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FINAL ENGINEERING EVALUATION AND COST ANALYSIS FOR SOIL REMOVAL AT SITES
19 AND 27 NSWC INDIAN HEAD MD
9/1/2010
CH2MHILL

Final

**Engineering Evaluation/Cost Analysis
for Sites 19 and 27**

**Naval Support Facility Indian Head
Indian Head, Maryland**

Contract Task Order JU35

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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 nitroglycerin- (NG) and lead-contaminated surface and subsurface soils at Site 19 (Catch Basins at Chip Collection Houses) and arsenic- and chromium-contaminated surface soil at Site 27 (Thermal Destructor 1) 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, DC. Site 19 consists of drainage areas leading from two chip collection houses, Buildings 785 and 1051. Site 27 consists of a concrete pad (former Thermal Destructor 1, Building 1584) and the immediate surrounding area.

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 (Title 40 of the Code of Federal Regulations 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 U.S. Environmental Protection Agency's (EPA's) guidance document on conducting NTCRAs (EPA, 1993).

A human health risk screening (HHRS) and ecological risk screening (ERS) were performed as part of Site Screening Process investigation (CH2M HILL, 2009a). The HHRS and ERS evaluated current and future human health and ecological risks associated with surface and subsurface soil at Sites 19 and 27. The human health and ecological risk screenings identified chemicals of potential concern (COPCs) by comparing maximum detected concentrations to the 95 percent upper confidence limit background concentrations and EPA Region III risk-based concentrations / regional screening levels. The inorganic COPCs were then compared to the eastern U.S. soil range, Maryland soil range, and 95 percent upper tolerance limits for further consideration to determine if they are risk-driving COPCs.

Based on the analytical results and risk screenings, no further action is warranted for the Building 1051 catch basin because there were no unacceptable risks to human health and the environment. A soil removal is proposed for the Building 785 drainageway, north of Silo Road, because of potential human health and ecological risks associated with NG and lead. However, no further action is proposed for the drainage ditch south of Silo Road because the concentrations of NG and lead were within acceptable risk levels.

Based on the analytical results and data evaluation, arsenic and chromium pose a potential risk to human health and ecological receptors at Site 27. As a result, a removal action is proposed for surface soil around the concrete pad (Building 1584).

The Department of the Navy, therefore, proposes to remove and dispose of soil contaminated with unacceptable levels of chemicals to acceptable levels, thereby reducing risks to human and ecological receptors. As a result, this EE/CA presents only this removal alternative. The removal action was 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. The evaluation of 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 contaminated soils at Site 19 and Site 27 because it can achieve the removal action objectives with a great certainty of success and because implementation is technically feasible. The cost to implement this alternative at Sites 19 and 27 is estimated to have a total present-worth range from \$147,265 to \$315,565.

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Acronyms and Abbreviations

ARAR	applicable or relevant and appropriate requirements
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
COPC	chemicals of potential concern
EE/CA	Engineering Evaluation/Cost Analysis
EPA	U.S. Environmental Protection Agency
ERS	ecological risk screening
HHRS	human health risk screening
IHIRT	Indian Head Installation Restoration Team
mg/kg	milligram(s) per kilogram
MDE	Maryland Department of the Environment
Navy	U.S. Department of the Navy
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NG	nitroglycerin
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
RSL	regional screening level
SARA	Superfund Amendments and Reauthorization Act of 1986
SSP	site screening process
SVOC	semivolatile organic compound
TAL	target analyte list
TCL	target compound list
UCL	upper confidence limit
UDMH	unsymmetrical dimethylhydrazine
UTL	upper tolerance limit
VOC	volatile organic compound

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 Washington, Atlantic Division, Comprehensive Long-Term Environmental Action Navy CLEAN 1000, Contract No. N62470-08-D-1000, Contract Task Order JU35.

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, DC. This report presents an EE/CA for a non-time-critical removal action (NTCRA) for surface and subsurface soil at Site 19 (Catch Basins at Chip Collection Houses) and surface soil at Site 27 (Thermal Destructor 1) (Figure 1-1).

This report was developed using the information from the following documents:

- *Final Work Plan for Additional Investigation at Site 19, Site 27, and Stump Neck SWMU 14, Naval Support Facility Indian Head, Indian Head, Maryland (CH2M HILL, 2007)*
- *Final Site Screening Process Investigation Report for Sites 19, 26, and 27; Wetland Area Adjacent to Site 45; and Stump Neck SWMUs 14 and 30, Naval Support Facility Indian Head, Indian Head, Maryland (CH2M HILL, 2009a)*
- *Final Additional Investigations at Site 19, Site 27, and Stump Neck SWMU 14 at Naval Support Facility Indian Head, Indian Head, Maryland (CH2M HILL, 2009b)*

1.1 Regulatory Framework

This document is issued by the Navy, the lead federal agency authorized to conduct remediation at Site 19 and Site 27, with the assistance of the U.S. Environmental Protection Agency (EPA) 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:

...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.

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.” An NTCRA is being considered for both Site 19 and Site 27. Title 40 CFR 300.415 requires the lead agency to conduct an EE/CA when an NTCRA is planned. 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 the 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 EPA’s *Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA* (EPA, 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 0.5 foot below ground surface [bgs]) and subsurface soil (0.5 to 4 feet bgs) in drainage areas and the downstream area leading from Building 785 at Site 19; and the surface soil (0 to 0.5 foot bgs) in areas around the concrete pad (Building 1584) at Site 27. The overall objective of this EE/CA is to remove and dispose of surface and subsurface soil contaminated with unacceptable levels of chemicals harmful to human and ecological receptors.

At Site 19, surface and subsurface soil will be removed along the drainage swale from Building 785 to Silo Road because of human health and ecological risks from nitroglycerine (NG) and lead in the surface soil and human health risks from NG in the subsurface soil. At Site 27, surface soil will be removed in the area around the concrete pad (Building 1584) because of human health and ecological risks from arsenic and chromium in the soil. Soil excavation and offsite disposal is the only removal alternative presented in this EE/CA for both sites because the removal will decrease chemical concentration in surface and subsurface soil to acceptable levels, thereby, reducing risks to human and 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
- Section 5 – Analysis of the Removal Action Alternatives

- Section 6— References
- Appendix A— Applicable or Relevant and Appropriate Requirements
- Appendix B— Detailed Cost Estimate for Removal Alternative



Figure 1-1
Facility Map
EE/CA for Sites 19 and 27
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 human health and ecological risks at Sites 19 and 27.

2.1 Site Characteristics

To reduce duplication of information, the information provided in this section is summarized from Section 4 (for Site 19) and Section 6 (for Site 27) of the *Site Screening Process Investigation Report for Sites 19, 26, and 27; Wetland Area Adjacent to Site 45; and Stump Neck SWMUs 14 and 30* (hereinafter referred to as SSP report) (CH2M HILL, 2009a).

2.1.1 Site 19

Site 19, Catch Basins at the Chip Collection Houses, is located to the west of Silo Road and consists of drainage areas leading from the two chip collection houses, Buildings 785 and 1051. The northern drainage area, leading from Building 785, covers approximately 0.25 acre. The southern drainage area, leading from Building 1051, covers approximately 0.18 acre.

Operations at buildings adjacent to Site 19 used a variety of metallic salts in processing explosives. These operations resulted in an aqueous wastewater stream that contained explosives and metallic salts, particularly of copper and lead. Historically, this wastewater drained from the two buildings through fabric bags, to collect the explosive shavings, and then into baffled catch basins to further capture smaller explosive shavings. Spills of explosive shavings may have occurred around and downstream from the catch basins when the fabric bags attached to the outfall end of the pipes ruptured or detached.

Wastewater from Building 785 was historically drained through an 8-inch cast iron pipe into an approximately 2-foot-by-2-foot wooden catch basin. Discharge from the catch basin would then lead into a downgradient swale. Discharges from Building 785 occurred from 1956, when the building was constructed, until 1999, when the waste stream was diverted to a wastewater treatment building. The wooden structure has been removed; however, the concrete base that supported the wooden catch basin remains in place. The former catch basin (suspected release area) associated with Building 785 lies in a naturally vegetated area and is immediately upstream of a swale. Discharge was headed into this downgradient swale from the catch basin before it was diverted to the wastewater treatment building. Building 785 is still in operation as a chip house, but wastewater is now recycled rather than discharged to the swale.

