N00174.AR.001456
NSWC INDIAN HEAD
5090.3a

FINAL RECORD OF DECISION SITE 38 NSWC INDIAN HEAD MD
3/1/2014
TETRA TECH

RECORD OF DECISION

Site 38 – Rum Point Landfill
at
Naval Support Facility, Indian Head
Indian Head, Maryland

March 2014

TABLE OF CONTENTS

TABLES

FIGURES

ACRONYMS AND ABBREVIATIONS

ARAR	Applicable or relevant and appropriate requirement
BTAG	Biological Technical Assistance Group
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
COC	Chemical of concern
COMAR	Code of Maryland Regulations
COPC	chemicals of potential concern
DoN	Department of the Navy
EPA	United States Environmental Protection Agency
ERA	Ecological Risk Assessment
ER,N	Environmental Restoration, Navy
FS	Feasibility Study
HI	Hazard Index
HQ	Hazard Quotient
IAS	Initial Assessment Study
ILCR	Incremental lifetime cancer risk
IR	Installation Restoration
LUC	Land use control
MDE	Maryland Department of the Environment
MEC	Munitions and explosives of concern
mg/kg	milligrams per kilogram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPW	Net Present Worth
NSF-IH	Naval Support Facility Indian Head
O&M	Operation and maintenance
PAH	Polycyclic aromatic hydrocarbon
RAB	Restoration Advisory Board
RAO	Remedial action objective
RBC	Risk Based Concentrations
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SSL	Soil Screening Level
SSP	Site Screening Process
SVOC	Semivolatile organic compound

SRE	Streamlined Risk Evaluation
TAL	Target Analyte List
TCL	Target Compound List
Tetra Tech	Tetra Tech NUS, Inc.
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
VOC	Volatile organic compound

1.0 DECLARATION

1.1 SITE NAME AND LOCATION

Site 38 – Rum Point Landfill at Naval Support Facility Indian Head (NSF-IH) Maryland
United States Environmental Protection Agency (EPA) Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) ID number MD7170024684.

1.2 STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the Selected Remedy for Site 38 (see Figure 1-1), which was chosen by the Navy and EPA in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on information contained in the Administrative Record for the site. The Maryland Department of the Environment (MDE) concurs with the Selected Remedy.

1.3 ASSESSMENT OF SITE

The response action selected in this ROD is necessary to protect the public health and welfare or the environment from actual or threatened releases of hazardous substances, pollutants, or contaminants into the environment. A CERCLA action is required because concentrations of manganese in shallow groundwater and arsenic and benzo(a)pyrene in surface soil pose unacceptable risk to human health under a residential exposure scenario. There is also potentially unacceptable risk associated with exposure to buried landfill waste.

1.4 DESCRIPTION OF SELECTED REMEDY

The major components of the Selected Remedy for Site 38 include:

- Debris and landfill waste removal.
- Land use controls (LUCs) to prevent use of shallow groundwater at the site.
- Long-term monitoring of shallow groundwater to confirm that groundwater contamination is attenuating and not migrating from the site.
- Five-year reviews until site conditions allow for unlimited use and unrestricted exposure.

Through the removal of landfill contents and use of LUCs, the Selected Remedy will eliminate potential future unacceptable risk associated with exposure to landfill waste and potable use of groundwater within and adjacent to the boundaries of the landfill and will also address the potential risks associated with exposure to buried landfill material. Exposure to soil, surface water, sediment, and groundwater beyond the landfill boundaries is not associated with unacceptable risk. The Selected Remedy is expected to achieve substantial long-term risk reduction and to be protective under the current and reasonably anticipated future use of the site. This ROD documents the final remedial action for Site 38 and does not include or affect any other sites at the facility. Implementation of this remedy will allow industrial/commercial use of the site, which is consistent with the current use and overall cleanup strategy for NSF-IH of restoring sites to support base operations.

FIGURE 1-1. SITE LOCATION MAP

1.5 STATUTORY DETERMINATIONS

The Selected Remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. Although manganese concentrations in shallow groundwater at the landfill may pose an unacceptable risk to a hypothetical future resident, the contamination is expected to attenuate such that the groundwater will be suitable for potable use in the future. The Selected Remedy does not satisfy the statutory preference for remedies that use treatment as a principal element to reduce the toxicity, mobility, or volume of hazardous substances, pollutants, and contaminants. Treatment was deemed impractical because of the heterogeneous nature of waste materials and contaminants at Site 38, the relatively low concentrations and inert nature of the contaminants, and the fact that the only potential for risk is from exposure to surface soil on the landfill and shallow groundwater within and adjacent to the footprint of the landfill under a hypothetical future residential exposure scenario.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on site in excess of levels that would allow for unlimited use and unrestricted exposure, a statutory review will be conducted within 5 years of initiation of the remedial action and every 5 years thereafter (until such levels are achieved) to ensure that the remedy is, or will be, protective of human health and the environment.

