Final

Site 17 Engineering Evaluation/Cost Analysis

Naval District Washington, Indian Head
Indian Head, Maryland

Contract Task Order 0122

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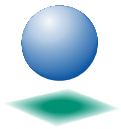
Prepared by



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Herndon, Virginia

Executive Summary

This document presents an Engineering Evaluation and Cost Analysis (EE/CA) for a non-time-critical removal action for Site 17 (Disposed Metal Parts Along Shoreline) at the Naval District Washington, Indian Head* (NDWIH), in Indian Head, Maryland. The purpose of this document is to present the remedial action alternative to reduce risks to ecological receptors associated with site soil to acceptable levels through excavation and removal of affected soil, and to remove rusted drums from the site.

NDWIH is a Navy facility located in northwestern Charles County, Maryland, approximately 25 miles southwest of Washington, District of Columbia. Site 17 is located in the southeast portion of the facility (Figure 1-1) and is defined as a 1,000-foot stretch of Mattawoman Creek shoreline where metal parts were discarded. The majority of the metal parts, which were placed along the shoreline for erosion control, were removed in the early 1990s. The defined area of Site 17 was expanded in 1997 to include the forested area 100 feet from the shoreline where dozens of rusted drums were identified. The horizontal extent of the site is approximately 3.5 acres.

This EE/CA will be completed as a non-time-critical removal action as required by section 300.415(b)(4)(i) of the National Oil and Hazardous Substance Pollution Contingency Plan (NCP; 40 CFR Part 300). Submittal of this document fulfills the requirements for non-time-critical actions defined by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), the Superfund Amendments and Reauthorization Act of 1986 (SARA). This EE/CA has been prepared in accordance with USEPA's guidance document *Superfund, Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA*, PB93-963402, August 1993.

During the remedial investigation conducted in 2000, ecological risks were identified in sediment and soil. Risks in sediment will be further evaluated in a baseline ecological risk assessment whereas risks in soil will be addressed in this EE/CA. Refinement of the ecological risk assessment concluded that there are potentially unacceptable risks from lead, mercury and zinc in surface soil at Site 17. The U.S. Department of the Navy (Navy), in concurrence with the United States Environmental Protection Agency (USEPA) and the Maryland Department of the Environment (MDE), agreed to perform soil removal due to potential ecological risks from lead, mercury, and zinc in soil. Furthermore, rusted drums present at the site also will be removed. The removal of these drums is proposed and evaluated in this EE/CA because of the possibility that the contents of the drums are a potential source of volatile organic compound (VOC) contamination to soil and groundwater. VOC contamination in groundwater will be addressed in a separate Feasibility Study. Removal of the drums will also eliminate the drums as a potential future concern or pathway for future contaminant transport to the soil and groundwater. The Navy, with support from USEPA and MDE, agreed that a soil removal action based on

*On 1 October 2003, the installation management functions at Indian Head transferred from IHDIV/NSWC to NDW. References to this installation will now be Naval District Washington, Indian Head.

appropriate Preliminary Remediation Goals (PRGs) would reduce the level of potential ecological risk at the site to acceptable levels. The established PRGs are used to determine the areas within the site that require cleanup action. Table ES-1 presents the removal action alternative considered.

The Navy intends to remove and dispose of the drums at the site and remediate the soil through excavation and removal activities. As a result, this EE/CA presents only this remedial alternative. The removal action is evaluated in terms of effectiveness, implementability, and cost. The effectiveness evaluation included reviewing the protectiveness of the alternative and its ability to meet the removal action objectives. Implementability included looking at the technical feasibility, availability, and administrative feasibility of the alternative. The evaluation of cost included a review of capital cost, operating cost, and present-worth cost.

Overall, soil excavation and drum removal is the recommended alternative because it can achieve the RAOs for Site 17 with a great certainty of success and implementation is technically feasible. The cost for implementation of this alternative is estimated to have a present worth cost of $268,000.

TABLE ES-1
Evaluation of Soil and Drum Removal Remedial Action Alternative
Site 17 EE/CA, NDWIH, Indian Head, Maryland

Alternative	Description	Effectiveness	Ease of Implementation	Present Worth
Soil Excavation with Stockpiling at Site 11 for Future Consolidation Under Site 11 Cap and Drum Removal with Offsite Disposal	Remove and stabilize drums in over-pack containers for offsite disposal. Remove contaminated soil with an excavator and stockpile soil at Site 11 for future consolidation under cap. The excavated areas would be backfilled, regraded, and revegetated with native grasses.	Will Meet RAOs: Potential ecological risks from soil contaminants eliminated. Potential source of VOCs to soil and groundwater removed with drum removal	Implementation would be straightforward. There are a number of contractors capable of handling excavation of soil contaminated with the types of contamination found at Site 17 as well as the drum removal activities. The drum removal presents some uncertainties that may increase the difficulty of this alternative.	$268,000*

*Cost assumes that the removal action will be completed within 1 year.

Contents

Tables (Tables are located at the end of each section.)

Figures (Figures are located at the end of each section.)

Acronyms and Abbreviations

ARAR	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action Navy
COPC	Contaminants of Concern
CTO	Contract Task Order
EE/CA	Engineering Evaluation Cost Analysis
EFACHES	Engineering Field Activity, Chesapeake
IAS	Initial Assessment Study
IHDIV-NSWC	Indian Head Division, Naval Surface Warfare Center
IR	Installation Restoration
LANTDIV	Naval Facilities Engineering Command, Atlantic Division (
MDE	Maryland Department of the Environment
mg/kg	milligrams per kilogram
msl	mean sea level
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NDWIH	Naval District Washington, Indian Head
NOS	Naval Ordnance Station
NSWC	Naval Surface Warfare Center
O&M	Operation and Maintenance
PPE	personal protection equipment
PR	Preliminary Review
PRG	Preliminary Remediation Goal
RAO	Removal Action Objective
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RI	Remedial Investigation
SARA	Superfund Amendments and Reauthorization Act of 1986
SVOC	Semivolatile Organic Compounds
TAL	Total Analyte List
TSD	Treatment, Storage, and Disposal
USEPA	United States Environmental Protection Agency
UXO	Unexploded Ordnance

VOC	volatile organic compound
VSI	Visual Site Inspection

SECTION 1

Introduction

Naval District Washington, Indian Head (NDWIH), is a Navy facility located in northwestern Charles County, Maryland, approximately 25 miles southwest of Washington, District of Columbia. This report presents an Engineering Evaluation and Cost Analysis (EE/CA) for a non-time-critical removal action for Site 17 at NDWIH. Figure 1-1 shows the location of Site 17.

This EE/CA was prepared by CH2M HILL under the U.S. Department of the Navy (Navy), Naval Facilities Engineering Command, Atlantic Division (LANTDIV), Comprehensive Long-Term Environmental Action Navy (CLEAN) II Contract N62470-95-D-6007, Contract Task Order (CTO) 0122. This EE/CA has been submitted to the Engineering Field Activity, Chesapeake (EFA CHES; now Naval Facilities Engineering Command Washington), NDWIH, The United States Environmental Protection Agency (USEPA), and the Maryland Department of the Environment (MDE). The activities described herein are part of the overall Installation Restoration (IR) Program being implemented at NDWIH.

This EE/CA comprises the following sections:

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

1.1 Regulatory Background

This document is issued by the Navy, a Federal agency authorized for remediation of Site 17, with the assistance of the USEPA and the MDE, under Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA).

Section 104 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, 40 Code of Federal Regulations (CFR) 300, provides regulations for implementing CERCLA and SARA and regulations specific to removal actions. The NCP defines a removal action as the "cleanup or removal of released hazardous substances from the environment, such actions as may be necessary to monitor, assess, and evaluate the threat of release of hazardous substances; the disposal of removed material; or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of

release." A non-time-critical removal action is being considered for Site 17. Non-time-critical removal actions are defined in 40 CFR Section 300.415(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." For time-critical removal actions, activities shall begin as soon as possible to "abate, prevent, minimize, stabilize, mitigate, or eliminate the threat to public health or welfare of the United States or the environment" (40 CFR Section 300.415(b)(3)).

Title 40 CFR Section 300.415 requires the lead agency to conduct an EE/CA when a non-time-critical removal action is planned for a site. The goals of an EE/CA are to identify the objectives of the removal action and to analyze the effectiveness, implementability, and cost of various alternatives that may satisfy these objectives. An EE/CA documents the removal action alternatives and selection process. Where the extent of the contamination is well defined and limited in extent, non-time-critical removal actions also allow for the expedited cleanup of sites in comparison to the remedial action process under CERCLA. This EE/CA has been prepared in general accordance with USEPA's guidance document *Superfund, Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA*, PB93-963402, January 1993.

Community involvement requirements for non-time-critical removals 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 Purpose and Objectives

The Navy used Site 17 as a metal parts and drum disposal area. Environmental impacts from the metal parts and drums were investigated during a remedial investigation (RI) conducted between July 21 and October 12, 2000, and during an additional investigation conducted in 2002. The results from these investigations have been used to support the preparation of this EE/CA.

The overall objectives are to reduce risks to ecological receptors associated with site soil to acceptable levels through excavation and removal of impacted soil and removal of rusted drums from the site, which may be a potential source of volatile organic compounds (VOCs) to soil and groundwater. Human health risks, quantified in the RI, were within acceptable ranges defined by USEPA. The Navy intends to remove and dispose of the drums at the site and remediate the soil through excavation and removal activities. As a result, this EE/CA presents only this remedial alternative. Therefore, the purpose of this EE/CA is to present the excavation and removal remedy that achieves the following:

- Is technically feasible
- Protects the environment and reduces risks to ecological receptors
- Eliminates potential release of constituents from the drums to soil and groundwater
- Satisfies environmental review and public relations requirements for removal actions
- Satisfies administrative record requirements for documenting the removal action selection

This EE/CA does not address potential ecological risks from metals contamination in the near-shore sediment resulting from historical disposal of metal parts along the Mattawoman Creek shoreline or human health risks associated with groundwater. Risks in sediment will be further evaluated in a baseline ecological risk assessment being conducted separately. Risks in groundwater will be evaluated in a feasibility study.

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Figure 1-1
Site 17 Location Map
Site 17 EE/CA
NDWIH, Indian Head, Maryland

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SECTION 2

Site Characterization

This section presents information that forms the basis for the site characterization. This information includes site history and characteristics, previous investigations, previous remedial or removal actions, ecological risks, and nature and extent of impact.

2.1 Site History and Characteristics

Site 17 is a 1,000-ft stretch of shoreline along the Mattawoman Creek where metal parts were discarded from the 1960s until the early 1980s. The discarded materials included rocket motor casings, shipping containers, empty drums, and various metal parts. An Initial Assessment Study (IAS) conducted in 1983 (Fred C. Hart Associates, Inc., 1983) identified the presence of rusted metal parts in the vicinity of the reported disposal area. The study also noted that the submerged materials were covered over with bottom sediments.

In 1997, the area of the site was expanded to include the forested area 100 ft from the shoreline, where dozens of rusted drums were identified. During a site reconnaissance conducted in January 2000, disintegrated drums containing a yellow, waxlike material were observed at the site. In addition, some drums were partially exposed in the soil. Base personnel could not verify the origin of the drums. NDWIH personnel analyzed the contents and determined that the substance was wax, which indicates that the substance was safe to handle (e.g., was not explosive) though possibly it contained residual levels of explosives and VOCs.