Building 1051 discharged wastewater through an approximately 50-foot-long cast iron pipe, through the fabric bag, to a concrete outfall, and into an approximately 2-foot-by-2-foot metal catch basin. Subsequently, water would migrate approximately 15 feet into a downgradient stream before it was diverted to a wastewater treatment building. Discharges from Building 1051 occurred from 1962, when the building was constructed, until 1999,

when the waste stream was diverted to the wastewater treatment building. The area in the vicinity of the suspected release near Building 1051 consists of an intermittent stream/drainage ditch surrounded by a small wooded area to the north and maintained lawn areas to the south. The stream/ditch consists of a small incised channel with a sand substrate. Building 1051 is no longer used as a chip collection house and no longer produces a wastewater stream.

2.1.2 Site 27

Site 27 consists of a concrete pad (historically named Building 1584), where the former Thermal Destructor 1 was located, and the immediate surrounding area. The site covers approximately 0.27 acre.

The thermal destructor was a propane-fired incinerator that burned wastewater between 1976 and 1979. During operation of the incinerator, the area, with the exception of the actual incinerator, was diked. Potentially, small spills may have occurred in the area of the incinerator when the pump transferring wastewater did not switch off in time. The thermal destructor has been dismantled, and only the concrete pad currently remains at the site.

The footprint of the concrete pad encompasses approximately 225 square feet and is surrounded by a grass-covered area. Building 406 is adjacent to the concrete pad (formerly Building 1584). Building 406, constructed in 1923, was used as a nitre cake (sodium bisulfate) shed until 1947, when it became a storehouse for acid plant filter materials. From 1957, the building was used as a chemical storehouse until 1976, when it was used for tool and equipment storage. Since 1999, Building 406 has been used as a heating, ventilating, and air-conditioning storage building.

Possible spills of contaminated wastewater may have occurred in the immediate vicinity of the incinerator. Although no pipe ruptures or leaks were noted in available site records, small releases of contaminated wastewater may have occurred at the location where the inflow piping entered the incinerator (Fred C. Hart Associates, 1983).

2.2 Previous Investigations

2.2.1 Initial Assessment Study

The objective of the Initial Assessment Study (Fred C. Hart Associates, Inc., 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. Sites 19 and 27 were first identified in this study. No sludge deposits were observed in the catch basins, and no evidence of vegetation stress along the swale or stream was noted at Site 19. There was no indication of any spillage or evidence of stressed vegetation in the area surrounding the incinerator at Site 27.

2.2.2 Site Screening Process Investigation

Site 19

In 2005, an SSP investigation (hereinafter referred to as the “initial investigation”) was conducted at Site 19. Based on the results of the initial investigation, an additional three rounds of sampling were conducted in 2007 and 2008 to delineate the lateral and vertical extents of contaminants of concern (NG and lead) in soil for a removal action. The rationale

for the additional investigations, the sampling approach, analytical results, evaluation process, and results are presented in Appendix A of the SSP report.

The objectives of the initial investigation were:

- Characterize the nature and extent of metals and explosives in surface and subsurface soil
- Perform human health and ecological risk screenings to assess whether detected constituents in site soils pose potential risks to human health and ecological receptors

SSP investigation field activities were performed at Site 19 in October 2005, July 2007, July – September 2008, and December 2008. Locations for the sampling events are shown in [Figure 2-1](#). In October 2005, nine surface soil samples (IS19SS01 through IS19SS09) were collected downgradient of the two catch basins along the drainageway leading from the chip collection houses, Buildings 785 and 1051. Five of the nine sampling locations, IS19SS01 through IS19SS05, were in the drainageway downstream from Building 785. The other four locations, IS19SS06 through IS19SS09, were in the drainageway downstream from Building 1051 (not shown on Figure 2-1).

At each sample location, surface soil samples were collected from 0 to 0.5 feet bgs and analyzed for target analyte list (TAL) metals, explosives (including NG and nitroguanidine), total organic carbon, and pH. Two explosives (NG and nitroguanidine) and 22 inorganics (aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, zinc) were detected in one or more of the surface soil samples collected from Site 19.

The detected chemicals were taken through the two-step risk-screening process to determine whether the level of chemical concentrations exceeded the acceptable levels: (1) comparison against risk-based criteria, and (2) comparison against background concentrations noted in the background soil investigation report (TetraTech NUS, 2002). A number of explosive compounds and inorganics were detected in the samples and identified as chemicals of potential concern (COPCs) through the human health risk screening (HHRS) and ecological risk screening (ERS). The Site 19 COPCs identified during the human health and ecological risk-screening processes are as follows:

- Surface Soil
 - Explosives – NG, nitroguanidine
 - Inorganics – aluminum, arsenic, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, silver, vanadium, zinc

Then the COPCs were compared against other criteria such as 95 percent upper tolerance limit (UTL) and eastern U.S. soil and Maryland soil background concentrations as additional considerations for deciding whether they should be retained as risk-driving COPCs. The results for identified COPCs and their risk considerations are summarized below.

For explosives:

- The maximum NG concentration around the Building 785 catch basin was 3,200 milligrams per kilogram (mg/kg), substantially higher than the risk-based concentration (RBC) of 46 mg/kg. The screening value for ERS and background concentrations for both HHRS and ERS are not available, but it was concluded that this may pose a potential risk to human receptors and NG was retained as a COPC for both HHRS and ERS. NG was not measured above the RBC in any of the samples collected around the Building 1051 catch basin.
- Nitroguanidine (77 J mg/kg) was detected in one soil sample north of the Building 785 catch basin. The result was below the adjusted RBC of 7,821 mg/kg but was identified as a COPC in the ERS because risk-based and background concentrations for this chemical were not available. The ecological risks posed by nitroguanidine are not clear because an ecological screening level is not available for this chemical.

For inorganics:

- At the Building 785 catch basin, the maximum detected concentrations of arsenic, cobalt, copper, lead, manganese, and zinc were above the 95 percent UTL background concentrations and the range of Maryland soil background concentrations. At the Building 1051 catch basin, the maximum detected concentrations of copper, lead, and zinc were above the 95 percent UTL background concentrations and the range of Maryland soil background concentrations. The elevated concentrations of lead around the Building 785 catch basin suggest that lead may pose a risk to human and ecological receptors.
- At both catch basins, the maximum concentration of silver (1.60 mg/kg) fell below the adjusted RBC of 39 mg/kg but was identified as a COPC through the ERS. Silver exceeded the ecological screening level (9.8×10^{-6} mg/kg) and the 95 percent UCL and 95 percent UTL background concentrations at both catch basins, although it should be noted that silver was only detected in one of four samples (at an estimated concentration of 0.94 mg/kg) collected from the Building 1051 catch basin.
- Mercury and nickel exceeded the 95 percent UTL.

Based on these results, no further action for the Building 1051 catch basin was recommended in the SSP report. Because of potential human health and ecological risks associated with NG and lead, Building 785 was recommended for an additional investigation.

First Additional Sampling Event

In July 2007, four direct-push technology borings (IS19DP01 through IS19DP04) were advanced along the drainageway at approximate distances of 25, 100, 200, and 300 feet from the former chip collection box. Samples were analyzed for TAL metals and explosives, including NG and nitroguanidine.

The results of the risk screenings suggested that a removal action was necessary at Site 19 based on concentrations of NG, lead, copper, and zinc in the surface soil. NG, however, was not detected in any of the four subsurface soil samples collected from the 2- to 3-foot depth

interval, so it was not considered to be a subsurface soil COPC. Lead, however, was found to be a COPC in the subsurface soil, based on the HHRS.