1.6 ROD DATA CERTIFICATION CHECKLIST

The locations in Section 2.0, Decision Summary, of the information required to be included in the ROD are summarized in Table 1-1. Additional information can be found in the Administrative Record file for NSF-IH.

TABLE 1-1. ROD DATA CERTIFICATION CHECKLIST

DATA	LOCATION IN ROD
Contaminants of concern (COCs) and their respective concentrations	Sections 2.5 and 2.7
Baseline risk represented by the COCs	Section 2.7
Cleanup levels established for COCs and the basis for these levels	Section 2.7 and 2.8
How source materials constituting principal threats are addressed	Section 2.11
Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the risk screening	Section 2.6
Potential land and groundwater uses that will be available at the site as a result of the Selected Remedy	Section 2.12.3
Estimated capital, operating and maintenance (O&M), and total net present worth (NPW) costs; discount rate; and number of years over which the remedy costs are projected	Appendix A
Key factors that led to the selection of the remedy	Section 2.12.1

1.7 AUTHORIZING SIGNATURES

Peter R. Nette

P. R. Nette
Captain, U. S. Navy
Commanding Officer
NSA South Potomac

9 MAY 14
Date

Cecil Rodrigues

Cecil A. Rodrigues, Director
Hazardous Site Cleanup Division
U.S. EPA - Region III

5/22/2014
Date

2.0 DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND BRIEF DESCRIPTION

NSF-IH, EPA CERCLIS ID number MD7170024684, is located in northwestern Charles County, Maryland, and consists of the Main Installation on Cornwallis Neck Peninsula and the Stump Neck Annex on Stump Neck Peninsula, both on the Potomac River. NSF-IH was established in 1890 and is the Navy's oldest continuously operating ordnance station. At various times during its operation, NSF-IH has served as a gun and armor proving ground, powder factory, propellant plant, and research facility. Current uses included operations and training; maintenance and utilities; research, development, and testing and evaluation; explosives storage; supply and non-explosives storage; administration; community facilities and services; housing; and open space.

Site 38 is located in the eastern portion of Stump Neck Annex west of Rum Point Road (Figure 1-1). The landfill was intended for disposal of biodegradable waste and has been inactive since December, 1989. The date when waste disposal began is not known, and little is known about the site history. Ash from a thermal treatment tank may have been disposed of at the site on a one-time basis. Wastes observed on the landfill surface include scrap metal, tires, wood, and concrete construction debris.

NSF-IH is an active facility, and environmental investigations and remediation at the base are funded under the Environmental Restoration, Navy (ER,N) program. The Navy is the lead agency for CERCLA activities at the facility, and EPA and MDE are support agencies.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

Table 2-1 provides brief summaries of previous investigations at Site 38. Results of these investigations indicated that elevated concentrations of metals were present in shallow groundwater and that elevated concentrations of metals and semivolatile organic compounds (SVOCs) were present in surface soil at the site. The nature and extent of contamination is discussed in Section 2.5.

TABLE 2-1. PREVIOUS INVESTIGATIONS AND SITE DOCUMENTATION

INVESTIGATION	DATE	ACTIVITIES
Initial Assessment Study (IAS)	1983	A site visit during the IAS indicated the presence of metal parts in addition to biodegradable material such as wood on the surface of the site. The IAS did not include a recommendation concerning future actions at Site 38.
Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI)	1997	An RFI conducted at the site in 1997 reported that visible wastes included pieces of metal, rusted empty 55-gallon drums, tires, wood, and concrete construction debris. During the RFI, soil borings were installed and converted into six groundwater monitoring wells. Surface soil, subsurface soil, shallow groundwater, surface water, and sediment samples were collected.
Site Visit	2003	A site visit conducted in April 2003 in preparation for the Site 38 Site Screening Process (SSP) investigation verified that previously observed site conditions were essentially unchanged.
SSP Investigation	2005	The 2005 SSP investigation was conducted to identify the presence or absence of contamination at Site 38. The field investigation included collection of four surface soil, six unfiltered, shallow groundwater, six filtered groundwater, four surface water, and four sediment samples. Surface soil samples were collected from the surface of the landfill, surface water and sediment samples were collected from two locations in the intermittent stream west of the landfill, and groundwater samples were collected from all monitoring wells and piezometers. All samples were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), TCL SVOCs, explosives, nitrocellulose, nitroglycerin, nitroguanidine, Target Analyte List (TAL) metals, hexavalent chromium, and cyanide.