Soil underlying the site consists of fill material in the upper 10 to 12 ft of the subsurface. The fill is characterized by greenish clay with silt containing wood fragments. The fill is underlain by fine to medium sand with some clay. The groundwater table, as determined from monitoring wells installed at the site, ranges from about 1.4 ft above mean sea level (msl) along the shoreline to 6.7 ft above msl upgradient of Site 17. Groundwater flow is generally from northwest to southeast and discharges to Mattawoman Creek. The nearest potable water well is Well 17, located hydraulically upgradient 1,000 ft north of the site.

2.2 Previous Investigations

2.2.1 Initial Assessment Study

The objective of the IAS (Fred C. Hart Associates, 1983) was to identify and assess sites posing a threat to human health or to the environment owing to contamination from past hazardous materials operations at NDWIH. The IAS identified the area now known as Site 17 as the location of discarded metal parts. The study did not recommend a Confirmation Study for this site because of the inert nature of the materials.

2.2.2 Phase II RCRA Facility Assessment (RFA)

A Phase II RFA (A.T. Kearney, Inc., 1988) was conducted in 1988 by USEPA and consisted of a Preliminary Review (PR) of available documents and a Visual Site Inspection (VSI). During the VSI, rusted large metal parts were noted in the reported disposal area, many of which were covered with sediment. The RFA conveyed that Naval Ordnance Station representatives stated the metal parts would be removed in late 1988 or early 1989 under the direction of the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Department.

2.2.3 Remedial Investigation

Because no sampling had been conducted at this site up to that point, groundwater, surface soil, subsurface soil, surface water, and sediment sampling was conducted in 2000 as part of the RI conducted at Site 17 and four other sites (CH2M HILL, 2004).

Surface and subsurface soil samples including background samples (i.e., samples in areas considered to be uncontaminated) were collected and analyzed for VOCs, semivolatile organic compounds (SVOCs), Total Analyte List (TAL) inorganics, and explosives. Several samples were also sampled for TOC and pH. Groundwater samples were analyzed for VOCs, SVOCs, total and filtered TAL inorganics, and explosives. Sediment samples were analyzed for TAL inorganics, explosives, total organic carbon, and pH. Surface water samples were analyzed for total and filtered TAL inorganics, explosives, and hardness.

Human health and ecological risk assessments were performed as part of the RI. Human health risks were evaluated only for those media with complete exposure pathways. These media include soil, groundwater, and surface water. Exposure to the Mattawoman Creek sediment was not considered a complete pathway for human exposure because the sediment is completely covered by water and there is no shoreline with exposed sediment. The risk assessment indicated that human health hazards and risks above USEPA target levels are associated with potential future exposure to iron in combined surface and subsurface soil and VOCs and inorganics in groundwater. The concentration of iron detected in the soil was greater than the concentrations detected in the site-specific background soil samples. However, iron is considered an essential human nutrient, and the concentration of iron detected in the soil would result in a daily intake of iron of 5.4 mg/day, which is below the recommended daily intake established by the National Academy of Sciences of 10 mg/day. Therefore, exposure to combined surface and subsurface soil likely would not result in an unacceptable hazard. Future construction at the site may result in a hazard slightly above USEPA target levels associated with exposure to groundwater (mainly due to vinyl chloride detected in the groundwater) by a construction worker. Potentially unacceptable human health risks in groundwater will be addressed in a feasibility study and are not considered as part of this EE/CA. No COPCs were retained for the surface water. Therefore, surface water was eliminated as a medium of potential concern.

Ecological risks were identified in sediment and soil. Risk in sediment will be further evaluated in a baseline ecological risk assessment. Lead, mercury, and zinc risks in surface soil will be addressed in this EE/CA.

2.2.4 Pre-Feasibility Study Investigations

Following the RI, a pre-Feasibility Study investigation was conducted in 2002 to define the distribution of VOCs in groundwater, to determine if VOCs in groundwater are adversely affecting Mattawoman Creek, and to assess the viability of monitored natural attenuation as a remedial alternative for groundwater. Additionally, a tidal study was conducted to determine the influence of the tides on groundwater levels and to estimate the hydraulic conductivity of the subsurface.

The investigation delineated the extent of VOCs in groundwater and concluded that VOCs in groundwater are not adversely affecting Mattawoman Creek. The results of the investigation are presented in more detail in a technical memorandum entitled "Pre-Feasibility Study Field Activities and Results, Site 17, Indian Head Division-NSWC, Indian Head, Maryland," dated September 30, 2002 (CH2M HILL, 2002).

2.3 Previous Remedial or Removal Actions

The Phase II RCRA Facility Assessment (RFA) conducted by USEPA in 1988 (A. T. Kearney, Inc., 1988) mentioned that the metal parts were to be removed in 1989 under the direction of the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Department. During the site reconnaissance conducted in 2002, large metal items were not observed along the shoreline, which indicated that metal scraps have been removed from along the shoreline. In 2003, the Navy removed approximately 90 drums that were present at the surface of the site, leaving in place partially exposed drums. These partially exposed drums are the subject of this EE/CA.

2.4 Ecological Risks

Potential ecological risks for Site 17 were identified following the RI and pursuant to the decision to conduct a removal action at the site. Refinement of the ecological risk assessment concluded that there are unacceptable risks from lead, mercury, and zinc in surface soil at Site 17. The Navy, with support from USEPA and MDE, agreed that a soil removal action based on appropriate Preliminary Remediation Goals (PRGs) would reduce the level of potential ecological risk at the site to acceptable levels and, thus, avoid the need to conduct a baseline ecological risk assessment for the surface soil at the site (Appendix A). Table 2-1 presents a summary of the PRGs developed for lead, mercury, and zinc.

2.5 Nature and Extent of Impact

Using the proposed ecological PRGs, the soil removal action can be limited to the area encompassing samples IS17SS06, IS17SS07, IS17SS08, IS17SS09, IS17SS10, and IS17SS01 (Figure 2-1). It has been assumed that the lateral extent of soil contamination extends from these points to approximately the nearest sample with COPC concentrations below PRGs.

The lateral extent of area containing drums was documented during site inspections in July and August 2003. The area is approximately 75 ft long and 35 ft wide and located in the northwest of Site 17. No geophysical data have been collected at Site 17; therefore, the vertical extent and number of drums have been estimated solely on the basis of the site inspections. The presence

of the drums at ground surface, with some partially exposed, is an indication of possible dumping of the drums rather than burial.

TABLE 2-1
Summary of Ecological Soil PRGs for COCs in Site 17 Soil
Site 17 EE/CA, NDWIH, Indian Head, Maryland

Constituent	Facility Background Average (mg/kg)	Calculated Soil (mg/kg)	Maximum Detected Concentration in Site 17 Soil (mg/kg)	Basis for PRG
Lead	20	500	602	ORNL-Soil Invertebrate Effects Level
Mercury	0.043	0.15	0.41	ORNL-Effects Level for Short-Tailed Shrew
Zinc	18.1	200	1,140	ORNL-Soil Invertebrate Effects Level

Grey shading indicates applicable PRG for the given constituent.

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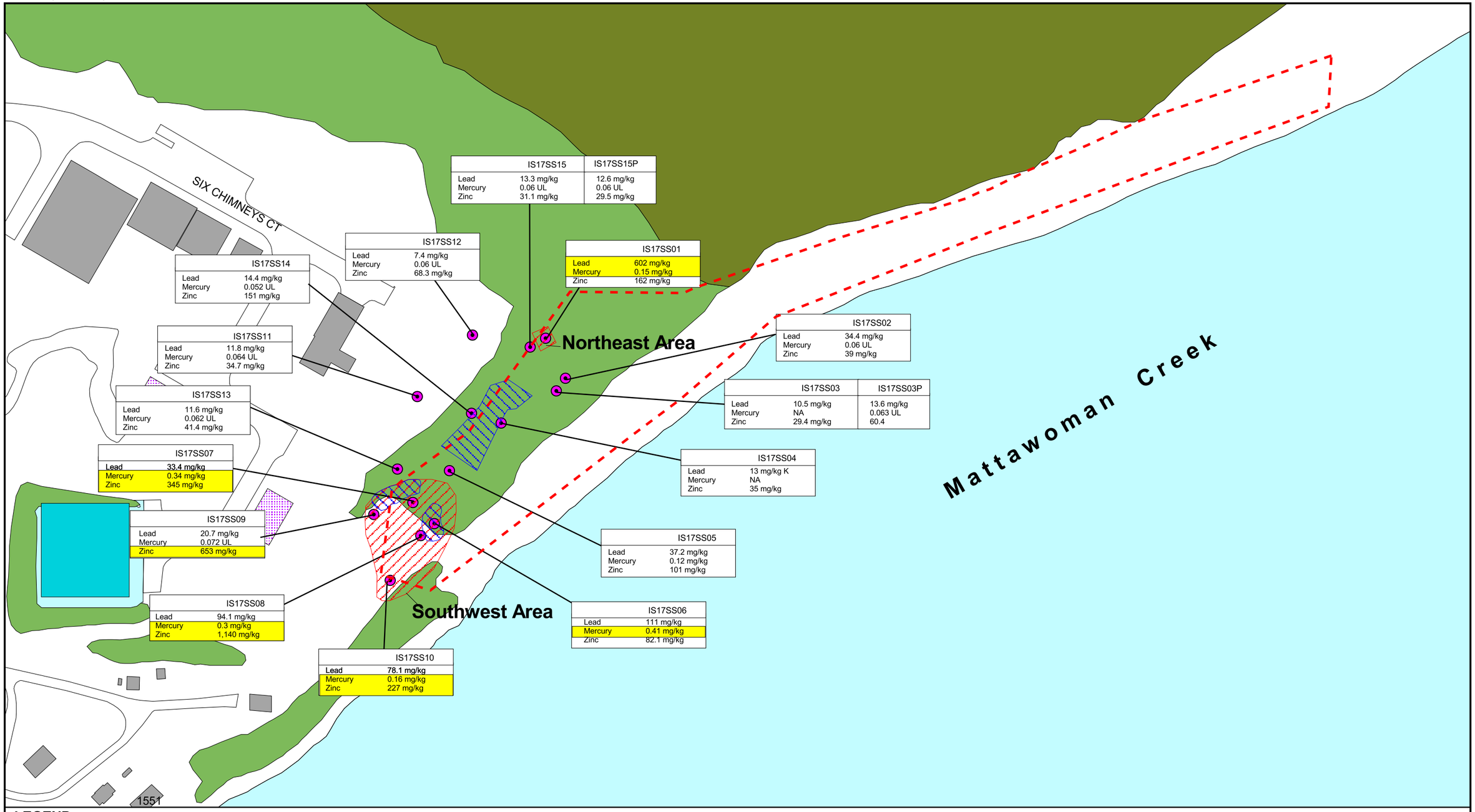

LEGEND

- Surface Soil Sample Location
- Approximate Site Boundary
- Buildings
- Demolished Buildings
- Wooded Area
- Proposed Soil Excavation Area
- Approximate lateral extent of drum removal based on visual Site inspection
- Road
- Dense Wooded Area
- Values that Exceed PRGs
- Pond

Ecological Preliminary Remediation Goals (PRGs):

Lead	500 mg/kg
Mercury	0.15 mg/kg
Zinc	200 mg/kg

Notes:

UL = Below Detection Limit

mg/kg = Milligrams per kilogram

N

0 100 200 Feet

1 inch = 100 feet

Figure 2-1
Proposed Areas for Soil
Excavation and Drum Removal
Site 17 EE/CA
NDWIH, Indian Head, Maryland

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SECTION 3

Identification of Removal Action Objectives

To select the excavation and removal remedy for Site 17, the site removal action objectives need to be developed and understood. This section presents information that forms the basis for the site removal action objectives. This information includes statutory limits on removal actions, the removal action objectives and scope, applicable or relevant and appropriate requirements (ARARs), and a discussion of the selection of cleanup criteria.