Second Additional Sampling Event

Additional data were needed to delineate the lateral and longitudinal extents of NG and lead, the primary drivers, along the drainageway. Between July and September 2008, samples were collected along transects (Transects 1 through 7) from 2 feet and 4 feet on each side of the drainageway.

The analytical results indicated that the concentrations of lead and NG in samples collected from south of Silo Road were within acceptable risks levels, so a removal action was not warranted along the drainageway south of Silo Road. In addition, the Indian Head Installation Restoration Team (IHIRT) concluded that delineation was completed to the north of Silo Road, except for the area around Transect 2.

Third Additional Sampling Event

A third sampling event was conducted to delineate the extent of NG north and northeast of the stream bank along Transect 2 and to confirm previous sample results along Transect 1. In December 2008, surface soil samples IS19SO36 through IS19SO43 were collected and analyzed for NG.

As noted in the SSP report, delineation of COPCs (lead and NG) in the surface soil and subsurface soil was completed for a removal action north of Silo Road; no further action is warranted along the drainage ditch south of Silo Road. Refer to [Table 2-1](#) for the sampling results.

Site 27

In 2005, an SSP investigation (herein referred to as the “initial investigation”) was conducted at Site 27. Based on the results of the initial investigation, an additional two rounds of sampling were conducted in 2007 and 2008 to delineate the lateral and vertical extents of contamination in surface soil for a removal action. Locations for the sampling events are shown in [Figure 2-2](#). The rationale for the additional investigations, the sampling approach, analytical results, evaluation process, and results are presented in Appendix A of the SSP report.

The objectives of the initial investigation were:

- Characterize the nature and extent of metals in surface soil
- Perform human health and ecological risk screenings to assess whether detected constituents in site soils pose potential risks to human health and ecological receptors.

The initial investigation consisted of two sampling events for surface and subsurface soil; the first was in October 2005 and the second in June 2006. The first event consisted of the advancement of four soil borings (IS27SB01 through IS27SB04). Surface and subsurface soil samples were collected and analyzed for unsymmetrical dimethylhydrazine (UDMH), hydrazine, TAL metals, target compound list (TCL) semivolatile organic compounds (SVOCs), TCL volatile organic compounds (VOCs), explosives (including NG and nitroguanidine), total organic carbon, and pH. Neither UDMH nor hydrazine, the suspected contaminants, were detected in any of the samples; however, based on an arsenic exceedance at one location, a second round of sampling was conducted at the site. In June

2006, five surface soil samples (IS27SS01 through IS27SS05) were collected from 0 to 6 inches bgs and analyzed for TAL metals. Nineteen inorganics (aluminum, arsenic, barium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, silver, sodium, vanadium, zinc) were detected in at least one of the five surface soil samples from Site 27. Three VOCs (acetone, 2-butanone, carbon disulfide), 11 SVOCs (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, bis[2-ethylhexyl]phthalate, chrysene, fluoranthene, indeno[1,2,3-cd]pyrene, phenanthrene, pyrene), and 17 inorganics (aluminum, arsenic, barium, beryllium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, sodium, vanadium, zinc) were detected in at least one of the four subsurface soil samples.

The detected chemicals were taken through the two-step risk-screening process to determine whether the level of chemical concentrations exceeded the acceptable levels: (1) comparison against risk-based criteria, and (2) comparison against background concentrations (Tetra Tech NUS, 2002). A number of compounds were detected in the samples and identified as COPCs through the HHRS and ERS. The Site 27 COPCs identified during the human health and ecological risk-screening processes are as follows:

- Surface Soil
 - Inorganics – aluminum, arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver, vanadium, zinc
- Subsurface Soil
 - SVOCs – benzo(a)pyrene, benzo(b)fluoranthene
 - Inorganics – arsenic, manganese

Then the COPCs were compared against other criteria, such as 95 percent UTL, eastern U.S. soil, and Maryland soil background concentrations, as additional considerations to decide whether they should be retained as risk-driving COPCs. The results for identified COPCs and their risk considerations are summarized below.

For surface soil:

- The comparison eliminated manganese and vanadium from further consideration because their maximum concentrations at Site 27 were below the 95 percent UTL. Of the remaining 13 chemicals, maximum detected concentrations of arsenic, cadmium, chromium, lead, and zinc also were above the range of Maryland soil background concentrations.
- The maximum concentration of silver was above the 95 percent UTL, but it was detected in only two of the five samples, and the maximum concentration of 1.6 mg/kg is below an alternative ecological screening value for silver of 2.0 mg/kg (Efroymson et al., 1997). Therefore, it is unlikely that silver in surface soils at Site 27 poses a significant risk to ecological receptors.

For subsurface soil:

- The maximum arsenic concentration was above the 95 percent UTL and above the range of Maryland and eastern U.S. soil background concentrations. The maximum detected

concentration of manganese was above the 95 percent UTL but within the range of eastern U.S. background soil concentrations. Maryland soil background concentrations were not available for manganese.

- Both benzo(a)pyrene and benzo(b)fluoranthene were retained as COPCs because no background data are available for these chemicals.

Based on these results, potential human health and ecological risks associated with metals in surface soil, specifically arsenic, cadmium, chromium, lead, and zinc, were identified. Because of these risks, the site was recommended for an additional investigation. Subsurface soil was not investigated further because the arsenic concentration exceeded the 95 percent UTL at only one location (IS27SB04); manganese was within the eastern U.S. background soil concentrations; and the two SVOCs are PAHs, which absorb readily onto soil substrate and are highly unlikely to migrate into the subsurface.

First Additional Sampling Event

A two-tiered approach was implemented in 2007 that allowed for surface soil samples to be collected from 20 feet (Tier 1) and 40 feet (Tier 2) from the concrete pad. In July 2007, the Tier 1 samples (IS27SS06 through IS27SS12) were analyzed for TAL metals and the Tier 2 samples (IS27SS13 through IS27SS18) only for arsenic. Based on the HHRS and ERS, it was concluded that arsenic in surface soil may pose a risk to human and ecological receptors. The ERS suggested that chromium may also pose a risk to ecological receptors.

Second Additional Sampling Event

Based on the HHRS and ERS results of the first additional sampling event, additional characterization was recommended to determine the extent of arsenic and chromium in surface soil around the concrete pad.

In August 2008, surface soil samples were collected using a tiered approach; Tier 3 samples (IS27SS19 through IS27SS28) were 60 feet away from the concrete pad; Tier 4 samples (IS27SS29 through IS27SS37) were 80 feet away; and Tier 5 samples (IS27SS38 through IS27SS49) were 100 feet away. Tiers 3 and 4 samples were analyzed for arsenic and chromium. Tier 5 samples were not analyzed, because on September 9, 2008, the results collected to date were discussed by the IHIRT and it was agreed that sufficient data had been collected to delineate both arsenic and chromium in surface soil at the site. As noted in the SSP report, delineation of COPCs (arsenic and chromium) in the surface soil was completed for a removal action around the concrete pad. Refer to [Table 2-2](#) for the sampling results.

