structures located on Site 6 located on the IHDIV-NSWC.
Endangered Species Act of 1973					
Critical habitat upon which endangered species or threatened species depend.	Action to conserve endangered species or threatened species, including consultation with the Department of the Interior. Reasonable mitigation and enhancement measures must be taken, including live propagation, transplantation, and habitat acquisition and improvement.	Determination of effect upon endangered or threatened species or its habitat by conducting biological assessments.	16 USC 1531; 16 USC 1536(a); 50 CFR 81, 225, 402	Not applicable	There are no endangered or rare plant and animal species located at NSF-IH.
Migratory Bird Treaty Act of 1972					
Migratory bird area	Protects almost all species of native birds in the U.S. from unregulated "take" which can include poisoning at hazardous waste sites.	Presence of migratory birds.	16 USC Section 703	Relevant and Appropriate	Migratory birds are encountered at NSF-IH. These requirements are applicable to any response actions that could result in unregulated "taking" of native birds.
Marine Mammal Protection Act					
Marine mammal area	Protects any marine mammal in the U.S. except as provided by international treaties from unregulated "take."	Presence of marine mammals.	16 USC 1372(2)	Not applicable	Marine mammals will not be encountered along the any waterways at NSF-IH. These requirements would be applicable to response actions that could fatally impact marine mammals.
Wilderness Act					
Wilderness area	Area must be administered in such a manner as will leave it unimpaired as wilderness and preserve its wilderness character.	Federally-owned area designated as wilderness area.	16 USC 1131 et seq.; 50 CFR 35.1 et seq.	Not applicable	No sites at NSF-IH are located in a federally owned wilderness area.
National Wildlife Refuge System					
Wildlife refuge	Only actions allowed under the provisions of 16 USC Section 688 dd(c) may be undertaken in areas that are part of the National Wildlife Refuge System.	Area designated as part of National Wildlife Refuge System.	16 USC 668; 50 CFR 27	Not applicable	Site 6 is not located in or adjacent to an area designated as part of the National Wildlife Refuge System.
Fish and Wildlife Coordination Act, Fish and Wildlife Improvement Act of 1978, Fish and Wildlife Conservation Act of 1980					
Area affecting stream or other water body	Provides protection for actions that would affect streams, wetlands, other water bodies or protected habitats. Any action taken should protect fish or wildlife.	Diversion, channeling or other activity that modifies a stream or other water body and affects fish or wildlife.	16 USC 661; 16 USC 662; 16 USC 742a; 16 USC 2901; 50 CFR 83	Applicable	Response actions will incorporate protection against any area water body, wetlands, or protected habitats.