TABLE 2-1. PREVIOUS INVESTIGATIONS AND SITE DOCUMENTATION		
INVESTIGATION	DATE	ACTIVITIES
Expanded SSP	2007	During the 2007 Expanded SSP investigation, four monitoring wells were installed, two upgradient of the landfill and two at the toe of the landfill slope. Groundwater samples, 10 filtered and unfiltered, were collected from all new and existing monitoring wells and piezometers. All samples were analyzed for TCL VOCs, TCL SVOCs, explosives, nitrocellulose, nitroglycerin, nitroguanidine, TAL metals, hexavalent chromium, and cyanide. The Expanded SSP recommended the development of a Feasibility Study (FS).
Geophysical Survey	2009	A geophysical survey was conducted across Site 38 in December 2009 to further define the limits of waste. In general, the data indicated that the fill was predominantly placed on the slope, which confirmed the predicted limits of waste disposal at the site. The landfill area was estimated at 96,000 square feet, with an estimated depth of 8 to 16 feet below ground surface.
FS	2013	Remedial alternatives that could permanently and significantly reduce potential inherent risk associated with landfill wastes were developed and evaluated. Test trenching conducted as part of the FS identified a smaller volume of waste at the site than previously estimated. In addition, no munitions and explosives of concern (MEC) were identified at the site.

There have been no cited violations under federal or state environmental law or any past or pending enforcement actions pertaining to Site 38.

2.3 COMMUNITY PARTICIPATION

The Navy performs public participation activities in accordance with CERCLA and the NCP throughout the site cleanup process at NSF-IH, and has established an Information Repository at three locations in the area of the base for dissemination of information to the community. The NSF-IH Information Repository can be accessed at:

- Indian Head Town Hall, 4195 Indian Head Highway, Indian Head, Maryland
- Charles County Public Library, 2 Garrett Avenue, LaPlata, Maryland
- NSF-IH, Building 620, 101 Strauss Avenue, Indian Head, Maryland

Documents and other relevant information relied on in the remedy selection process are available for public review at the Information Repositories, which include a copy of the Administrative Record. For access to the Administrative Record or additional information about the Installation Restoration Program at NSF-IH, contact Gary Wagner, Public Affairs Officer, 6509 Sampson Road, Code 00P, Dahlgren, Virginia, 22448, 540-653-1475, gary.wagner@navy.mil.

A Restoration Advisory Board (RAB) made up of community members and Navy, federal, and state officials was formed in 1994 and currently meets twice a year. The RAB is designed to act as a focal point for the exchange of information between NSF-IH and the local community regarding restoration activities at the base. The investigations at Site 38 have been discussed at RAB meetings in the past.

In accordance with Sections 113 and 117 of CERCLA, the Navy provided a public comment period from July 29, to August 28, 2013, for the proposed remedial action described in the Proposed Plan for Site 38. Public notice of the meeting and availability of documents was published in the Maryland Independent on July 26, 2013. A public meeting to present the Proposed Plan was held on August 21, 2013, at the Indian Head Senior Center, 100 Cornwallis Square, Indian Head, Maryland.

2.4 SCOPE AND ROLE OF OPERABLE UNIT

Site 38 is part of a comprehensive environmental investigation and cleanup program currently being performed at NSF-IH under CERCLA. The status of these sites can be found in the current version of the Site Management Plan, which is located in the Administrative Record. There are 56 Installation Restoration (IR)

sites in various stages of investigation or remediation at Indian Head. Remedial Investigations are underway for eight of these, one is undergoing a Site Screening Investigation, and six are in the Remedial/Removal Action phase and one is in the Remedial Design phase. Remedial Actions are complete on three sites where long-term monitoring is still required. There are eight sites that require no further action beyond LUCs but are included in Five-Year Reviews due to the presence of hazardous substances that remain at the site above levels that allow for unlimited use and unrestricted exposure. Previous investigations have determined that the remaining sites require no further action.