TABLE 2-1
 Site 19 Sampling Results for Nitroglycerin and Lead
 EE/CA for Sites 19 and 27
 NSF-IH, Indian Head, Maryland

Station ID	RSL Residential Soil	Frequency of Detection	Frequency of Exceedance	IS19SS01	IS19SS02	IS19SS03		IS19SS04	IS19SS05	IS19SS06	IS19SS07	IS19SS08	IS19SS09	IS19DP01		
Sample ID				IS19SS01-0001	IS19SS02-0001	IS19SS03-0001	IS19SS03P-0001	IS19SS04-0001	IS19SS05-0001	IS19SS06-0001	IS19SS07-0001	IS19SS08-0001	IS19SS09-0001	IS19SS010001	IS19SB01P0203	IS19SB010203
Sample Date				10/04/05	10/04/05	10/04/05	10/04/05	10/04/05	10/04/05	10/04/05	10/04/05	10/04/05	10/04/05	07/10/07	07/10/07	07/10/07
Explosives (mg/kg)																
Nitroglycerin	6.1	32/46 (SS); 0/26 (SB)	25/46 (SS); 0/26 (SB)	2,000	3,200	24	49	14	5.2 J	6.4 U	13	5.2 U	5.6 U	6.3 U	5.9 U	6 U
Total Metals (mg/kg)																
Lead	400	24/24 (SS); 26/26 (SB)	5/24 (SS); 1/26 (SB)	869	2,090	179	230	32.9	74.8	29	74.2	10.6	26.9	32.3	9.1	8.3

Shaded cells represent analytical results detected above the reporting limit
 Shaded and bold cells represent analytical results exceeding the RSL Residential Soil
 J - Reported value is estimated
 K - Reported value may be biased high
 L - Reported value may be biased low
 U - Analyte not detected
 UL - Analyte not detected but reported value may be biased low

SS - Surface soil samples; sample depth 0 - 0.5 feet bgs indicated by the "0001" nomenclature in the sample ID.
 SB - Subsurface soil samples; sample depths of 2 - 3 feet bgs and 5 - 6 feet bgs indicated by the "0203" and "0506" nomenclature in the sample ID, respectively.
 P - indicates duplicate sample

TABLE 2-1
 Site 19 Sampling Results for Nitroglycerin and Lead
 EE/CA for Sites 19 and 27
 NSF-IH, Indian Head, Maryland

Station ID	IS19DP02		IS19DP03		IS19DP04			IS19DP05	IS19DP06	IS19DP07	IS19DP09	IS19DP10	IS19DP11		IS19DP12	IS19DP14	IS19DP15	
Sample ID	IS19SS020001	IS19SB020203	IS19SS030001	IS19SB030203	IS19SS040001	IS19SB040506	IS19SB040203	IS19SS050001	IS19SS060001	IS19SS070001	IS19SS090001	IS19SS100001	IS19SS110001	IS19SS11P0001	IS19SS120001	IS19SS140001	IS19SS150001	IS19SS15P0001
Sample Date	07/10/07	07/10/07	07/10/07	07/10/07	07/10/07	07/10/07	07/10/07	9/15/08	7/29/08	7/29/08	9/15/08	7/29/08	7/29/08	7/29/08	9/15/08	7/29/08	9/15/08	9/15/08
Explosives (mg/kg)																		
Nitroglycerin	33	6.1 U	200	6 U	130 UJ	NA	130 UJ	5.5	240	28	980	270	350	360	330	23	38	68
Total Metals (mg/kg)																		
Lead	119	32.1	275	15.5	579	17.3 L	573	NA	NA	NA	NA	NA						

Shaded cells represent analytical results detected above the reporting limit
 Shaded and bold cells represent analytical results exceeding the RSL Residential Soil
 J - Reported value is estimated
 K - Reported value may be biased high
 L - Reported value may be biased low
 U - Analyte not detected
 UL - Analyte not detected but reported value may be biased low

SS - Surface soil samples; sample depth 0 - 0.5 ft
 SB - Subsurface soil samples; sample depths of 2
 P - indicates duplicate sample

TABLE 2-1
 Site 19 Sampling Results for Nitroglycerin and Lead
 EE/CA for Sites 19 and 27
 NSF-IH, Indian Head, Maryland

Station ID	IS19DP18				IS19DP19				IS19DP20			IS19DP22	IS19DP23			IS19DP24			
Sample ID	IS19SS180001	IS19SB180203	IS19SB180506	IS19SB18P0506	IS19SS190001	IS19SS19P0001	IS19SB190203	IS19SB190506	IS19SS200001	IS19SB200203	IS19SB200506	IS19SS220001	IS19SS230001	IS19SB230203	IS19SB230506	IS19SS240001	IS19SS24P0001	IS19SB240203	IS19SB240506
Sample Date	7/29/08	7/30/08	7/30/08	7/30/08	7/29/08	7/29/08	7/29/08	7/29/08	7/29/08	7/29/08	7/29/08	7/29/08	7/29/08	7/29/08	7/29/08	7/29/08	7/29/08	7/29/08	7/29/08
Explosives (mg/kg)																			
Nitroglycerin	4 U	4 U	4 U	4 U	24	14	4 U	4 U	9.5	4 U	4 U	2.4 J	4 U	4 U	4 U	4.8	4 U	4 U	4 U
Total Metals (mg/kg)																			
Lead	15.8 K	13.9	12.9	18.1	1,660 K	1,630 K	16.4 K	14.1 K	31.8 J+	28.2	11	NA	619 J+	10.3 J+	12.1 J+	106 J+	154 J+	42.2 J+	20.6 J+

Shaded cells represent analytical results detected above the reporting limit
Shaded and bold cells represent analytical results exceeding the RSL Residential Soil
 J - Reported value is estimated
 K - Reported value may be biased high
 L - Reported value may be biased low
 U - Analyte not detected
 UL - Analyte not detected but reported value may be biased low

SS - Surface soil samples; sample depth 0 - 0.5 ft
 SB - Subsurface soil samples; sample depths of 2
 P - indicates duplicate sample

TABLE 2-1
 Site 19 Sampling Results for Nitroglycerin and Lead
 EE/CA for Sites 19 and 27
 NSF-IH, Indian Head, Maryland

Station ID	IS19DP25		IS19DP27		IS19DP28				IS19DP29			IS19DP30	IS19DP31	IS19DP32		IS19DP33			
Sample ID	IS19SS250001	IS19SS270001	IS19SB270203	IS19SB270506	IS19SS280001	IS19SB280203	IS19SB280506	IS19SB28P0203	IS19SS290001	IS19SB290203	IS19SB290506	IS19SS300001	IS19SS310001	IS19SS320001	IS19SB320203	IS19SS330001	IS19SS33P0001	IS19SB330203	IS19SB330506
Sample Date	9/15/08	7/30/08	7/30/08	7/30/08	7/30/08	7/30/08	7/30/08	7/30/08	7/30/08	7/30/08	7/30/08	9/15/08	9/15/08	7/30/08	7/31/08	7/30/08	7/30/08	7/30/08	7/30/08
Explosives (mg/kg)																			
Nitroglycerin	11	23	4 U	4 U	4 U	4 U	4 U	4 U	5.3	4 U	4 U	6.5	7	3.2 J	4 U	4 U	4 U	4 U	NA
Total Metals (mg/kg)																			
Lead	NA	250	19.9	8.5	46.6	11.4	7.5	13.3	64	10.8	9.1	NA	NA	102	24.3	16.4	15.6	17	7.8

Shaded cells represent analytical results detected above the reporting limit
 Shaded and bold cells represent analytical results exceeding the RSL Residential Soil
 J - Reported value is estimated
 K - Reported value may be biased high
 L - Reported value may be biased low
 U - Analyte not detected
 UL - Analyte not detected but reported value may be biased low

SS - Surface soil samples; sample depth 0 - 0.5 ft
 SB - Subsurface soil samples; sample depths of 2
 P - indicates duplicate sample

TABLE 2-1
 Site 19 Sampling Results for Nitroglycerin and Lead
 EE/CA for Sites 19 and 27
 NSF-IH, Indian Head, Maryland

Station ID	IS19DP34				IS19DP35		IS19SO36	IS19SO37	IS19SO38	IS19SO39	IS19SO40	IS19SO41	IS19SO42	IS19SO43
Sample ID	IS19SS340001	IS19SB340203	IS19SB340506	IS19SB34P0203	IS19SS350001	IS19SS35P0001	IS19SS360001	IS19SS370001	IS19SS380001	IS19SS390001	IS19SS400001	IS19SS410001	IS19SS420001	IS19SS430001
Sample Date	7/30/08	7/30/08	7/30/08	7/30/08	9/15/08	9/15/08	12/22/08	12/22/08	12/22/08	12/22/08	12/22/08	12/22/08	12/22/08	12/22/08
Explosives (mg/kg)														
Nitroglycerin	16	4 U	4 U	4 U	3.1 J	3.8 J	4 U	4 U	4 U	4 U	10	12	10	4 U
Total Metals (mg/kg)														
Lead	383	20.2	10.7	20.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Shaded cells represent analytical results detected above the reporting limit
 Shaded and bold cells represent analytical results exceeding the RSL Residential Soil
 J - Reported value is estimated
 K - Reported value may be biased high
 L - Reported value may be biased low
 U - Analyte not detected
 UL - Analyte not detected but reported value may be biased low