**Table B-3
Potential Federal Location-Specific ARARs
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland**

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
Procedures for Implementing the Requirements of the Council on Environmental Quality on the National Environmental Policy Act and Executive Order 11990, Protection of Wetlands					
Wetland	Action to minimize the destruction, loss, or degradation of wetlands. Wetlands of primary ecological significance must not be altered so that ecological systems in the wetlands are unreasonably disturbed.	Wetlands as defined by Executive Order 11990 Section 7.	40 CFR 6, Appendix A excluding Sections 6(a)(2), 6(a)(4), 6(a)(6); 40 CFR 6.302	Relevant and Appropriate	This regulation may be an ARAR for activities occurring in areas that meet the definition of a wetland. Due to the proximity of Mattawoman Creek to Site 6 and the presence of plant life associated with a nontidal wetland remedial activities would minimize the destruction, loss, or degradation of the wetlands.
Clean Water Act, Section 404					
Wetland	The degradation Section requires degradation or destruction of wetlands and other aquatic sites be avoided to the extent possible. Dredged or fill material must not be discharged to navigable waters if the activity: contributes to the violation of Maryland water quality standards; CWA Sec. 307; jeopardizes endangered or threatened species; or violates requirements of the Title III of the Marine Protection, Research, and Sanctuaries Act of 1972.	Wetland as defined by Executive Order 11990 Section 7.	40 CFR 230.10; 40 CFR 231 (231.1, 231.2, 231.7, 231.8)	Relevant and Appropriate	This regulation may be an ARAR for activities occurring in areas that meet the definition of a wetland. Due to the proximity of Mattawoman Creek to Site 6 and the presence of plant life associated with a nontidal wetland remedial activities would minimize the destruction, loss, or degradation of the wetlands.
Surface Water	Ambient Water Quality Criteria established to protect aquatic life and human consumers of water or aquatic life.	Activities that affect or may affect the surface water onsite	40 CFR 129	Relevant and appropriate	These regulations would be considered during the remedial action plan for Site 6 due to the presence of surface water. All actions will comply with the relevant aspects of this regulation.
Wild and Scenic Rivers Act					
Within area affecting national wild, scenic, or recreational rivers.	Avoid taking or assisting in action that will have direct adverse effect on national, wild, or scenic recreational rivers.	Activities that affect or may affect any of the rivers specified in Section 1276(a).	16 USC 1271 et seq. and Section 7(a); 36 CFR 297; 40 CFR 6.302 (e)	Applicable	There are national wild, scenic, or recreational rivers located on the NSF-IH facility. Remedial activities would minimize/mitigate the destruction, loss, or degradation of the wetlands.
Coastal Zone Management Act					
Within coastal zone	Regulates activities affecting the coastal zone including lands thereunder and adjacent shoreline. The coastal zone is rich in a variety of natural, commercial, recreational, ecological, industrial, and esthetic resources of immediate and potential value to the present and future well-being of the Nation. Must conduct activities in a manner consistent with the approved State management programs.	Activities affecting the coastal zone including lands thereunder and adjacent shoreland.	Section 307(c) of 16 USC 1456(c); 16 USC 1451 et seq.; 15 CFR 930; 15 CFR 923.45	Not applicable	This regulation is not a ARAR for sites at NSF-IH.
Coastal Barrier Resources Act, Section 3504					
Within designated coastal barrier	Prohibits any new federal expenditure within the Coastal Barrier Resource System. A coastal barrier is defined as habitats providing habitats for migratory birds and other wildlife, habitats which are essential spawning, nursery, nesting, and feeding areas for commercially and recreationally important species of finfish and shellfish, as well as other aquatic organisms such as sea turtles; contain resources of extraordinary scenic, scientific, recreational, natural, historic, archeological, cultural, and economic importance; serve as natural storm protective buffers and are generally unsuitable for development.	Activity within the Coastal Barrier Resource System.	16 USC 3504	Not applicable	NSF-IH is not located within a coastal barrier resource system.

**Table B-3
Potential Federal Location-Specific ARARs
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland**

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
Navigation and Navigable Waters					
Navigable waters	Establishes regulations pertaining to activities that affect the navigation of the waters of the United States.	Activities affecting navigable waters.	33 CFR 320-329	Potentially Applicable	There are rivers classified as navigable at NSF-IH. Measures will be taken to ensure that there is no impact to the Potomac River.
Magnuson Fishery Conservation and Management Act					
Managed Fisheries	Provides for conservation and management of specified fisheries within specified fishery conservation zones (in federal waters).	Presence of managed fisheries in federal waters.	16 USC 1801, et seq.	Not applicable	There are no rivers classified as fisheries at NSF-IH.
Hazardous Waste Control Act (HWCA)					
Within 61 meters (200 feet) of a fault displaced in Holocene time	New treatment, storage or disposal of hazardous waste prohibited.	Resource Conservation and Recovery Act (RCRA) hazardous waste; treatment, storage, or disposal of hazardous waste.	40 CFR 264.18 (a)	Not applicable	No sites at NSF-IH are located near a fault displaced in Holocene time.
Within 100-year floodplain	Facility must be designed, constructed, operated, and maintained to avoid washout.	RCRA hazardous waste; treatment, storage, or disposal of hazardous waste.	40 CFR 264.18 (b)	Applicable	The NSF-IH is on a 100-year flood zone, therefore the requirements of this regulation are applicable, measures will be taken to comply with applicable regulations.
Within salt dome formation, underground mine, or cave	Placement of non-containerized or bulk liquid hazardous waste prohibited.	RCRA hazardous waste; placement.	40 CFR 264.18 (c)	Not applicable	Placement of hazardous material into any salt dome formation, underground mine, or cave, will not occur during any response action at NSF-IH.
Executive Order 11988, Protection of Floodplains					
Within floodplain	Actions taken should avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values.	Action that will occur in a floodplain, i.e., lowlands, and relatively flat areas adjoining inland and coastal waters and other flood-prone areas.	40 CFR 6, Appendix A; excluding Sections 6(a)(2), 6(a)(4), 6(a)(6); 40 CFR 6.302	Applicable	The NSF-IH is on a 100-year flood zone, therefore the requirements of this regulation are applicable, measures will be taken to comply with applicable regulations.
Rivers and Harbors Act of 1972					
Navigable waters	Permits are required for structures or work affecting navigable waters.	Activities affecting navigable waters.	33 USC 403	Potentially Applicable	There are rivers classified as navigable at NSF-IH. Measures will be taken to ensure that there is no impact to the Potomac River.
ARARs - Applicable or relevant and appropriate requirements. RCRA - Resource Conservation and Recovery Act. CFR - Code of Federal Regulations. CWA- Clean Water Act. DON - Department of Navy. EO - Executive Order.		FR - Federal Register. HWCA - Hazardous Waste Control Act. NSF-IH - Naval Support Facility, Indian Head USC - United States Code. TBC - To Be Considered.			