3.1 Removal Action Objectives and Scope

The removal action objectives (RAOs) are as follows:

- Reduce potential risks to ecological receptors associated with site soil contaminants to acceptable levels, represented by the agreed upon PRGs and
- Remove exposed and partially exposed drums, which may be a source of VOC contamination in soil and groundwater.

These objectives will be accomplished through the implementation of the removal action as described throughout this document. Section 4 provides a detailed description of the removal action scope.

3.2 Applicable or Relevant and Appropriate Requirements

ARARs are distinguished by USEPA as being 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. The definitions of ARARs below are from USEPA (1988) guidance. Both the applicable requirements and the relevant and appropriate requirements pertain to a site, to the extent practicable.

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

Relevant and appropriate requirements are standards, standards of control, and other substantive environmental protection requirements, criteria, or limits promulgated under federal or state law that, although not applicable to a hazardous substance, a pollutant, a contaminant, a remedial action, or other circumstances at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site so that their use is well suited to the particular site. Relevant and appropriate requirements also are defined in the NCP (40 CFR 300.5). For example, although Resource Conservation and Recovery Act (RCRA) regulations are not applicable to closure of landfills in which hazardous waste was

disposed of before 1980, RCRA regulations for landfill closure with hazardous substances in-place may be deemed relevant and appropriate.

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

Chemical-specific ARARs are health or risk management-based numbers or methodologies that result in the establishment of numerical values for a given medium 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 chemicals of concern in the designated medium, or set safe concentrations of discharge for remedial activity.

Action-specific ARARs are requirements that define acceptable procedures related specifically to the type of activity being performed. Federal action-specific and State of Maryland action-specific ARARs that may affect the development and conceptual arrangement of removal action alternatives are summarized in Appendixes B-1 and B-2, respectively.

Location-specific ARARs restrict activities based on the geographic location of the site or characteristics of the surrounding environments. Location-specific ARARs may include restrictions on actions within wetlands or floodplains, near locations of known endangered species, or on protected waterways. Federal and State of Maryland location-specific ARARs that have been reviewed are summarized in Appendixes B-3 and B-4, respectively.

3.3 Selection of Site Cleanup Criteria

Ecological PRGs were established following the risk assessment to define the extent of impacted soil requiring a removal action. The PRGs are developed only for those constituents identified as contaminants of potential concern (COPCs), or individual constituents that contributed a potentially unacceptable risk to ecological receptors as identified in the ecological risk assessment.

Lead, mercury, and zinc in soil are the primary contaminants posing potential unacceptable risk to ecological receptors. Therefore, PRGs were developed for these constituents based on the exposure routes employed in the ecological risk assessment. The PRGs are 500 mg/kg for lead, 0.15 mg/kg for mercury, and 200 mg/kg for zinc. Appendix A provides a technical memorandum that presents the development of the PRGs.

SECTION 4

Description of Removal Action

The primary criteria used in developing the remedy were the RAOs. The excavation and removal alternative was identified to effectively meet the objectives for the non-time-critical removal action at Site 17. Soil will be excavated to meet cleanup criteria outlined in Section 3. This section provides a description of the excavation removal remedy. A summary of the alternative evaluation is provided in this section and the detailed analysis of the remedy is presented in Section 5.

The total estimated volume of soil to be excavated is 420 bank cubic yards. This volume is a conservative estimate based on the locations and depths of lead, mercury, and zinc concentrations in soil at two discrete areas identified from previous investigations (Figure 2-1). For the purposes of this EE/CA, the two areas have been designated as the "Southwest Area" and the "Northeast Area." The Southwest Area has a volume of approximately 400 cubic yards. The Northeast Area has a volume of approximately 20 cubic yards. Site 17 soil is anticipated to expand by a factor of 1.2 upon excavation, which results in an increase in the volume for disposal though mass estimates are unaffected. This volume increase is taken into consideration when estimating the volume of soil to be stockpiled at Site 11.

The lateral extent of soil removal is anticipated for the area encompassing samples IS17SS06, IS17SS07, IS17SS08, IS17SS09, IS17SS10, and IS17SS01 where PRGs were exceeded. The vertical extent of soil removal will be limited to the organic topsoil layer, or A-horizon. The rationale for the vertical extent is based on the habitat that is most supporting of earthworms and other soil invertebrates, which are the primary ecological receptors and form a potentially complete pathway for the COPCs to reach upper trophic level ecological receptors. Based on the lithology observed at Site 17, the A-horizon is anticipated to be 12 in. or less in thickness; thus, the depth of excavation is assumed to be 12 in.

Rusted drums located throughout the northern and western portions of the site will be removed and disposed of off site. The approximate locations of these drums are shown in Figure 2-1. These locations are based on two site visits conducted in July and August 2003 by CH2M HILL. Approximately 30 drums were observed to be completely or partially exposed and concentrated in three separate areas totaling 4,800 ft^2. The presence of drums has not been investigated by a geophysical survey or intrusive investigation. Therefore, the number of whole or partial drums at the site is unknown. For the purpose of this EE/CA, the vertical extent of excavation in areas where drums are partially exposed is estimated to extend to a depth of 2 ft, the approximate diameter of an intact drum, based on the assumption that, at most, a single layer of drums was dumped across Site 17, rather than there having been a large-scale burial.

The area proposed for excavation would be cordoned off during the implementation of excavation activities as a safety measure to prevent site visitors from being exposed to the contaminated soil. Additionally, appropriate erosion control measures will be installed and maintained in the excavation area and the staging area until all work has been completed.

A qualified backhoe or excavator operator will excavate the soil in accordance with the site-specific health and safety plan. Although Site 17 has not been identified previously as an unexploded-ordnance (UXO) area, UXO clearance will be performed as a safety precaution prior to the start of excavation and during excavation activities. The excavated soil will be screened to separate any metal debris from the soil. The screened soil will then be stockpiled at Site 11 to be consolidated under the Site 11 cap. As the cap will not be installed at the time of the Site 17 excavation, the excavated and screened soil will be placed on a bermed polyethylene liner and covered. Proper installation of the liner and cover by the removal action contractor (RAC) will ensure the soil is secured and protected from erosion. The cover will be secured under the outside of the containment berm using staked hay bails. Furthermore, NDWIH personnel will be responsible for inspecting the cover over the soil and NAVFAC Washington will be responsible for its maintenance. With these safeguards in place, the constituents in soil will not present an unacceptable risk to human health and the environment. Any metal debris will be disposed offsite.

Following soil excavation from affected areas, confirmatory sampling will be performed to determine if PRGs have been met for the COPCs (lead, mercury, and zinc). The success of the soil removal action will be based primarily on the postremoval mean concentration (95 percent UCL of the mean) for the site, rather than on COPC concentrations at individual sampling locations (i.e., if a few exceedances of the PRGs are found, this would not necessarily trigger the need for further excavation). However, if exceedances appear clustered in one area, additional excavation will be considered. Confirmatory soil samples will be collected from the bottom and sides of each excavation area and analyzed for lead, mercury, and zinc. The results will be compared to the ecological PRGs presented in Table 2-1. Figure 5-1 presents a flow chart showing the approach for applying PRGs in the confirmatory sampling.

Once cleanup goals are met, the excavated areas will be backfilled with an approved backfill material and seeded with native grasses. Straw mulch will be applied over the seeded area to reduce erosion of soil and seeds until germination of the seeds occur. Backfill material will be analyzed prior to placement, and will meet specifications for cleanliness and structural stability, depending on the future use of the property. The levels of lead, mercury, and zinc in the backfill material will be required to be lower than the ecological PRGS set forth in Table 2-1.

Dewatering for the soil removal effort should not be required. The depth of excavation for soil removal is about 12 in. where PRGs are to be met and 24 in. where drums are located. The static water table is below these horizons.[1] If PRGs are met in confirmatory samples, further excavation will not be warranted. Failure to meet PRGs in confirmatory samples may result in continued excavation to the water table. Excavation will not continue past the water table, since saturated soil would not be habitable for the ecological receptors at risk. Therefore, dewatering is not included in the detail cost analysis for this alternative.

Drums also will be removed as part of this field effort. The drums are partially exposed and in a structurally weak condition. The drums will be overpacked prior to disposal. Some of

[1] Three monitoring wells (IS17MW01, IS17MW02, and IS17MW03) were installed at the site during the RI. Groundwater elevations based on water level measurements taken in 2000 are 1.35, 1.64, and 6.72 ft above msl at wells IS17MW01, IS17MW02, and IS17MW03, respectively. Ground surface elevations are 3.98, 4.43, and 13.01 ft above msl at wells IS17MW01, IS17MW02, and IS17MW03, respectively.

the drums contain a hard, waxlike substance, which will be sampled and analyzed for disposal purposes for toxicity characteristic, ignitability, corrosivity, and reactivity.

The approximate locations of the drums, for the most part, do not coincide with the areas proposed for excavation. Only two small areas fall within the Southwest Area. In addition, the drums or their contents have not been identified as the source of the ecological COPCs. Therefore, soil under the drums in locations outside the areas proposed for excavation will not be sampled for the ecological COPCs. Local treatment, storage, and disposal (TSD) facilities in Virginia or Maryland can accommodate drum disposal.

SECTION 5

Analysis of Removal Action Alternative

Section 5 provides an evaluation of the removal action according to the USEPA guidance document *Guidance on Conducting Non-Time Critical Removal Actions under CERCLA* (EPA/540-R-93-057). The removal action is evaluated in terms of effectiveness, implementability, and cost, which are only applied to the soil and drums at Site 17. Table 5-1 summarizes the evaluation of the remedy.

TABLE 5-1
Evaluation of Soil and Drum Removal Remedial Action Alternative
Site 17 EE/CA, NDWIH, Indian Head, Maryland

Alternative	Description	Effectiveness	Ease of Implementation	Present Worth
Soil Excavation with Stockpiling at Site 11 for Future Consolidation Under Site 11 Cap and Drum Removal with Offsite Disposal	Remove and stabilize drums in over-pack containers for offsite disposal. Remove contaminated soil with an excavator and stockpile soil at Site 11 for future consolidation under cap. The excavated areas would be backfilled, regraded, and revegetated with native grasses.	Will Meet RAOs: Potential ecological risks from soil contaminants eliminated. Potential source of VOCs to soil and groundwater removed with drum removal	Implementation would be straightforward. There are a number of contractors capable of handling excavation of soil contaminated with the types of contamination found at Site 17 as well as the drum removal activities. The drum removal presents some uncertainties that may increase the difficulty of this alternative.	$268,000

Cost assumes that the removal action will be completed within 1 year.