SS - Surface soil samples; sample depth 0 - 0.5 ft
 SB - Subsurface soil samples; sample depths of 2
 P - indicates duplicate sample

TABLE 2-2
 Site 27 Sampling Results for Arsenic and Chromium
 EE/CA for Sites 19 and 27
 NSF-IH, Indian Head, Maryland

Station ID	95% UTL Background	Frequency of Detection	Frequency of Exceedance	IS27SB01	IS27SB02	IS27SB03	IS27SB04	IS27SS01	IS27SS02	IS27SS03		IS27SS04	IS27SS05	IS27SS06	IS27SS07	IS27SS08
Sample ID				IS27SB01-1014	IS27SB02-0609	IS27SB03-0004	IS27SB04-0004	IS27SS010001	IS27SS020001	IS27SS030001	IS27SS03P0001	IS27SS040001	IS27SS050001	IS27SS060001	IS27SS070001	IS27SS080001
Sample Date				10/25/05	10/25/05	10/25/05	10/25/05	06/29/06	06/29/06	06/29/06	06/29/06	06/29/06	06/29/06	07/10/07	07/10/07	07/10/07
Total Metals (mg/kg)																
Arsenic	14.9	37/37 (SS); 4/4 (SB)	25/37 (SS); 1/4 (SB)	4.6	8	6.8	191	18.3 L	42.5 L	149 L	168 L	38.4 L	21.3 L	44.5 K	40.8 K	26 K
Chromium	33.4	31/31 (SS); 4/4 (SB)	16/31 (SS); 0/4 (SB)	6 J	13.9 J	20 J	22.8 J	344.0 L	267.0 L	34.6 L	28.0 L	68.0 L	264.0 L	65.6	61.8	75.1

Shaded cells represent analytical results detected above the reporting limit

Shaded and bold cells represent analytical results exceeding the 95% UTL Background

- J - Reported value is estimated
- K - Reported value may be biased high
- L - Reported value may be biased low
- U - Analyte not detected
- UL - Analyte not detected but reported value may be biased low

SS - Surface soil samples; sample depth 0 - 0.5 feet bgs indicated by the "0001" nomenclature in the sample ID.
 SB - Subsurface soil samples; sample depths of 0 - 4 feet bgs, 6 - 9 feet bgs, and 10 - 14 feet bgs indicated by the "0004", "0609", and "1014" nomenclature in the sample ID, respectively.
 P - indicates duplicate sample

TABLE 2-2
 Site 27 Sampling Results for Arsenic and Chromium
 EE/CA for Sites 19 and 27
 NSF-IH, Indian Head, Maryland

Station ID	IS27SS09	IS27SS10	IS27SS11	IS27SS12	IS27SS13	IS27SS14	IS27SS15	IS27SS16	IS27SS17	IS27SS18	IS27SS19	IS27SS20	IS27SS21	IS27SS22	IS27SS23		
Sample ID	IS27SS090001	IS27SS09P0001	IS27SS100001	IS27SS110001	IS27SS120001	IS27SS12P0001	IS27SS130001	IS27SS140001	IS27SS150001	IS27SS160001	IS27SS170001	IS27SS180001	IS27SS190001	IS27SS200001	IS27SS210001	IS27SS220001	IS27SS230001
Sample Date	07/10/07	07/10/07	07/10/07	07/10/07	07/10/07	07/10/07	07/10/07	07/10/07	07/10/07	07/10/07	07/10/07	8/1/08	8/1/08	8/1/08	8/1/08	8/1/08	
Total Metals (mg/kg)																	
Arsenic	19.5 K	18.6 K	8.5 K	12.4 K	45 K	46.4 K	129	24.3	59.2	11.6	41.4	63	1.3 J	6 J	85.9 J	192 J	29.5 J
Chromium	98.8	128	77.1	32.6	42.8	52.5	NA	NA	NA	NA	NA	NA	8.1 J	25.7 J	18.5 J	16.9 J	45 J

Shaded cells represent analytical results detected above the reporting limit

Shaded and bold cells represent analytical results exceeding the 95% UTL Background

- J - Reported value is estimated
- K - Reported value may be biased high
- L - Reported value may be biased low
- U - Analyte not detected
- UL - Analyte not detected but reported value may be biased low

- SS - Surface soil samples; sample depth 0 - 0.5
- SB - Subsurface soil samples; sample depths of
- P - indicates duplicate sample

TABLE 2-2
 Site 27 Sampling Results for Arsenic and Chromium
 EE/CA for Sites 19 and 27
 NSF-IH, Indian Head, Maryland

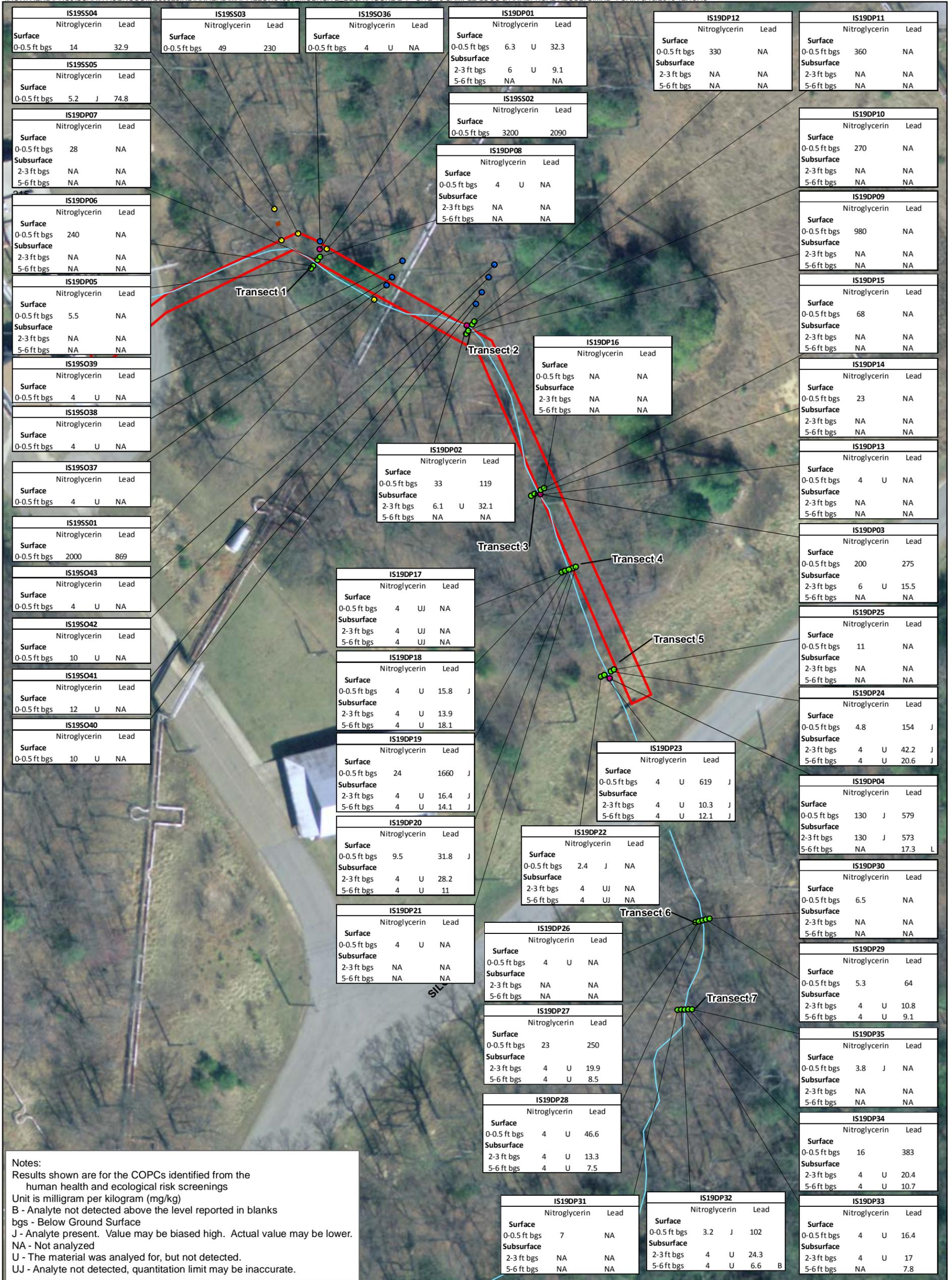
Station ID	IS27SS24	IS27SS25		IS27SS26	IS27SS27	IS27SS28	IS27SS29	IS27SS30	IS27SS31	IS27SS32	IS27SS33	IS27SS34	IS27SS35		IS27SS36	IS27SS37
Sample ID	IS27SS240001	IS27SS250001	IS27SS25P0001	IS27SS260001	IS27SS270001	IS27SS280001	IS27SS290001	IS27SS300001	IS27SS310001	IS27SS320001	IS27SS330001	IS27SS340001	IS27SS350001	IS27SS35P0001	IS27SS360001	IS27SS370001
Sample Date	8/1/08	8/1/08	8/1/08	8/1/08	8/1/08	8/1/08	8/1/08	8/1/08	8/1/08	8/1/08	8/1/08	8/1/08	8/1/08	8/1/08	8/1/08	8/1/08
Total Metals (mg/kg)																
Arsenic	58.6 J	39.5 J	44.6 J	110 J	46.1 J	5.9 J	2.4	4.9	42.9	10.9	6.2	22.8	24.9	26.2	5.4	5.6
Chromium	26 J	22.4 J	26.2 J	10.9 J	25.4 J	54.1 J	33.1	41.1	17	22.4	25.3	20.8	306	181	34.1	15.5