**Table B-4
Potential State Location-Specific ARARs
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland**

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
Threatened and Endangered Species					
Critical habitat upon which endangered species or threatened species depend.	Requires action to conserve endangered or threatened fish species and the critical habitats they depend on. May not reduce the likelihood of either the survival or recovery of a listed species in the wild by reducing the reproduction, numbers or distribution of a listed species or otherwise adversely affect the species.	Determination of effect upon endangered or threatened species or its habitat.	COMAR 08.03.08	Relevant and Appropriate	There are no endangered or rare plant and animal species located at NSF-IH. However, 3 species of plant are on the Maryland State watchlist; Honeyvine, Lancaster's sedge, and Stellate sedge are present at NSF-IH though these do not meet the criteria of the Endangered Species Act. Appropriate measures will be taken to try to preserve these species.
Threatened and Endangered Fish Species					
Critical habitat upon which endangered or threatened fish species depend.	Requires action to conserve endangered or threatened fish species and the critical habitats they depend on.	Determination of effect upon endangered or threatened fish species or its habitat.	COMAR 08.02.12	Not applicable	There are no endangered or threatened fish species at NSF-IH.
Fish and Fisheries					
Fisheries, locations where species of fish exist	Requirements to conserve species of fish for human enjoyment, for scientific purposes and to ensure their perpetuation as viable components of their ecosystems.	Determination of effect upon fish species or its habitat.	Annotated Code of Maryland, <i>Natural Resource Article</i> , Title 4 - Fish and Fisheries	Not applicable	There are no fish species at NSF-IH.
Wildlife					
Areas inhabited by wildlife	Requirements to conserve species of wildlife for human enjoyment, for scientific purposes and to ensure their perpetuation as viable components of their ecosystems.	Determination of effect upon wildlife species or its habitat.	Annotated Code of Maryland, <i>Natural Resource Article</i> , Title 10 - Wildlife	Applicable	Wildlife species are present on NSF-IH. If response actions may affect these species, the requirements of this title are applicable.
Chesapeake Bay Critical Protection Law					
Area 1,000 feet landward from tidal waters of the Chesapeake Bay and its tributaries and land under these waters	Minimize impacts of the Bay water quality and to conserve plant, fish, and wildlife habitat.	Activities that will occur in the area 1,000 feet landward from tidal waters of the Chesapeake Bay and its tributaries and land under these waters.	Annotated Code of Maryland, <i>Natural Resource Article</i> , Title 8 - Waters, Subtitle 18 - Chesapeake Bay Area Critical Protection Program	Not applicable	NSF-IH does not meet the necessary geographic requirements.
Nontidal Wetlands Protection Act, Maryland Nontidal Wetlands Regulations					
Wetland	Provides regulations for activities on or near nontidal wetlands (an area that is inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions). Must obtain a permit from the State in order to conduct certain regulated activities in a nontidal wetland, or within a buffer or an expanded buffer.	Activities that will occur on or near nontidal wetlands.	COMAR 26.23; Annotated Code of Maryland, <i>Environmental Article</i> , Title 5 - Water Resources	Relevant and Appropriate	This regulation may be an ARAR for activities occurring in areas that meet the definition of a wetland. Due to the proximity of Mattawoman Creek to Site 6 NSF-IH and the presence of plant life associated with a nontidal wetland remedial activities would minimize the destruction, loss, or degradation of the wetlands.
Maryland Wetland Law, Wetlands Tidal Wetlands Regulations					
Tidal Wetland	Tidal wetlands are State and private tidal wetlands, marshes, submerged aquatic vegetation, lands, and open water affected by the daily and periodic rise and fall of the tide within the Chesapeake Bay and its tributaries, the coastal bays adjacent to Maryland's coastal barrier islands, and the Atlantic Ocean to a distance of 3 miles offshore of the low water mark. Provides that activities such as dredging, filling, removing, constructing, reconstruction, or activities otherwise altering tidal wetlands must be permitted by the State.	Activities that will alter tidal wetlands.	COMAR 26.24; Annotated Code of Maryland, <i>Environmental Article</i> , Title 5 - Water Resources; Annotated Code of Maryland, <i>Environmental Article</i> , Title 16 - Wetlands and Riparian Rights	Not applicable	Tidal wetlands are not present at NSF-IH.