5.1 Effectiveness

The overall effectiveness of the remedy is high. The level of effectiveness was assessed based on the number of "effectiveness criteria" that would be satisfied by the alternative. The "effectiveness criteria" from the USEPA guidance are identified as the following:

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

Excavation and disposal of the contaminated media will achieve the RAOs, which are protective of ecological receptors.

Workers can be protected during implementation of this alternative by using personal protection equipment (PPE) and construction controls as necessary and in accordance with the project-specific health and safety plan. The environment is protected through the removal of contaminated soil from the site.

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 alternatives. 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.

Soil excavation with stockpiling at Site 11 for future consolidation under Site 11 cap removes and contains the contaminated soil. Drum removal with offsite disposal removes, treats as necessary, and contains the drums. The drums will be taken to a facility specifically designed to manage them and their associated media. The potential toxicity to environmental receptors will be significantly reduced because the potential for exposures will be prevented. The potential for future contamination of the clean fill to levels greater than the PRGs in the areas of excavation would be eliminated.

5.2 Implementability

The level of implementability was assessed based on the number of "implementability criteria" satisfied by the alternative. The "implementability criteria," from the USEPA guidance document *Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA (EPA/540-R-93-057)*, are as follows:

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

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

5.3 Cost

The capital, annual operation and maintenance (O&M), and present-worth cost of the alternatives are summarized in Table 5-2. The cost breakdown is provided in Appendix C.

TABLE 5-2
Cost Summary
Site 17 EE/CA, NDWIH, Indian Head, Maryland

Alternative	Capital Cost	Annual O&M Cost	Present-Worth Cost
Soil Excavation with Stockpiling at Site 11 for Future Consolidation under Site 11 Cap and Drum Removal with Offsite Disposal.	$268,000	$0	$268,000[1,2,3]

[1]The magnitude of present worth range is dependent on the total number of drums to be removed.

[2]Cost assumes that the removal action will be completed within 1 year.

[3]In accordance with USEPA guidance, costs are considered to be accurate within -30% to +50%.

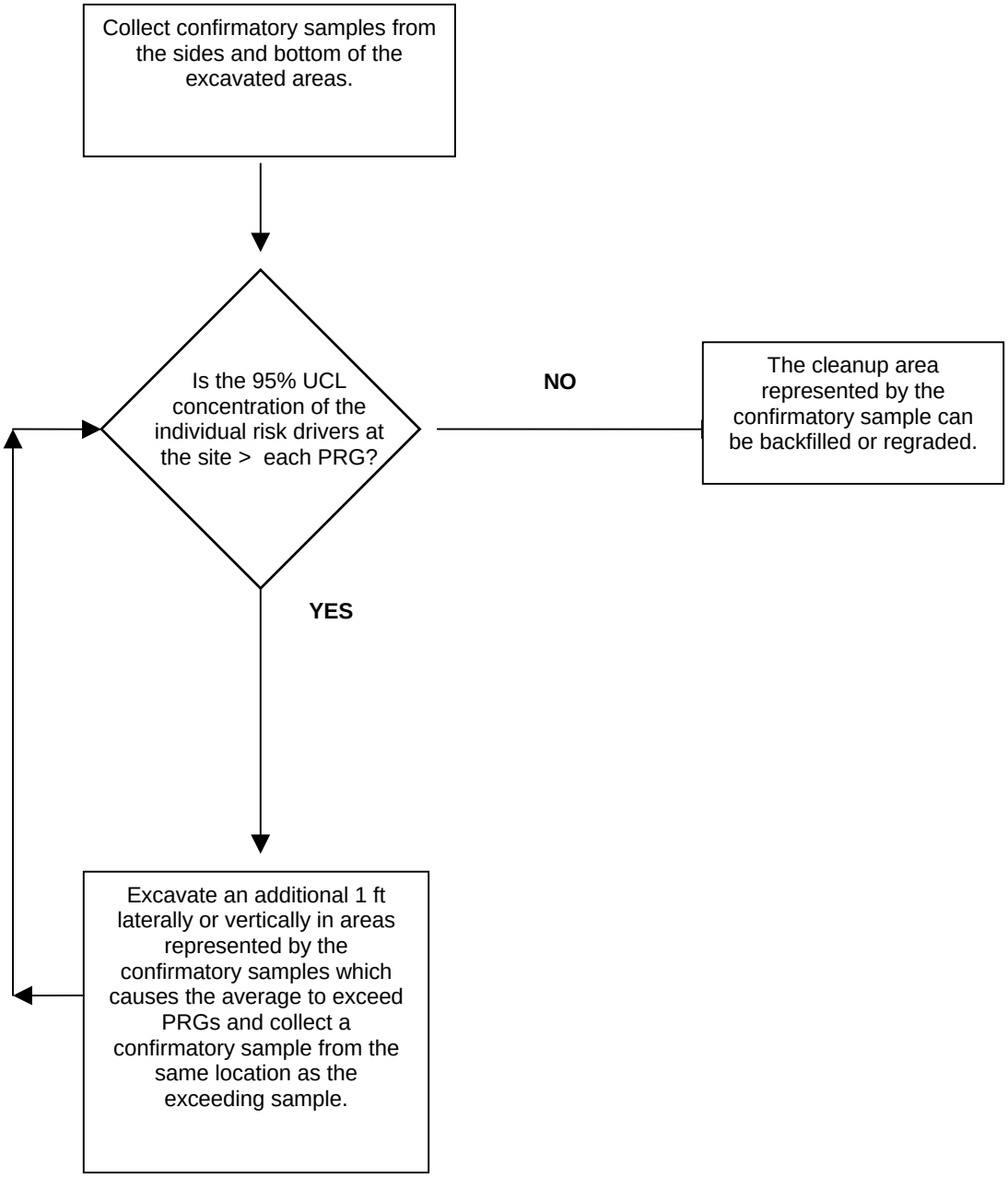
Summary

Excavation, characterization, and stockpiling of the soil at Site 11 for future consolidation under the Site 11 cap and removal, characterization, and disposal of drums has been chosen as the preferred remedy for Site 17. The collection of the confirmatory samples would take place following excavation. Confirmatory samples will be collected from soil at the bottom and sides of the excavated areas to determine if cleanup goals have been met. Once the cleanup goals have been met, the excavated areas will be backfilled with clean soil, regraded, and reseeded with native grasses. The excavated soil will be stockpiled at Site 11 and consolidated when the landfill at Site 11 is capped.

Soil Excavation and Drum Removal can achieve the RAOs for Site 17 with a great certainty of success and implementation is technically feasible. The cost for implementation of this alternative is estimated to have a present worth of $268,000.[2]

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

FIGURE 5-1
Proposed Confirmatory Sampling Procedure for Excavation Alternative
Site 17 EE/CA, NDWIH, Indian Head, Maryland



SECTION 6

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Appendix A
Determination of PRGs and Areal and Vertical Extent for Soil Removal at Site 17

Determination of PRGs and Areal and Vertical Extent for Soil Removal at Site 17, INDIV-NSWC

PREPARED FOR: Neal Parker/EFACHES
Simeon Hahn/BTAG

PREPARED BY: John Burgess/CH2M HILL

DATE: September 4, 2003

The purpose of this memorandum is to present an evaluation of the distribution of ecological COPCs in the surface soil at Site 17 in order to provide input into the risk management for the site. A screening ecological risk assessment (ERA) and baseline ERA work plan were previously prepared for Sites 11&17 together because of their close proximity to each other. This approach made sense from an ecological exposure perspective because of the potential combined exposure to ecological receptors from COPCs at both sites. However, in the interim, a drum removal action is being planned for Site 17, therefore, the Site 17 surface soil data were re-evaluated separately to determine whether there are isolated areas of potential risk where a soil removal action concurrent with the drum removal action might be considered, or if the potential risk at the site is widespread and thus any further actions should await the findings of a baseline ERA.

Distribution of COPCs

The evaluation of the Site 17 surface soil data alone revealed that the mean concentrations of seven metals and two PAHs, benzo(b)fluoranthene and pyrene, exceeded ecological screening values (Table 1). Three of the seven metals, aluminum, chromium, and vanadium, are present at concentrations similar to background (Table 2). The remaining four metals (iron, lead, mercury, and zinc) are present at concentrations substantially above background concentrations.

TABLE 2
Comparison of Metal COPC Concentrations with Background Concentrations

Inorganic	Site Average (mg/kg) (n = 15)	Surface Soil Background Average (mg/kg) (n = 12 or 14)	Ratio
Aluminum	7,275	7,874	0.9
Chromium	16.0	12	1.3
Iron	32,830	10,290	3.2
Lead	73.1	20	3.7
Mercury	0.12	0.043	2.7
Vanadium	21.7	19.2	1.1
Zinc	211	18.1	11.7

The surface soil concentrations of iron exceeded the screening value at every sampling location (Table 3), while elevated concentrations of the lead, mercury, and zinc were not as widespread. An evaluation of the spatial distribution of the exceedences revealed that elevated concentrations of these metals are concentrated in the southwest corner of the site, in the area where samples SS06, SS07, SS08, SS09, and SS10 were collected (Figure 1). Other than this area, only one other sampling location contained notably elevated metal concentrations (SS01), which was located on the northern edge of the site. The two PAHs that exceeded screening values were found in scattered locations, with a low frequency of exceedenece: benzo(b)fluoranthene (3 of 15), pyrene (3 of 15). Although elevated metals appeared to be primarily located in the southwest corner of the site, elevated concentrations of iron are found throughout the site.

Preliminary Remedial Goals for Soil Removal

Since site-specific information is lacking for Site 17, preliminary remediation goals (PRGs) from published literature were consulted for the primary COPCs at the site (lead, mercury, and zinc). PRGs for ecological endpoints have been developed and published by the Oak Ridge National Laboratory (Efroymson et al., 1997a). The PRGs developed by ORNL are based on the lowest value among the screening values for plants, soil invertebrates (earthworms), and PRGs for six species of terrestrial receptors (red fox, white-tailed deer, white-footed mouse, short-tailed shrew, American woodcock, and red-tailed hawk). All the ORNL PRGs for the three driver COPCs at Site 17 are derived from the PRGs for American woodcock (Table 4).

TABLE 4
Comparison of ORNL PRGs with Background Concentrations of COPCs

COPC	ORNL PRG	Background Average
Lead	40.5	20
Mercury	0.00051	0.043
Zinc	8.5	18.1

As shown in Table 4, the PRGs for mercury and zinc are considerably lower than the average background concentrations for these metals. Additionally, since the habitat at Site 17 is marginal for woodcock (i.e., the site lacks dense growth of young hardwood trees and moist soils), the ORNL PRGs for the driver COPCs at Site 17 are likely not appropriate. Alternatively, the PRGs for the next most sensitive receptor, the short-tailed shrew, may be considered more applicable to the site, since the site provides adequate habitat to support short-tailed shrew. The ORNL PRGs for the short-tailed shrew are shown in Table 5, along with effects levels for soil invertebrates developed by ORNL (Efyomson et al., 1997b).