Shaded cells represent analytical results detected above the reporting limit

Shaded and bold cells represent analytical results exceeding the 95% UTL Background

- J - Reported value is estimated
- K - Reported value may be biased high
- L - Reported value may be biased low
- U - Analyte not detected
- UL - Analyte not detected but reported value may be biased low

- SS - Surface soil samples; sample depth 0 - 0.5
- SB - Subsurface soil samples; sample depths of
- P - indicates duplicate sample



Legend

- Surface Soil Sample Location (October 2005)
- DPT Sample Location (July 2007)
- DPT Sample Location (July-September 2008)
- Surface Soil Sample Location (December 2008)
- Approximate Location of Catch Basin
- Approximate Site Boundary
- Surface Water

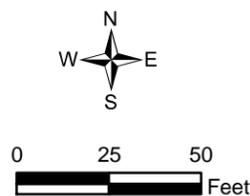


Figure 2-1
 Site 19 Sample Locations and Analytical Results
 EE/CA for Sites 19 and 27
 NSF-IH, Indian Head, Maryland



- Legend**
- Subsurface Soil Sample Location (October 2005)
 - ▲ Surface Soil Sample Location (June 2006)
 - Tier 1 (July 2007)
 - Tier 2 (July 2007)
 - Tier 3 (August 2008)
 - Tier 4 (August 2008)
 - Tier 5 (August 2008; not analyzed)
 - Approximate Site Boundary

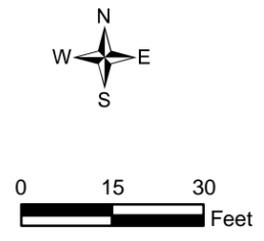


Figure 2-2
 Site 27 Sample Locations and Analytical Results
 EE/CA for Sites 19 and 27
 NSF-IH, Indian Head, Maryland

Identification of Removal Action Objectives

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 EPA 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 EPA fund-financed. The *Navy Environmental Restoration Program Manual* (Navy, 2006) 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 Objectives

The RAOs for Sites 19 and 27 are to remove and dispose of contaminated soil, ensure that soil left in place does not represent an unacceptable risk to human health and the ecological environment, and ensure that it does not provide a continuing source of contamination to soil beyond Silo Road (at Site 19) and around the concrete pad (at Site 27). Soil at Site 19 is contaminated with NG and lead; whereas soil at Site 27 is contaminated with arsenic and chromium.

3.3 Applicable or Relevant and Appropriate Requirements

As set forth in the NCP and EPA 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-citing 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 *CERCLA Compliance with Other Laws Manual* (EPA, 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. 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. 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* documents. If the ARARs do not address a particular situation, remedial actions should be based on the to-be-considered criteria or guidelines.

Three classifications of requirements are defined by EPA 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 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 RAOs. Chemical-specific ARARs are not listed in this document because only four chemicals (NG, lead, arsenic, and chromium), are constituents of concern.
- *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. [Table A-1](#) and [Table 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. [Table A-3](#) and [Table A-4](#) in [Appendix A](#) provide the federal and state action-specific ARARs, respectively.

3.4 Selection of the Site Cleanup Criteria

The delineation of the soil removal areas at Site 19 and 27 were based on the risk screening and background values discussed in Section 2. The IHIRT performed a comprehensive evaluation of the sampling data to ensure the sites have been sufficiently characterized and removal areas fully delineated. For Site 19, the NG and lead values used to determine the footprint for soil removal were 7.8 mg/kg and 400 mg/kg, respectively; both values were based on the 2007 residential soil RBCs. In 2009, the RBCs were revised and replaced with regional screening levels (RSLs). The footprint for the Site 19 soil removal has been revised to reflect exceedance of the current RSL values of 6.1 mg/kg and 400 mg/kg for NG and lead, respectively; both values are based on the May 2010 residential soil RSLs. For Site 27, arsenic and chromium values used to determine the footprint for soil removal were 14.9 mg/kg and 33.4 mg/kg, respectively; both values are based on the 95 percent UTL background concentrations for arsenic and chromium.

Description of the Removal Action

Soil excavation and Offsite disposal are recommended at Site 19 for the NG- and lead-contaminated surface and subsurface soil in the drainage area from approximately 120 feet east of Building 785 to Silo Road (Figure 4-1). The total excavation area is approximately 4,810 square feet (0.11 acre). As shown on Figure 4-1, the excavation area is divided into three subareas based on the different depths of excavation. The upper-excavation subarea is approximately 3,720 square feet to a depth of 0.5 foot bgs; the mid-excavation subarea is approximately 678 square feet to a depth of 2 feet bgs; the lower-excavation subarea is approximately 414 square feet to a depth of 4 feet bgs. Based on the acreage and varying depths of the total area to be excavated, approximately 216 cubic yards of material will be excavated. Because of limitations posed by the excavation equipment (i.e., minimum bucket width, maneuverability, accuracy, etc.), a 20 percent buffer has been added to the estimate to provide a more-realistic excavation volume.

Soil excavation and offsite disposal are recommended at Site 27 for the arsenic- and chromium-contaminated surface soil around the concrete pad (Figure 4-2). The total excavation area is approximately 14,695 square feet (0.34 acre) to a depth of 0.5 foot bgs; this corresponds to a total of 299 cubic yards of material to be excavated. This excavation volume includes a 10 percent buffer.

The excavations will be performed by qualified excavation personnel with hazard waste operations and emergency response training. Because of risk for worker exposure to chemical 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.

The two removal actions require site preparation, which will consist of clearing trees and brush to provide unobstructed equipment access to the proposed area for excavation. Overhead steam lines are present at Site 19, which may make accessibility of removal equipment difficult because these features cannot be removed or relocated. Site features, including roadways, sidewalks, concrete pad, and railroad tracks located within or adjacent to Site 27, will not be removed as part of the 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 for the two sites, post-excavation confirmatory sampling will not be necessary. The excavated areas will be backfilled with an approved backfill material that meets specifications for cleanliness and structural stability, depending on the future use of the property. The areas will be graded so that the topography is 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. 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

-  Proposed Area for Surface Excavation (3,720.12 sq ft)
-  Proposed Area for Subsurface Excavation 2ft bgs (677.45 sq ft)
-  Proposed Area for Subsurface Excavation 4 ft bgs (414.37 sq ft)
-  Approximate Site Boundary
-  Surface Water
-  Topographic Contour (5-Foot Interval)



Figure 4-1
Site 19 Proposed Soil Removal Area
EE/CA for Sites 19 and 27
NSF-IH, Indian Head, Maryland



Legend

-  Recommended Excavation Area (13,084.22 sq ft)
-  Approximate Site Boundary
-  Surface Water
-  Topographic Contour (5-Foot Interval)
-  Topographic Contour (1-Foot Interval)

Excavation will not occur under buildings or include permanent site features (i.e., concrete pad, sidewalks, streets, rail road tracks, etc.).