**Table B-4
Potential State Location-Specific ARARs
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland**

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
Wetlands and Riparian Rights					
Wetlands	Requirements to preserve wetlands and prevent their destruction; requires a license for dredging or filling of wetlands.	Activities that can affect the integrity of wetlands, such as dredging or filling.	Annotated Code of Maryland, <i>Environmental Article</i> , Title 16 - Wetlands and Riparian Rights	Relevant and Appropriate	This regulation may be an ARAR for activities occurring in areas that meet the definition of a wetland. For instance Mattawoman Creek, however no regulated actions at Site 6 will occur.
Construction on Nontidal Waters and Floodplains					
Nontidal waters and floodplains	Protect and maintain nontidal waterways and/or state of Maryland floodplains must follow these regulations	Activities that affect nontidal waterways and floodplains	COMAR 08.05.03	Applicable	Any remedial actions involving alteration to the Potomac River or floodplains (including temporary construction) are subject to these requirements. Appropriate actions will be taken to comply.
Maryland Water Pollution Control Regulations					
Surface waters of the State	Protect and maintain the quality of surface water in the State of Maryland. Criteria and standards for discharges limitations and policy for antidegradation of the State's limitations and policy for antidegradation of the State's surface water.	Activities that will pollute the surface waters of the state.	COMAR 26.08, Chapters 01-07	Applicable	This regulation is applicable for remedial actions that may affect surface water quality in the State of Maryland. Actions will be taken to mitigate the effect of the remedial action upon surface waters at NSF-IH (i.e. erosion control measures).
Water Management					
Water resources of the State	Provides for the conservation and protection of the water resources of the State by requiring that any land-clearing, grading, or other earth disturbances require an erosion and sediment control plan. Also provides that stormwater must be managed to prevent off-site sedimentation and maintain current site conditions.	Activities that affect the water resources of the State.	COMAR 26.17.01 COMAR 26.17.02, <i>Annotated Code of Maryland, Environment Article</i> , Title 4 - Water Management	Applicable	The design for the remedial actions will incorporate the requirements of this regulation.
ARARs - Applicable or relevant and appropriate requirements. RCRA - Resource Conservation and Recovery Act. CFR - Code of Federal Regulations. CWA - Clean Water Act. DON - Department of Navy. EO - Executive Order.		FR - Federal Register. HWCA - Hazardous Waste Control Act. NSF-IH - Naval Support Facility, Indian Head USC - United States Code. TBC - To Be Considered.			

Appendix C
Detailed Cost Estimate for Removal Alternative

Table C-1
Detailed Cost Estimate for Soil Excavation and Offsite Disposal
EE/CA - Site 6 (Fenced Area)
NSF-IH, Indian Head, Maryland