TABLE 5
Comparison of PRGs for Short-tailed Shrew with Effects Levels for Soil Invertebrates

COPC	ORNL PRG	Soil Invertebrate Effects Level
Lead	740	500
Mercury	0.146	0.10
Zinc	1600	200

No PRG was developed for iron by ORNL. However, USEPA has recently released a document presenting entitled *Ecological Soil Screening Level for Iron* (USEPA, 2003). This document states that the typical range of iron concentrations in soil is from 20,000 to 550,000 mg/kg, with clayey soils typically containing the highest iron content. Additionally, in well-drained soils between pH 5 and 8, the iron demand of plants is higher than the amount available, thus iron is not expected to be toxic to plants under these conditions. Although a definitive soil screening value is not presented in the document, the conclusion states that the main concern from an ecological risk perspective for iron is not direct chemical toxicity, but rather from the effect of iron as a mediator in the geochemistry of other metals. Therefore, considering the soil conditions at the site (pH range of 5.3 to 7.2 and well drained) and the iron concentrations in the surface soil (8,950 to 224,000 mg/kg) it is unlikely that iron poses a significant ecological risk and therefore iron will not be considered as a factor in guiding the soil removal action.

Based on the information presented above, the PRGs listed below (Table 6), which are protective of short-tailed shrew, are proposed for use in the soil removal action at Site 17.

TABLE 6
Proposed PRGs for Soil Removal Action

COPC	Proposed PRGs for Site 17 (mg/kg)
Lead	740
Mercury	0.15
Zinc	1600

Areal and Vertical Extent of Soil Removal

Using the proposed PRGs, the soil removal action can be limited to the area encompassing samples IS17SS06, IS17SS07, IS17SS08, and IS17SS10. None of the other samples collected at the site have concentrations of these metals above the proposed PRGs. A soil removal based on the proposed PRGs will also encompass all exceedences of the soil invertebrate effects levels in Table 5, with one exception: IS17SS01 with a lead concentration of 602 mg/kg.

The area of PRG exceedences is located in the southwest portion of the site. The potential areal extent of PRG exceedence is unknown, but will be confirmed by confirmatory sampling at the time of the removal action. It is proposed that the vertical extent of soil removal be limited to the organic topsoil layer or A-horizon. The rationale for this approach is based on the habitat that is most supporting of earthworms and other soil invertebrates, which form the primary exposure pathway for the COPCs to reach upper trophic level ecological receptors. It is anticipated that the A-horizon will likely be 12 inches or less in thickness, and therefore the soil removal action will likely include only the top 12 inches or less of soil.

References

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Conference Call to Discuss Preliminary Remedial Goals for Soil Removal at Site 17, IHDIV-NSWC

ATTENDEES: Simeon Hahn/BTAG, David Steckler/EFACHES, John Burgess/CH2M HILL, Jeff Morris/EFACHES, Joe Rail/EFACHES

FROM: John Burgess

DATE: October 8, 2003

A conference call was held on September 25, 2003 to discuss the PRGs proposed in the technical memorandum "*Determination of PRGs and Areal and Vertical Extent for Soil Removal at Site 17, IHDIV-NSWC*" (dated September 4, 2003). A soil removal action is being considered in conjunction with a planned drum removal at the site. It was agreed that a soil removal action based on appropriate PRGs would reduce the level of potential ecological risk at the site to acceptable levels and thus avoid the need to conduct a baseline ecological risk assessment for the surface soil at the site.

The PRGs proposed in the memorandum were based on concentrations for lead, mercury, and zinc that were protective of short-tailed shrew. BTAG expressed concerns the proposed values were not protective of soil invertebrates. Therefore, the call was held to refine the proposed PRGs.

The consensus reached during the conference call was that the lead and zinc PRGs would be changed to reflect values protective of soil invertebrates. The mercury value was retained at 0.15 mg/kg to be protective of short-tail shrew and still protective of soil invertebrates. The rationale for this value was that the published effects level for soil invertebrates was based on a test value of 0.5 mg/kg with a safety factor of 5 applied to derive the 0.1 mg/kg benchmark. Therefore, it was reasonable to assume that using a PRG of 0.15 mg/kg would offer adequate protection for the soil invertebrate population, in addition to the shrew.

The agreed upon PRGs for the soil removal action at Site 17 are as follows:

Lead:	500 mg/kg
Mercury:	0.15 mg/kg
Zinc:	200 mg/kg

It was noted that these values are not intended to apply to other sites at IHDIV-NSWC, but rather are intended to guide the removal action at Site 17 alone. The PRG agreed upon for zinc in particular could vary considerably for other sites, based on soil conditions and the results of site-specific bioavailability and toxicity (which can varying considerably with various soil conditions).

The approach for applying these PRGs in the confirmatory sampling was discussed. It was agreed that the success of the soil removal action should be based primarily on the post-removal mean concentration (95% UCL of the mean) for the site, rather than on individual

sampling locations (i.e, if a few exceedences of the PRGs are found, this would not necessarily trigger the need for further excavation). However, if exceedences appear clustered in one area, additional excavtion will be considered. It is anticipated that the planned removal based on the aerial extent discussed in the September 4th, memorandum (with the inclusion of location SS01) will result in site-wide mean concentrations well below the PRGs.

The need for restoring the riparian buffer post-removal was also discussed. It was agreed that a minimum of a 50 ft buffer should be maintained if possible (depending on the extent of excavation required) and that the area excavated would be filled with clean fill and seeded with native grassess. However, further restoration will not proceed initially because future construction activities related to the installation of a groundwater treatment system may be necessary at the site. Furthermore, it is highly unlikely that the excavation will extend to the bank of Mattawoman Creek and given that the site is relatively flat in the area to be excavated, there is little potential for soil erosion to occur. Additional restoration activities will be evaluated in the forthcoming feasibility study, including the restoration of trees at the site.

Appendix B
Applicable or Relevant and Appropriate Requirements

Appendix B-1
Federal Action-Specific Applicable or Relevant and Appropriate Requirements

TABLE B-1
Potential Federal Action-Specific ARARs
Site 17, Naval District Washington, Indian Head
EE/CA Evaluation

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Federal Action-Specific ARARs					
Handling and Disposal of Certain Hazardous Wastes					
Remediation, release, and disposal polychlorinated biphenyls (PCBs)	Requirements governing the remediation, release, and disposal of PCBs must be met.	Remediation, release, and disposal of PCBs.	40 CFR 761	Not Applicable	PCBs are not contaminants of concern on Site 17 at IHDIV-NSWC.
Resource Conservation and Recovery Act (RCRA) 42 USC 6901 et seq.*					
Onsite waste generation	Waste generator shall determine if that waste is hazardous waste.	Generator of hazardous waste.	40 CFR 262.10 (a), 262.11	Potentially applicable	Applicable for any operation where waste is generated. Portions of the extracted soil may be characteristic RCRA hazardous waste.
Hazardous waste accumulation	Generator may accumulate waste on-site for 90 days or less or must comply with requirements for operating a storage facility.	Accumulate hazardous waste.	40 CFR 262.34	Potentially applicable	If waste generated at Site 17 IHDIV-NSWC, 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 that 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 that 90 days before treatment, disposal or storage elsewhere, in a container.	40 CFR 264.174	Potentially applicable	

TABLE B-1
Potential Federal Action-Specific ARARs
Site 17, Naval District Washington, Indian Head
EE/CA Evaluation

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Container storage	Place containers on a sloped, crack-free base, and protect from contact with accumulated liquid. Provide con-attainment 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 that 90 days before treatment, disposal or storage elsewhere, in a container.	40 CFR 264.175(a) and (b)	Potentially applicable	Container storage requirements are applicable only if hazardous wastes are generated during remedial activities and are stored onsite for greater than 90 days. This may occur at Site 17.
	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 contain-ment system, and decontaminate or remove all containers, liners.		40 CFR 264.178	Potentially applicable	
Excavation	Movement of excavated materials to new location and placement in or on land will trigger land disposal restrictions for the excavated waste or closure requirements for the unit in which the waste is being placed.	Materials containing RCRA hazardous wastes subject to land disposal restrictions are placed in another unit.	40 CFR 268.40	Potentially applicable	Applicable to disposal of soil containing land disposal restricted RCRA hazardous waste. The wastes generated from the response action at Site 17 of the IHDIV-NSWC may be RCRA hazardous wastes.
Waste pile	Use single liner and leachate collection system. Waste put into waste pile subject to land disposal restriction regulations.	RCRA hazardous waste, non-containerized accumulation of solid, nonflammable hazardous waste that is used for treatment or storage.	40 CFR 264.251 (except 251(j), 251(e)(11))	Relevant and appropriate	Wastes will not be managed in waste piles as part of the response action. at Site 17 of the IHDIV-NSWC. 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 (in-situ) management of wastes if wastes at Site 17 of the Indian Head Division, NSWC are determined to be RCRA hazardous wastes. May be relevant to active management of wastes which are sufficiently similar to hazardous wastes. Though no *in-sito* remedial actions are planned at Site 17.

TABLE B-1
Potential Federal Action-Specific ARARs
Site 17, Naval District Washington, Indian Head
EE/CA Evaluation

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Clean closure	Removal or decontamination of all waste residues, contaminated containment system components, contaminated subsoils, and structures and equipment contaminated with waste and leachate, and management of them as hazardous waste.	Surface impoundment, container of tank liners and hazardous waste residues, or contaminated soil (including soil from dredging or soil disturbed in the course of drilling or excavation) returned to land.	40 CFR 264.111 and 264.228 (a, b, e through k, m, o, p, q).	Potentially applicable	May be applicable if the excavated soil and/or sediment is determined to be a RCRA hazardous waste.
RCRA corrective action	An area at a RCRA facility may be designated as a corrective action management unit (CAMU). Placement of remediation wastes into or within a CAMU does not constitute land disposal of hazardous wastes nor creation of a unit subject to minimum technology requirements.	RCRA corrective action management unit.	40 CFR 264.552	Not applicable	Not an ARAR. No actions that would require designation of a CAMU are planned.
Placement of waste in land disposal unit	Attain land disposal treatment standards before putting waste into landfill in order to comply with land disposal restrictions.	Placement of RCRA hazardous waste in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, or underground mine or cave.	40 CFR 268.40	Potentially applicable	This requirement may apply if active disposal of RCRA restricted hazardous waste occurs as part of the response action at Site 17 IHDIV-NSWC.
Use of equipment that contacts hazardous waste with organic concentrations greater than 10 percent by weight	Air emission standards for process vents or equipment leaks.	Equipment that contains or contacts hazardous waste with organic concentrations of at least 10 percent by weight or process vents associated with specified operations the manage hazardous wastes with organic concentrations of at least 10 percent by weight.	40 CFR 264.1030 through 1034 (excluding 1030(c), 1033(j), 1034(c)(2), 1034 (d)(2)); 40 CFR 264.1050 through 1063 (excluding 1015(c), 1050(d), 1057(g)(2), 1061(d), 1063(d)(3)	Not applicable	Organic contaminants of concern are not present at suitably high levels at Site 17 .