Figure 4-2
Site 27 Proposed Soil Removal Area
EE/CA for Sites 19 and 27
NSF-IH, Indian Head, Maryland

Analysis of the Removal Action Alternative

Evaluation of the soil removal action for the sites is discussed in terms of effectiveness, implementability, and cost (EPA, 1993) in this section.

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 federal guidance document (EPA, 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 human and ecological receptors. As discussed in Section 2, NG and lead pose unacceptable human health and ecological risks at Site 19; and arsenic and chromium pose unacceptable human health and ecological risks at Site 27.

Protection of Workers during Implementation: Workers can be protected during implementation of this alternative using personal protection equipment 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. Because potential unexploded ordnance has not been detected at Sites 19 and 27 during the site screening process investigation or additional investigation, it is assumed that unexploded ordnance clearance/avoidance will not be performed during the excavation. Therefore, it is not included in the cost estimate.

Protection of the Environment: Excavation and disposal of the contaminated surface and subsurface soil at Sites 19 and 27 will achieve the RAOs, which are protective of human and 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 and contains the contaminated surface and

subsurface soil in a facility specifically designed to manage the medium. The potential risks to human and 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 action levels documented in Section 3.4 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 federal guidance document (EPA, 1993), 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 criteria 1 through 6. For both Sites 19 and 27, implementation of excavation projects is straightforward and easily achievable based on criteria 1 through 6. Administrative feasibility involves criteria 7 through 10. These criteria are irrelevant to Sites 19 and 27 because no permits are required, no rights-of-way are required, and no adjoining property is present. Institutional controls (criterion 10) will be easily imposed if necessary because the two sites are on a Navy facility.

5.3 Cost

The total cost for the Sites 19 and 27 removal action is approximately \$210,375, with a potential range between \$147,265 and \$315,565¹. This estimate is based on the assumption that removal will be performed concurrently at Sites 19 and 27. The detailed cost analysis for this alternative is presented in [Appendix B](#).

5.4 Summary

Soil excavation with offsite disposal of contaminated soil has been chosen as the preferred remedy for Sites 19 and 27. Post-excavation sampling will not be conducted at either site. For Site 19, the vertical depths for the three excavated areas will be 0.5 foot bgs, 2 foot bgs

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

and 4 foot bgs, respectively. For Site 27, the vertical depth for the excavated area will be 0.5 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 NG and lead concentrations at Site 19 and arsenic and chromium concentrations at Site 27 to levels that will eliminate human health and ecological risks and eliminate the potential future concern or pathway for contaminant transport to human and ecological receptors in surrounding and/or downstream areas. This alternative can achieve the RAOs with a great certainty of success and implementation is technically feasible.

SECTION 6

References

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Appendix A
Applicable or Relevant and Appropriate
Requirements

TABLE A-1
 Federal Location-Specific ARARs
 EE/CA for Sites 19 and 27
 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 Sites 19 & 27 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 Sites 19 & 27. 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 Sites 19 & 27 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.
Bald and Golden Eagle Protection Act					
Site position relative to bald eagle nests	Work at sites 19 and 27 cannot result in a disturbance of bald eagles (a "taking" under federal rules)	Bald Eagles in the vicinity of Sites 19 and 27 during soil removal work.	50 CFR 22 <i>Eagle Permit Regulations</i> US Fish and Wildlife Service's National Bald Eagle Management Guidelines	Applicable	Coordinate the timing of construction activity with the base's Natural Resources Office. Follow the terms and conditions of USFWS's bald eagle biological opinion for the base. Construction may not start between December 15 and June 15 unless approved by the Natural Resources office.
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	Sites 19 & 27 are 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 A-1
 Federal Location-Specific ARARs
 EE/CA for Sites 19 and 27
 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 Sites 19 & 27 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 Sites 19 & 27 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 Sites 19 & 27 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 A-1
 Federal Location-Specific ARARs
 EE/CA for Sites 19 and 27
 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	Not applicable	Review of FEMA Flood Insurance Rate Map 2400890070B shows that Site 19 and 27 are not in a floodplain and not subject to these rules.
Executive Order 13508, Chesapeake Bay Protection and Restoration					
Within the Chesapeake Bay "watershed"	Federal facility managers shall implement land management practices to protect the Chesapeake and tributaries.		Part 5 of the Executive Order <i>Guidance for Federal Land Management in the Chesapeake Bay Watershed.</i>	Applicable	Stormwater and erosion/sediment control measures conducted during the soil removal work will use best management practices as described in the guidance document.
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 A-2
 State Location-Specific ARARs
 EE/CA for Sites 19 and 27
 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. Landclearing, tree removal, and other disturbance in the project area may require mitigation.	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	Applicable	Site 29 lies within the 1,000 foot buffer zone that makes up Maryland's Critical Area surrounding the bay. The Charles County Critical Area program can be found here: http://www.charlescounty.org/pgm/planning/plans/environmental/cbca/
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 Sites 19 & 27 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 A-2
 State Location-Specific ARARs
 EE/CA for Sites 19 and 27
 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 Sites 19 & 27 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 ben 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, Annotated Code of Maryland, <i>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.

TABLE A-3
 Federal Action-Specific ARARs
 EE/CA for Sites 19 and 27
 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 Sites 19 & 27.
CERCLA Off-Site Rule					
Off-Site Disposal of Waste from Site Remediation	Waste from a CERCLA site that is disposed of off-site must be sent to a facility reviewed by EPA under the Off-Site Rule, once a decision document is signed for the waste (e.g., ROD, Action Memo). (http://www.epa.gov/osw/hazard/wastetypes/wasteid/offsite/).	Off-Site Disposal of Waste from Site Remediation	CERCLA Off-Site Rule, 40 CFR 300.440	Applicable, if waste are disposed of offsite	Off-site disposal of excavated soil is planned for Sites 19 & 27.
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 excavated soil may be characteristic RCRA hazardous waste.
Hazardous waste accumulation	Generator may accumulate haz. 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 Sites 19 & 27 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 A-3
 Federal Action-Specific ARARs
 EE/CA for Sites 19 and 27
 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 Sites 19 & 27.
	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 Sites 19 & 27 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 Sites 19 & 27. 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>in situ</i>) management of wastes if wastes at Sites 19 & 27 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>in situ</i> remedial actions are planned at Sites 19 & 27.

TABLE A-3
 Federal Action-Specific ARARs
 EE/CA for Sites 19 and 27
 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 Sites 19 & 27.
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 Sites 19 & 27 .

TABLE A-3
 Federal Action-Specific ARARs
 EE/CA for Sites 19 and 27
 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	Sites 19 & 27 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 Sites 19 & 27.
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 Sites 19 & 27 .
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 Sites 19 & 27 .
	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 Sites 19 & 27 .

TABLE A-3
 Federal Action-Specific ARARs
 EE/CA for Sites 19 and 27
 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 Sites 19 & 27. 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 Sites 19 & 27. 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 Sites 19 & 27. will not be generating these air emissions.
Discharge to air	An Air Pollution Emission Notice (APEN) must be filed with the State of Maryland 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 Sites 19 & 27. 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 Sites 19 & 27. 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 Sites 19 & 27. 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 Sites 19 & 27. 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 A-3
 Federal Action-Specific ARARs
 EE/CA for Sites 19 and 27
 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 Sites 19 & 27 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 A-3
 Federal Action-Specific ARARs
 EE/CA for Sites 19 and 27
 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 A-3
 Federal Action-Specific ARARs
 EE/CA for Sites 19 and 27
 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 Sites 19 & 27 will not include 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 Sites 19 & 27.
	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 A-3
 Federal Action-Specific ARARs
 EE/CA for Sites 19 and 27
 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	The remedial action at Sites 19 & 27 at the may involve hazardous waste workers, therefore the requirements of OSHA must be met.