Item	Quantity	Units	Unit Cost	Subtotal	Notes
1 PROJECT SETUP AND CONTROL					
1.1 Field Project Manager ¹	100	hr	\$55.00	\$5,500	Assuming 2 weeks, 10 hour days
1.2 Construction Superintendent ¹	100	hr	\$55.00	\$5,500	Assuming 2 weeks, 10 hour days
1.3 Health and Safety Officer ¹	100	hr	\$40.00	\$4,000	Assuming 2 weeks, 10 hour days
1.4 Field Technician for Sample Collection ¹	80	hr	\$40.00	\$3,200	Assuming 2 weeks, 8 hour days
2 MOBILIZATION					
2.1 Storage Trailer ²	1	mo	\$1,175.16	\$1,175	
2.2 Construction Survey ³	2	day	\$1,040.00	\$2,080	1 day each for pre- and post-excavation surveys
2.3 Equipment Mobilization/Demobilization ²	3	ea	\$843.22	\$2,530	Backhoe, bull dozer, front end loader
2.4 Decontamination Trailer ²	1	mo	\$1,175.16	\$1,175	
3 DECONTAMINATION					
3.1 Equipment Decon Pad ³	1	ls	\$500.00	\$500	
3.2 Steam cleaner ²	1	mo	\$1,658.44	\$1,658	
3.3 3000 gal Decon Water Storage Tank ²	4	wk	\$201.33	\$805	
3.4 Decon Water ²	3000	gal	\$0.05	\$150	
3.5 PPE ²	10	day	\$32.30	\$323	
3.6 Spent Decon Water Storage Tank ²	12	wk	\$201.33	\$2,416	Storage between sampling and removal from site
3.7 Decon water testing (Metals, Ignitability, Reactivity, Corrosivity) ³	1	ea	\$294.00	\$294	
3.8 Decon water disposal, Nonhazardous ³	3000	gal	\$0.79	\$2,370	
4 EXCAVATION					
4.1 Clear, Grub, Chip Brush & Trees (level D)	0.2	ac	\$6,536.91	\$1,307	
4.2 Backhoe Excavation, 1 cy (level D)	323	cy	\$3.80	\$1,227	Excavation to 12", with exception of 2 isolated approx 10'x10' areas to 4'
5 STOCKPILING AND SOIL DISPOSAL					
5.1 HDPE, 30 mil, sheeting for Liner and Cover ²	1500	sf	\$0.88	\$1,320	stockpile is 25' x 25' x 13'
5.2 Staked Hay Bales for Berm ²	36	ea	\$2.65	\$95	bails 3' long, 9 per side
5.3 Stockpile sample testing (Metals, Ignitability, Reactivity, Corrosivity) ³	2	ea	\$248.82	\$498	
5.4 Backhoe, 1 cy, for Loading Excavated Soil to Dump Truck ²	388	cy	\$4.38	\$1,699	Expansion factor 20%
5.5 Haul Excavated Soil to landfill 11, 12 CY Dump ²	388	cy	\$20.50	\$7,954	Expansion factor 20%
5.6 Landfill Soil, Nonhazardous ²	388	cy	\$101.68	\$39,452	Expansion factor 20%
6 SITE RESTORATION					
6.1 Confirm imported material meets clean soil criteria ³	2	ea	\$115.91	\$232	
6.2 Standard Proctor Compaction Test for Backfill Soil ²	5	ea	\$179.04	\$895	
6.3 Purchase, Import, Place and Compact Clay Backfill from Off-Site Source to Backfill Excavation ²	194	cy	\$18.29	\$3,548	6" of clay, with the exception of 2 isolated 10'x10' areas - 3.5' of clay
6.4 Purchase, Import, Place and Compact Topsoil Backfill from Off-Site Source for Plant Growth ²	194	cy	\$32.14	\$6,235	6" of topsoil
6.5 Finish Grading Slopes ²	900	sy	\$0.16	\$144	
6.6 Fertilizer/Push and Seeding (native grasses) ²	0.2	ac	\$892.33	\$178	
6.7 Straw Mulch, hand spread 1" deep ²	900	sy	\$1.15	\$1,035	
7 MISC. SITE WORK					
7.1 Silt Fence ²	50	lf	\$2.72	\$136	
7.2 Remove Silt Fence ³	50	lf	\$1.92	\$96	
Subtotal				\$99,730	
Project Management	8%			\$7,978	
Remedial Design	15%			\$14,959	
Construction Management	10%			\$9,973	
Contingency	25%			\$33,160	
TOTAL COST					
Removal with Stockpiling				\$165,801	
Upper Limit of Cost Accuracy	150%			\$248,701	
Lower Limit of Cost Accuracy	70%			\$116,060	

Notes:

¹ Engineer's estimate

² R.S. Means Site Work and Landscape Cost Data, 2004

³ Navy CLEAN BOA rates