TABLE B-1
Potential Federal Action-Specific ARARs
Site 17, Naval District Washington, Indian Head
EE/CA Evaluation

Action	Requirement	Prerequisite	Citation	ARAR 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 upper-most 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	The Site 17 IHDIV-NSWC is not a RCRA treatment, storage, or disposal facility.
Clean Water Act (CWA), 33 USC 1251 et seq.*					
Discharge to POTW	Pretreatment standards. Control the introduction of pollutants into POTWs so as to: prevent interference with the operation of a POTW; prevent pass through of pollutants through a treatment works; and improve opportunities to recycle and reclaim municipal and industrial wastewater and sludges.		40 CFR 403	Not an ARAR	Discharge to a POTW is not planned as part of the response action at Site 17 at IHDIV-NSWC.
Discharge of treatment system effluent	Best available technology. Use of Best Available Technology (BAT) economically achievable is required to control toxic and nonconventional pollutants. Use of best conventional pollutant control technology (BCT) is required to control conventional pollutants.	Point source discharge to waters of United States.	40 CFR 122.44(a)	Not an ARAR	Treatment system effluent is not planned as part of the response action at Site 17 .
Discharge of treatment system effluent (continued)	Best Management Practices. Develop and implement a Best Management Practice program to prevent the release of toxic constituents to surface waters.		40 CFR 125.100	Not an ARAR	Treatment system effluent is not planned as part of the response action at Site 17 .
	Monitoring Requirements. Discharge must be monitored to assure compliance. Comply with additional substantive requirements such as; mitigate any adverse effects of any discharge, and proper operation and maintenance of treatment systems.		40 CFR 122.41 (i), (j)	Not an ARAR	Treatment system effluent is not planned as part of the response action at Site 17 .

TABLE B-1
Potential Federal Action-Specific ARARs
Site 17, Naval District Washington, Indian Head
EE/CA Evaluation

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Clean Air Act (CAA) 40 USC 7401 et seq.*					
Operations generating pollution	Establishes requirements for the control of pollution from Federal facilities.	Operations generating pollution.	Section 118 of the CAA.	Not an ARAR	Response actions at Site 17 IHDIV-NSWC will not be generating these air emissions.
Discharge of Volatile Organic Compounds (VOCs) to air.	A prediction of total emissions of VOCs must be made to demonstrate that emissions do not exceed 450 lb/hr, 3,000 lb/day, 10 gal/day, or allowable emission levels from similar sources using Reasonably Available Control Technology (RACT).	Emissions of VOCs	40 CFR 52	Not an ARAR	Response actions at Site 17 IHDIV-NSWC will not be generating these air emissions.
Operations generating odors into the environment	Systems must be designed to provide an odor-free operation.	Operations generating odors into the environment.	Section 101 of the CAA, 40 CFR 52	Not an ARAR	Response actions at Site 17 IHDIV-NSWC will not be generating these air emissions.
Discharge to air	An Air Pollution Emission Notice (APEN) must be filed with the State of Virginia to include an estimation of emission rates for each pollutant expected.	Major sources of air pollutants	40 USC Section 7140; portions of 40 CFR 52.220	Not an ARAR	Response actions at Site 17 IHDIV-NSWC will not be generating these air emissions.
Discharge to air	Provisions of State Implementation Plan (SIP) approved by EPA under Section 110 of CAA.	Major sources of air pollutants	40 USC Section 7140; portions of 40 CFR 52.220	Not an ARAR	Response actions at Site 17 IHDIV-NSWC will not be generating these air emissions.
NAAQS Attainment areas	New major stationary sources shall apply best available control technology for each pollutant, subject to regulation under the Act, that the source would have potential to emit in significant amounts.	Major stationary sources as identified in 40 CFR 52.21(b)(1)(i)(a) that emits, or has the potential to emit, 100 tons per year or more of any regulated pollutant; any other stationary source that emits, or has the potential to emit, 250 tons per year or more of any regulated pollutant.	40 CFR 52.21(j) (CAA)	Not an ARAR	Response actions at Site 17 IHDIV-NSWC will not be generating these air emissions.
NAAQS non-Attainment areas	Source must obtain emission offsets in Air Quality Control Region of greater than one-to-one	Any stationary facility or source of air pollutants that directly emits, or has the potential to emit, 100 tons per year or more of any air pollutant (including any major emitting facility or source of fugitive emissions of any such pollutants).	CAA Part D, Section 173(1)	Not an ARAR	Response actions at Site 17 IHDIV-NSWC will not be generating these air emissions.
	Source subject to "lowest achievable emission rate (LAER)" as defined in 40 CFR 51.18(j)(xiii) All major stationary sources owned or operated by any person in the State are in compliance, or on a schedule for compliance, with all applicable emission standards.		CAA Part D, Section 173(2) CAA Part D, Section 173(3)		

TABLE B-1
Potential Federal Action-Specific ARARs
Site 17, Naval District Washington, Indian Head
EE/CA Evaluation

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Air Quality					
Emissions of mercury, vinyl chloride, and benzene	Requirements to verify that emissions of mercury, vinyl chloride, and benzene do not exceed levels expected from sources that are in compliance with hazardous air pollution regulation.	Emissions of mercury, vinyl chloride, and benzene from sources in compliance with hazardous air pollution regulation.	40 CFR 61	Not an ARAR	Response actions at Site 17 IHDIV-NSWC 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 descrip-tions, packages, containers, or motor vehicles used for transportation of hazardous materials.		49 CFR 171.2(g)	Potentially applicable	
Hazardous Materials Marking, Labeling, and Placarding	Each person who offers hazardous material for transportation or each carrier that transports it shall mark each package, container, and vehicle in the manner required.	Person who offers hazardous material for transportation; carries hazardous material; or packages, labels, or placards hazardous material.	49 CFR 172.300	Potentially applicable	To be determined. Substantive portions of these requirements would be ARARs for transport of hazardous materials onsite. Offsite transport of hazardous materials must comply with both substantive and administrative requirements.
	Each person offering non-bulk hazardous materials for transportation shall mark the proper shipping name and identification number (technical name) and consignee's name and address.		49 CFR 172.301	Potentially applicable	
	Hazardous materials for transportation in bulk packages must be labeled with proper identification (ID) number, specified in 49 CFR 172.101 table, with required size of print. Packages must remain marked until cleaned or refilled with material requiring other marking.	Person who offers hazardous material for transportation; carries hazardous material; or packages, labels, or placards hazardous material.	49 CFR 172.302	Potentially applicable	

TABLE B-1
Potential Federal Action-Specific ARARs
Site 17, Naval District Washington, Indian Head
EE/CA Evaluation

Action	Requirement	Prerequisite	Citation	ARAR 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	

TABLE B-1
Potential Federal Action-Specific ARARs
Site 17, Naval District Washington, Indian Head
EE/CA Evaluation

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
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 under-ground 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.
	A facility shall not cause a discharge of pollutants into waters of the U.S. that is in violation of the substantive requirements of the NPDES under CWA Section 402, as amended.		40 CFR 257.3-3(a)	Potentially applicable	See above comment.
	A facility shall not cause discharge of dredged material or fill material to waters of the U.S. that is in violation of the substantive requirements of CWA Section 404.		40 CFR 257.3-3	Not an ARAR	The response action at Site 17 at the IHDIV-NSWC will not include the disposal of dredge or fill material into the river.
	A facility or practice shall not cause nonpoint source pollution of waters of the U.S. that violates applicable legal substantive requirements implement-ing 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.

TABLE B-1
Potential Federal Action-Specific ARARs
Site 17, Naval District Washington, Indian Head
EE/CA Evaluation

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Solid Waste Disposal (continued)	The facility or practice shall not engage in open burning of residential, commercial, institutional, or industrial solid waste.	Not applicable to infrequent burning of agricultural wastes in the field, silvicultural wastes for forest management purposes, land clearing debris from emergency cleanup operations, and ordnance.	40 CFR 257.3-7(a)	Not an ARAR	No open burning is planned as part of The response action at Site 17 at the IHDIV-NSWC.
	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.
Occupational Safety and Health Administration (OSHA)					
Hazardous waste work	Requirements for hazardous waste workers such as training, personal protective equipment (PPE), and clothing must be met.	Hazardous waste work.	29 CFR 1904, 29 CFR 1910, 29 CFR 1926	Potentially Applicable Applicable	The remedial action at Site 17 at the IHDIV-NSWC 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 subtantive 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.

Appendix B-2
State of Maryland Action-Specific Applicable or Relevant and Appropriate Requirements

TABLE B-2
Potential State Action-Specific ARARs
Site 17, Naval District Washington, Indian Head
EE/CA Evaluation

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
State Action-Specific ARARs					
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 wastes must be met.	hazardous wastes.	COMAR 26.13.02, COMAR 26.13.04, Annotated Code of Maryland Title 7	Potentially Applicable	Any hazardous waste found during site remediation will be disposed of according to regulations. Any residues or by-products from treatment systems which are hazardous will be disposed of properly
Construction, Alteration, and Extension of Sanitary Landfills					
Altering, extending or constructing sanitary landfills, determination of permit requirements	Regulation and permitting for the material alteration of proposed and former sanitary landfills.	Disposal and radioactive substances.	COMAR 26.04.07.04	Potentially Applicable	The Drum Removal at Site 17 may be subject to the substantive portions of this regulation.
Disposal of Controlled Hazardous Substances-Radioactive Hazardous Substances					
Handling of radioactive hazardous substances	Provides for the disposal and transport radioactive hazardous substances (low- nuclear waste and low-level radioactive an appropriate manner.	Disposal and radioactive substances.	COMAR 26.15.02	Not an ARAR	Radioactive hazardous substances will not be disposed of or transported as part of the remedial actions at Site 17 IHDIV-NSWC.
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 and sediment for activities involving clearing, and grading and earth Erosion and sediment control criteria 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 or matter containing oil may not be dumped, spilled, drained, thrown, or near, or in an area likely to pollute the the State (surface and underground the boundaries of the State, including Chesapeake Bay and its tributaries, and lakes, rivers, streams, public ditches, drainage systems within the State other designed to collect, convey, or dispose sanitary sewer).	Disposal of oil or matter containing	COMAR 26.10.01.02, Annotated Code of Maryland Title 5	Not Applicable	Oil products are not anticipated to be present at Site 17 IHDIV-NSWC.
Air Quality					
Ambient Air Quality Control	Maintains the degree of purity of air protect the health, the general welfare, property of people of the State.	Action that will air quality	Annotated Code of Maryland Title 2	Applicable	These regulations are applicable at IHDIV-NSWC in connection with activities that move debris, soil, etc.