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.

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.

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.

TABLE A-4
State Action-Specific ARARs
EE/CA for Sites 19 and 27
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
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) 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 Sites 19 & 27.
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 Sites 19 & 27.

TABLE A-4
 State Action-Specific ARARs
 EE/CA for Sites 19 and 27
 NSF-IH, Indian Head Maryland

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
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.
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 Sites 19 & 27 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 Sites 19 & 27 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 Sites 19 & 27 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 Sites 19 & 27 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 Sites 19 & 27, 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 Sites 19 & 27.
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 Sites 19 & 27 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 Sites 19 & 27 IHDIV-NSWC boundaries.

ARAR - Applicable or relevant and appropriate requirement.
 TAP - Toxic Air Pollutant.

USTs - Underground Storage Tanks.
 VOCs - Volatile Organic Compounds.

Appendix B
Detailed Cost Estimate for Removal Alternative

TABLE B-1
Detailed Cost Estimate for Soil Excavation and Offsite Disposal
EE/CA for Sites 19 and 27
NSF-IH, Indian Head Maryland

Item	Quantity	Unit	Cost Source	Unit Cost	Subtotal	Notes
PRE-CONSTRUCTION COST						
1 Permitting, Planning, and Reporting						
1.1 Soil Removal Work Plan						
1.1.1 Draft for Navy Review and RTC	120	hr	CH2M HILL average P-grade	\$ 100.00	\$ 12,000.00	
1.1.2 Final for Regulatory Review and RTC	40	hr	CH2M HILL average P-grade	\$ 100.00	\$ 4,000.00	
SUBTOTAL PRE-CONSTRUCTION COST					\$ 16,000.00	
CONSTRUCTION COST						
2 Environmental Safety Controls						
2.1 Dust Control (assume onsite water source)	20	day		\$ 520.00	\$ 10,400.00	Assume 2 weeks per site
3 Site Preparation						
3.1 Site Clearing						
3.1.1 Site 19 (heavy clearing)	0.11	acre	M 022030 200 0500	\$ 3,978.00	\$ 437.58	Assume clearing debris chipped and left onsite
3.1.2 Site 27 (light clearing)	0.34	acre	M 022030 200 0501	\$ 1,989.00	\$ 676.26	Assume clearing waste (i.e., grass clippings, brush) left onsite
3.2 Construction Survey						
3.2.1 Pre-excavation	2	ls	M 02920 320 2400	\$ 1,600.00	\$ 3,200.00	1 day each for pre- and post-excavation surveys per site
3.2.2 Post-excavation	2	ls	M 02920 320 2400	\$ 1,600.00	\$ 3,200.00	1 day each for pre- and post-excavation surveys per site
3.3 Erosion and Sediment Controls						
3.3.1 Silt Fence	700	lf	R.S. Means	\$ 2.72	\$ 1,904.00	
3.3.2 Removal of Silt Fence	700	lf	R.S. Means	\$ 1.92	\$ 1,344.00	
4 Equipment and Supplies						
4.1 Storage Trailer	1	mo	R.S. Means	\$ 1,175.16	\$ 1,175.16	
4.2 PPE (Level D)	20	day	R.S. Means	\$ 32.30	\$ 646.00	
5 Excavation and Backfill						
5.1 Excavation, bulk, backhoe, stockpiled	515	CY	M 31 23 16 42 5020	\$ 8.42	\$ 4,336.30	Assumes a 20% buffer for Site 19 and 10% buffer for Site 27
5.2 Borrow, loading, and spreading - top soil, shovel, 1 CY bucket (6" thick)	362	CY	M 31 23 23 15 7000	\$ 29.36	\$ 10,628.32	
5.3 Material Costs for Imported Common Fill	153	CY	M 02315 210 4000	\$ 15.00	\$ 2,295.00	
5.4 Borrow, loading, and spreading - common earth, shovel, 1 CY bucket	184	CY	M 02315 210 4000	\$ 1.62	\$ 298.08	Includes 20% for compaction factor
5.5 Grading (small area)	722	SY	M 02300 100 0100	\$ 1.00	\$ 722.41	
5.6 Compaction - sheepsfoot, 12' lifts, 4 passes	184	CY	M 02315 310 6540	\$ 2.00	\$ 368.00	
6 Decontamination						
6.1 Decontamination Pad (install and removal)	2	each	BOA Rates	\$ 154.58	\$ 309.16	Assume onsite water source
6.2 Steam Cleaner	1	mo	R.S. Means	\$ 1,658.44	\$ 1,658.44	Assume 1 decon pad per site; plastic liner and wood
7 Disposal Characterization						
7.1 TCLP Analysis	10	each	BOA Rates	\$ 665.00	\$ 6,650.00	Assume 5 samples per site
7.2 Reactivity (cyanide)	10	each	BOA Rates	\$ 57.33	\$ 573.30	Assume 5 samples per site
7.3 Corrosivity (pH)	10	each	BOA Rates	\$ 47.33	\$ 473.30	Assume 5 samples per site
7.4 Ignitability (Pensky Martins)	10	each	BOA Rates	\$ 30.67	\$ 306.70	Assume 5 samples per site
8 Offsite T&D						
8.1 Transportation and Disposal (includes landfill fees)	644	ton	Professional Judgment	\$ 55.00	\$ 35,420.00	Assume Non-haz landfill
8.2 Loading soil into truck	515	CY	E 33 19 0150	\$ 3.44	\$ 1,771.60	
9 Site Restoration						
9.1 Seeding + 10% buffer	1	acre	M 02920 320 2400	\$ 2,500.00	\$ 2,500.00	
10 Construction Oversight						
10.1 Field Project Manager/Construction Superintendent	200	hr	CH2M HILL average P-grade	\$ 100.00	\$ 20,000.00	Assuming 2 weeks, 10 hour days per site
10.2 Health and Safety Officer/Field Engineer	200	hr	CH2M HILL average P-grade	\$ 100.00	\$ 20,000.00	Assuming 2 weeks, 10 hour days per site
SUBTOTAL CONSTRUCTION COST					\$ 131,293.61	
11 Mobilization/Demobilization						
11.1 Mob & demob of equipment and personnel	1	ls	3% of construction cost	\$ 3,938.81	\$ 3,938.81	Assume one mob/demob for both sites
12 Contractor Overhead and Profit						
12.1 Home office cost, project management, etc.	1	ls	10% of construction cost	\$ 13,129.36	\$ 13,129.36	
12.2 Insurance and performance bond	1	ls	3% of construction cost	\$ 3,938.81	\$ 3,938.81	
TOTAL CONSTRUCTION COST					\$ 152,300.58	
SUBTOTAL CAPITAL COST					\$ 168,300.58	
13 Scope Contingency	15%				\$ 25,245.09	
14 Bid Contingency	10%				\$ 16,830.06	
TOTAL CAPITAL COST					\$210,376	
Upper Limit of Cost Accuracy	150%				\$315,564	
Lower Limit of Cost Accuracy	70%				\$147,263	

Notes:
a) The enclosed Engineer's Estimate is only an estimate of possible construction costs for budgeting purposes. This estimate is limited to the conditions existing at its issuance and is not a guaranty of actual price or cost. Uncertain market conditions such as, but not limited to: local labor or contractor availability, wages, other work, material market fluctuations, price escalations, force majeure events, and developing bidding conditions etc. may affect the accuracy of this estimate. CH2M Hill is not responsible for any variance from this estimate or actual prices and conditions obtained.
b) The cost estimate is not an offer to execute project. It is a means for budgeting purposes only.
c) The cost estimate provides an accuracy of +50% to -30%