TABLE B-2
Potential State Action-Specific ARARs
Site 17, Naval District Washington, Indian Head
EE/CA Evaluation

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Air emissions	Provides State-adopted, National Air Quality Standards and Guidelines.	Action that will air quality	COMAR 26.11.03	Not an ARAR	Remedial actions at Site 17 IHDIV-NSWC will not be generating these air emissions.
Visible air emissions	Provides Emission Standards for Visible Air Emissions.	Action resulting in air emissions.	COMAR 26.11.06.02	Applicable	These regulations are applicable at Site 17 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, particulates.	Action that will emission of particulates.	COMAR 26.11.06.03	Applicable	These regulations are applicable at Site 17 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 VOCs.	Action that will emission of VOCs air, where the VOC has a vapor greater than 0.002 per square inch	COMAR 26.11.06.06	Not an ARAR	Remedial actions at Site 17 IHDIV-NSWC will not be generating these air emissions.
Nuisance Control	Prohibits nuisance or air pollution.	Action causing a or air pollution.	COMAR 26.11.06.08	Potentially Applicable	May be applicable for remedial actions at Site 17 IHDIV-NSWC, measures will be to mitigate impacts if needed.
Odor Control	May not cause or permit the discharge into the atmosphere of gases, vapors, odors beyond the property line in such manner that a nuisance or air pollution created.	Action causing nuisance, or air	COMAR 26.11.06.09	Not Applicable	Will not be applicable for remedial actions at Site 17 IHDIV-NSWC.
Emissions of Toxic Air Pollutants (TAPs) into the ambient air	Provides air quality standards, emission standards from construction activities, treatment technologies, and vents.		COMAR 26.11.15 COMAR 26.11.15.04 COMAR 26.11.15.05 COMAR 26.11.15.06 COMAR 26.11.15.07 COMAR 26.11.15.08 COMAR 26.11.15.11 COMAR 26.11.15.12 COMAR 26.11.15.13 COMAR 26.11.15.19.02(G)	Not an ARAR	Remedial actions at Site 17 IHDIV-NSWC 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. maximum permitted levels for activities may not exceed 90 dBA the day and 75 dBA during night.	Action that will noise.	COMAR 26.02.03.02A (2) and B(2), COMAR 26.02.03.02.03A, Annotated Code of Maryland Title 3	Applicable	During the site remediation work, the maximum allowable noise levels will not be exceeded at Site 17 IHDIV-NSWC boundaries.

ARAR - Applicable or relevant and appropriate requirement
TAP - Toxic Air Pollutant.
USTs - Underground Storage Tanks.
VOCs - Volatile Organic Compounds.

Appendix B-3
Federal Location-Specific Applicable or Relevant and Appropriate Requirements

TABLE B-3
Potential Federal Location-Specific ARARs
Site 17, Naval District Washington, Indian Head
EE/CA Evaluation

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
Federal Location-Specific ARARs					
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 archaeologic data.	Substantive requirements of 36 CFR 65; 16 USC 469	Not applicable	None of the remedial actions being considered forSite 17 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/invvestigation has not been performed at Site 17. 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 IHDIV-NSWC.
Historic Sites, Buildings, and Antiquities Act					
Historic sites	Avoid undesirable impacts on landmarks.	Areas designated as historic sites.	16 USC 461-467; 40 CFR 6.301 (a)	Not applicable	There are no historical structures located on Site 17 at IHDIV-NSWC. 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 habitit 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 IHDIV-NSWC.
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 IHDIV-NSWC. These requirements are applicable to any response actions that could result in unregulated "taking" of native birds.
Marine Mammal Protection Act					
Marine mammal area	Protects any marine mammal in the U.S. except as provided by international treaties from unregulated "take."	Presence of marine mammals.	16 USC 1372(2)	Not applicable	Marine mammals will not be encountered along the any waterways at IHDIV-NSWC. 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 IHDIV-NSWC are located in a federally owned wilderness area.
National Wildlife Refuge System					
Wildlife refuge	Only actions allowed under the provisions of 16 USC Section 688 dd(c) may be undertaken in areas that are part of the National Wildlife Refuge System.	Area designated as part of National Wildlife Refuge System.	16 USC 668; 50 CFR 27	Not applicable	Site 17 is not located in or adjacent to an area designated as part of the National Wildlife Refuge System.
Fish and Wildlife Coordination Act, Fish and Wildlife Improvement Act of 1978, Fish and Wildlife Conservation Act of 1980					
Area affecting stream or other water body	Provides protection for actions that would affect streams, wetlands, other water bodies or protected habitats. Any action taken should protect fish or wildlife.	Diversion, channeling or other activity that modifies a stream or other water body and affects fish or wildlife.	16 USC 661; 16 USC 662; 16 USC 742a; 16 USC 2901; 50 CFR 83	Applicable	Response actions will incorporate protection against any area water body, wetlands, or protected habitats.

TABLE B-3
Potential Federal Location-Specific ARARs
Site 17, Naval District Washington, Indian Head
EE/CA Evaluation

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 occuring in areas that meet the definition of a wetland. Due to the proximity of Mattawoman Creek to Site 17 at IHDIV-NSWC 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 occuring in areas that meet the definition of a wetland. Due to the proximity of Mattawoman Creek to Site 17 at IHDIV-NSWC and the presence of plant life associated with a nontidal wetland remedial activities would minimize the destruction, loss, or degradation of the wetlands.
Surface Water	Ambient Water Quality Criteria established to protect aquatic life and human consumers of water or aquatic life.	Activities that affect or may affect the surface water onsite	40 CFR 129	Relevant and appropriate	These regulations would be considered during the remedial action plan for Site 17 at IHDIV-NSWC 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 IHDIV-NSWC 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 IHDIV-NSWC.
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	IHDIV-NSWC is not located within a coastal barrier resource system.

TABLE B-3
Potential Federal Location-Specific ARARs
Site 17, Naval District Washington, Indian Head
EE/CA Evaluation

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 IHDIV-NSWC. 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 IHDIV-NSWC.
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 IHDIV-NSWC 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 IHDIV-NSWC 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 IHDIV-NSWC.
Executive Order 11988, Protection of Floodplains					
Within floodplain	Actions taken should avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values.	Action that will occur in a floodplain, i.e., lowlands, and relatively flat areas adjoining inland and coastal waters and other flood-prone areas.	40 CFR 6, Appendix A; excluding Sections 6(a)(2), 6(a)(4), 6(a)(6); 40 CFR 6.302	Applicable	The IHDIV-NSWC is on a 100-year flood zone, therefore the requirements of this regulation are applicable, measures will be taken to comply with applicable regulations.
Rivers and Harbors Act of 1972					
Navigable waters	Permits are required for structures or work affecting navigable waters.	Activities affecting navigable waters.	33 USC 403	Potentially Applicable	There are rivers classified as navigable at IHDIV-NSWC. Measures will be taken to ensure that there is no impact to the Potomac River.

ARARs - Applicable or relevant and appropriate requirements.
FR - Federal Register.
RCRA - Resource Conservation and Recovery Act.
HWCA - Hazardous Waste Control Act.
CFR - Code of Federal Regulations.
NAS - Naval Air Station.
CWA- Clean Water Act.
USC - United States Code.
DON - Department of Navy.
TBC - To Be Considered.
EO - Executive Order.

Appendix B-4
State of Maryland Location-Specific Applicable or Relevant and Appropriate Requirements

TABLE B-4
Potential State Location-Specific ARARs
Site 17, Naval District Washington, Indian Head
EE/CA Evaluation

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
State Location-Specific ARARs					
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 IHDIV-NSWC. However, 3 species of plant are on the Maryland State watchlist; Honeyvine, Lancaster's sedge, and Stellate sedge are present at IHDIV-NSWC 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 IHDIV-NSWC.
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, *Natural Resource Article*, Title 4 - Fish and Fisheries	Not applicable	There are no fish species at IHDIV-NSWC.
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, *Natural Resource Article*, Title 10 - Wildlife	Applicable	Wildlife species are present on the IHDIV-NSWC site. If response actions may affect these species, the requirements of this title are applicable.
Chesapeake Bay Critical Protection Law					
Area 1,000 feet landward from tidal waters of the Chesapeake Bay and its tributaries and land under these waters	Minimize impacts of the Bay water quality and to conserve plant, fish, and wildlife habitat.	Activities that will occur in the area 1,000 feet landward from tidal waters of the Chesapeake Bay and its tributaries and land under these waters.	Annotated Code of Maryland, *Natural Resource Article*, Title 8 - Waters, Subtitle 18 - Chesapeake Bay Area Critical Protection Program	Not applicable	IHDIV-NSWC does not meet the necessary geographic requirments.
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, *Environmental Article*, Title 5 - Water Resources	Relevant and Appropriate	This regulation may be an ARAR for activities occuring in areas that meet the definition of a wetland. Due to the proximity of Mattawoman Creek to Site 17 at IHDIV-NSWC and the presence of plant life associated with a nontidal wetland remedial activities would minimize the destruction, loss, or degradation of the wetlands.

TABLE B-4
Potential State Location-Specific ARARs
Site 17, Naval District Washington, Indian Head
EE/CA Evaluation

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
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, *Environmental Article*, Title 5 - Water Resources; Annotated Code of Maryland, *Environmental Article*, Title 16 - Wetlands and Riparian Rights	Not applicable	Tidal wetlands are not present at IHDIV-NSWC.
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, *Environmental Article*, Title 16 - Wetlands and Riparian Rights	Relevant and Appropriate	This regulation may be an ARAR for activities occuring in areas that meet the definition of a wetland. For instance Mattawoman Creek ,however no regulated actions at Site 17 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 flood-plains (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 IHDIV-NSWC (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, *Environment Article*, 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.
FR - Federal Register.
RCRA - Resource Conservation and Recovery Act.
HWCA - Hazardous Waste Control Act.
CFR - Code of Federal Regulations.
NAS - Naval Air Station.
CWA- Clean Water Act.
USC - United States Code.
DON - Department of Navy.
TBC - To Be Considered.
EO - Executive Order.

Appendix C
Detailed Cost Estimates for Removal Alternative

Table C-1
Cost Estimate for Site 17 Removal Action
Naval District Washington, Indian Head
Indian Head, Maryland

Item	Quantity	Unit	Unit Cost				Extended Cost (Unit Cost X Quantity)				Subtotal
			Subcontract	Material	Labor	Equipment	Subcontract	Material	Labor	Equipment	
1 MOBILIZATION/DEMOBILIZATION											
1.1 Storage Trailer 1	1	mo				$ 95.00	$ -	$ -	$ -	$ 95	$ 95
1.2 Construction Survey	0.8	ac	$ 1,175.00				$ 940	$ -	$ -	$ -	$ 940
1.3 Equipment Mobilization/Demobilization	1	ls				$ 5,400.00	$ -	$ -	$ -	$ 5,400	$ 5,400
1.4 Site Utilities	1	mo		$ 500.00			$ -	$ 500	$ -	$ -	$ 500
1.5 Decontamination Trailer 1	1	mo				$ 1,300.00	$ -	$ -	$ -	$ 1,300	$ 1,300
2 DECONTAMINATION											
2.1 Equipment Decon Pad 4	1	ls		$ 800.00	$ 1,000.00	$ 350.00	$ -	$ 800	$ 1,000	$ 350	$ 2,150
2.2 Decontamination Services (man-weeks) 2	4	wk		$ 840.00			$ -	$ 3,360	$ -	$ -	$ 3,360
2.3 Decon Water 1	2000	gal	$ 0.20				$ 400	$ -	$ -	$ -	$ 400
2.4 Decon Water and Storage Tank 1	1	mo				$ 641.30	$ -	$ -	$ -	$ 641	$ 641
2.5 PPE 3,4	20	day		$ 30.00			$ -	$ 600	$ -	$ -	$ 600
3 (a) EXCAVATION & DISPOSAL (Non-Hazardous)											
3.1 Clear, Grub, Chip Brush & Trees (level D) 1	1	ac			$ 4,406.00	$ 4,056.00	$ -	$ -	$ 4,406	$ 2,028	$ 6,434
3.2 UXO Technician for Excavation5,6	240	hr			$ 26.00		$ -	$ -	$ 6,240	$ -	$ 6,240
3.3 Backhoe Excavation, 2 cy (level D) 1	420.1	cy			$ 0.86	$ 1.12	$ -	$ -	$ 361	$ 471	$ 832
3.4 Ground Protection, 4 mil thick PE1	2000	sf		$ 0.12			$ -	$ 240	$ -	$ -	$ 240
3.5 Mechanical Screening3,5	1	mo				$ 3,500.00	$ -	$ -	$ -	$ 3,500	$ 3,500
3.6 Mechanical Screen Operator5,6	240	hr			$ 22.00		$ -	$ -	$ 5,280	$ -	$ 5,280
3.7 UXO Technician for Screening Process5,6	240	hr			$ 26.00		$ -	$ -	$ 6,240	$ -	$ 6,240
3.8 UXO Equipment Rental 3,5	20	day				$ 50.00	$ -	$ -	$ -	$ 1,000	$ 1,000
3.9 Removal/Excavation and Overpacking of 30 Drums5	1	ea	$ 75.00	$ 4,005.00	$ 6,977.75	$ 1,885.50	$ 75	$ 4,005	$ 6,978	$ 1,886	$ 12,943
3.11 Excavation Confirmatory Sampling & Testing, 24 hour turn-around-time (Pb, Hg, Zn only)7,8	10	ea	$ 700.00	$ 20.00	$ 200.00	$ 100.00	$ 7,000	$ 200	$ 2,000	$ 1,000	$ 10,200
3.12 Drum Characterization Sampling7	2	hr			$ 71.67		$ -	$ -	$ 143	$ -	$ 143
3.13 Drum Characterization (TCLP, Reactivity, Ignitability, Corrosivity)7	3	ea	$ 922.66				$ 2,768	$ -	$ -	$ -	$ 2,768
3.14 Decon water disposal	2000	gal	$ 0.41				$ 820	$ -	$ -	$ -	$ 820

Table C-1
Cost Estimate for Site 17 Removal Action
Naval District Washington, Indian Head
Indian Head, Maryland

Item	Quantity	Unit	Unit Cost				Extended Cost (Unit Cost X Quantity)				Subtotal
			Subcontract	Material	Labor	Equipment	Subcontract	Material	Labor	Equipment	
4 STOCKPILING											
4.1 Purchase and Spread Gravel for Site 11 Access Road1,10,11	450	sy		$ 5.95	$ 0.33	$ 0.63	$ -	$ 2,678	$ 149	$ 284	$ 3,110
4.2 Geotextile for Liner and Cover1,9	450	sy		$ 1.50	$ 0.20		$ -	$ 675	$ 90	$ -	$ 765
4.3 Staked Hay Bales for Berm 1	40	ea		$ 2.08	$ 0.25	$ 0.50	$ -	$ 83	$ 10	$ 20	$ 113
4.4 Front-End Loader for Loading Excavated Soil to Dump Truck1	420.1	cy			$ 0.20	$ 0.25	$ -	$ -	$ 84	$ 105	$ 189
4.5 Haul Excavated Soil to Site 11, 22 CY Dump, 1000 ft R/T1,10	420.1	cy			$ 0.28	$ 1.64	$ -	$ -	$ 118	$ 689	$ 807
5 Drum Removal and Disposal											
5.1 Disposal of Drums by Subcontrator7	30	ea	$ 115.00				$ 3,450	$ -	$ -	$ -	$ 3,450
6 SITE RESTORATION											
6.1 Purchase Fill 1	450	cy		$ 6.75			$ -	$ 3,038	$ -	$ -	$ 3,038
6.2 Haul Fill in 20 cy Trucks, 25 mile R/T 1	450	cy	$ 11.25				$ 5,063	$ -	$ -	$ -	$ 5,063
6.3 Place/Spread Fill with Dozer 1	450	cy			$ 0.51	$ 1.87	$ -	$ -	$ 230	$ 842	$ 1,071
6.4 Compact Fill, 6" lift w/2 passes 1	450	cy			$ 0.05	$ 0.16	$ -	$ -	$ 23	$ 72	$ 95
6.5 Place/Grade with Dozer 1	450	cy			$ 0.51	$ 1.87	$ -	$ -	$ 230	$ 842	$ 1,071
6.6 Fertilizer/Push and Seeding (native grasses) 1	1	ac		$ 459.00	$ 86.00	$ 106.00	$ -	$ 459	$ 86	$ 106	$ 651
6.7 Straw Mulch, hand spread 1" deep 1	4840	sy		$ 0.52	$ 0.44		$ -	$ 2,517	$ 2,130	$ -	$ 4,646
7 MISC. SITE WORK											
7.1 Silt Fence 1	400	lf		$ 0.50	$ 0.35		$ -	$ 200	$ 140	$ -	$ 340
7.2 Remove Silt Fence	400	lf			$ 0.35		$ -	$ -	$ 140	$ -	$ 140
Subtotal			$ 3,000	$ 6,671	$ 12,820	$ 17,492	$ 20,515				**$ 96,574**

Table C-1
Cost Estimate for Site 17 Removal Action
Naval District Washington, Indian Head
Indian Head, Maryland

Item	Quantity	Unit	Unit Cost				Extended Cost (Unit Cost X Quantity)				Subtotal
			Subcontract	Material	Labor	Equipment	Subcontract	Material	Labor	Equipment	
Subtotal Direct Costs Less Subcontract							$ 20,515	$ 19,354	$ 36,076	$ 20,629	$ 96,574
Overhead on Labor Cost @ 30%									$ 10,823		$ 10,823
G & A on Labor Cost @ 10%									$ 3,608		$ 3,608
G & A on Material Cost @ 10%								$ 1,935			$ 1,935
							$ 20,515	$ 21,289	$ 50,506	$ 20,629	$ 92,424
Total Direct Cost											
Indirects on Total Direct Labor Cost @ 75%									$ 37,879		$ 37,879
Profit on Total Direct Cost @ 10%											$ 9,242
											$ 139,546
Subtotal											
Health & Safety Monitoring @ 3% on Direct Labor											$ 4,186
											$ 143,732
Total Field Cost											
Subtotal Subcontractor Cost							$ 20,515				$ 20,515
G & A on Subcontract Cost @ 10%							$ 2,052				$ 2,052
Profit on Subcontractor Cost (see note below) @ 5%							$ 1,026				$ 1,026
(Note: Excludes landfilling t &d cost)											$ 23,593
Contingency on Total Field and Subcontractor Costs @ 50% 12											$ 83,663
Engineering and project management on total cost @ 10%											$ 16,733
TOTAL COST											
Removal with Stockpiling											**$ 267,720**
Upper Limit of Cost Accuracy13	150	%									**$ 401,580**
Lower Limit of Cost Accuracy13	70	%									**$ 187,404**

Notes:

1 RS Mean, Site Work & Landscape Cost Data (2000)

2 Cost quote from Waste Management Inc.

3Assumed 4 weeks (20 days) for completion

4 Engineers's Estimate

5Cost estimate provided by Shaw Environmental

6Assumed 12 hour days (240 hours total)

7 Average Small Business Rates (BOA) for MD

8Assumed 5 samples from each excavated area (1 from each sidewall, 1 from the bottom) for a total of 10 samples from the two excavation areas.

9Assumed soil stockpile spread to a nominal height of 2 feet

10Assumed excavated soil will be transported directly from Site 17 to Site 11 using an access road (to be constructed) rather than establish roads around the base

11Access road is 200' x 20' x 0.5' made of 3/4" stone

12 50% contigency on drum removal due to unknown vertical/horizontal extent of subsurface drums.

13Cost estimate accurate to within -30%/+50%

Project# 831866

Site 17
Drum Removal & Overpacking

Labor	Rate	OT	Hours	Total
Foreman	$ 31.00	$ 46.50	33	$ 1,100.50
Eq Operator V	$ 27.00	$ 40.50	33	$ 958.50
Health & Safety Officer	$ 42.00	$ 63.00	33	$ 1,491.00
Field Serv. Tech	$ 24.00	$ 36.00	33	$ 852.00
Field Serv. Tech	$ 24.00	$ 36.00	33	$ 852.00
				$ 5,254.00

Per Diems	Diem	Lodging	Days	Daily
Eq Operator	$ 34.00	$ 64.50	3.5	$ 344.75
Foreman	$ 34.00	$ 64.50	3.5	$ 344.75
Health & Safety Officer	$ 34.00	$ 64.50	3.5	$ 344.75
Field Serv. Tech	$ 34.00	$ 64.50	3.5	$ 344.75
Field Serv. Tech	$ 34.00	$ 64.50	3.5	$ 344.75
				$ 1,723.75

Shaw Equipment	Rate		Days	
LEL 3 Gas Meter	$ 94.50	/wk	1	$ 94.50
Photoionization Detector	$ 92.00	/wk	1	$ 92.00
Pickup 4x4	$ 41.00	/day	4	$ 164.00
Pickup 4x4	$ 41.00	/day	4	$ 164.00
				$ 514.50

Rental Equipment	unit rate		units	
Skid Loader	$ 132.00	/day	3	$ 396.00
Mobe/Demobe Loader	$ 75.00	/trip	2	$ 150.00
Tracked Excavator	$ 175.00	/day	3	$ 525.00
Mobe/Demobe Excav.	$ 150.00	/trip	2	$ 300.00
				$ 1,371.00

Materials & ODC's	unit rate		units	
Overpacks	$ 111.00	/ea	30	$ 3,330.00
FOGMA	$ 75.00	LS	1	$ 75.00
Level C Protection	$ 60.00	man-day	10	$ 600.00
				$ 4,005.00

Subcontractors	unit rate		units	
Overpack Disposal	$ 550.00	/ea		
Express Shipping	$ 75.00	LS	1	$ 75.00
Analytical	????	/ea		
				$ 75.00

COST SUMMARY		
Labor	***$***	***5,254.00***
Per Diem	***$***	***1,723.75***
Shaw Equipment	***$***	***514.50***
Rental Equipment	***$***	***1,371.00***
Materials & ODC's	***$***	***4,005.00***
Subcontractors	***$***	***75.00***
	$	***12,943.25***

Notes:

1)Costs for sampling and analysis need to be included.
2)Specific costs for disposal need to be included.
3)Estimate assumes 30 overpacks can be completed in 2.5 10-hour days using a small tracked excavator and a skid loader.
4)No soil disposal or backfilling is included.
5)The work will not involve Level B personnal protection.
6)It is assumed that the drum area is accessable with the equipment listed above and no significant access improvements will be required.
7)Labor hours include 4 hours for mobilization and 4 hours for demobilization.