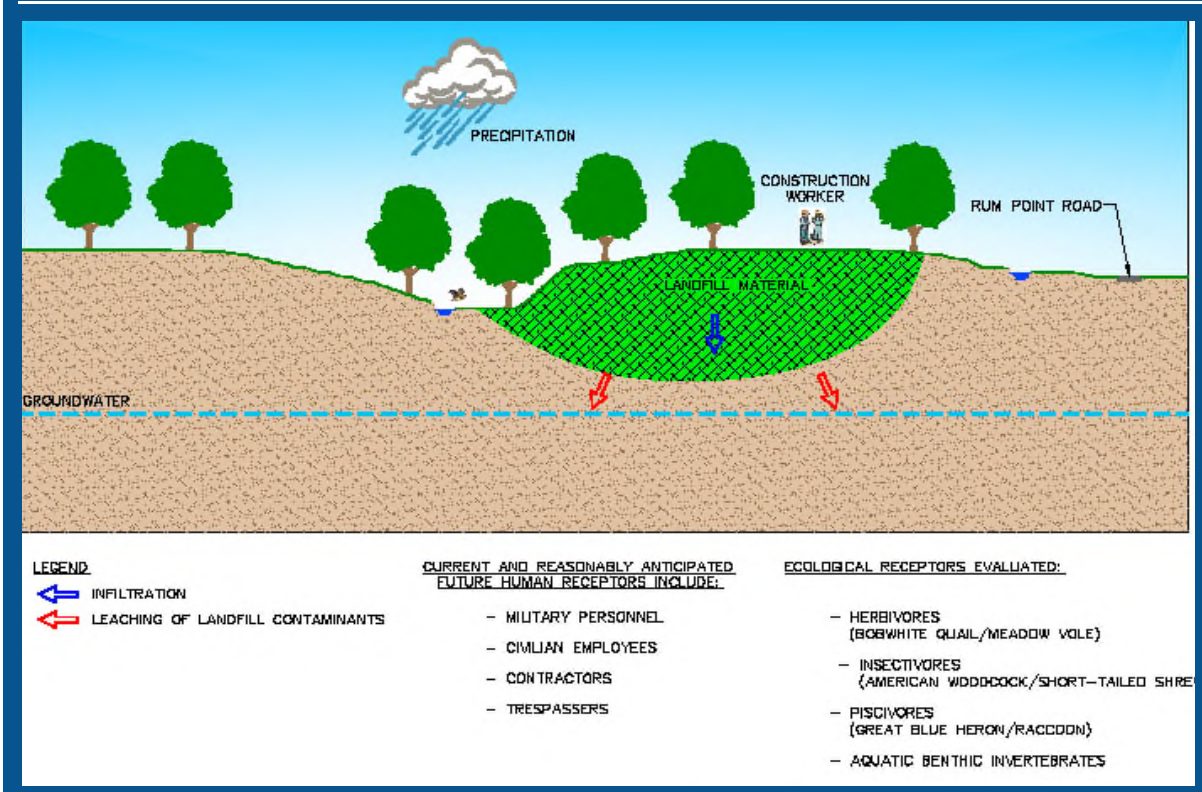
Investigations at Site 38 indicated the presence of surface soil contamination within the limits of the landfill and the presence of groundwater contamination that would pose unacceptable human health risk to hypothetical future receptors using groundwater within or adjacent to the landfill boundaries as a potable supply. In addition, there may be unacceptable risks from exposure to landfill waste. No previous actions have been taken in response to the contamination at Site 38. The remedy documented in this ROD will achieve the Remedial Action Objectives (RAOs) for Site 38, as listed in Section 2.8.

This is the only ROD contemplated for Site 38. Separate investigations and assessments are being conducted for the other IR sites at NSF-IH in accordance with CERCLA. Therefore, this ROD only applies to Site 38. Separate RODs or other CERCLA decision documents will be prepared for the other IR sites.

2.5 SITE CHARACTERISTICS

Figure 2-1 presents the Site 38 conceptual site model, which identifies contaminant sources, contaminant release mechanisms, transport routes, and receptors under current and future land use scenarios. The source of contamination at Site 38 is the landfill, and contaminant release and transport mechanisms include runoff to surface soil and sediment and vertical infiltration to groundwater. Human health and ecological receptors are discussed in Sections 2.7.1 and 2.7.2, respectively.

FIGURE 2-1. CONCEPTUAL SITE MODEL



2.5.1 Physical Characteristics

The surface of Site 38 is relatively flat and slopes steeply to the west, north, and northeast toward intermittent streams. The site covers an area of approximately 2 acres, and the surface of the site is mostly covered with grasses, with some trees present (Figure 2-2). The area surrounding the landfill is wooded, and trees have grown on the landfill slopes. Site observations indicate that the landfill was probably layered, with soil pushed south to north toward the toe of the landfill. Intermittent streams located west and northeast of the landfill join north of the site and flow toward Mattawoman Creek, which is located more than 2,000 feet north of Site 38. Precipitation either infiltrates into the soil or runs off into the intermittent streams. There are no obvious drainage channels on the surface or slopes of the landfill.

2.5.2 Nature and Extent and Fate and Transport of Contamination

The source of contamination at Site 38 is the landfill waste. Various organic [mainly polycyclic aromatic hydrocarbons (PAHs) in soil] and inorganic chemicals were detected in soil and groundwater samples from the site. Maximum concentrations of the PAHs benzo(a)anthracene [920 milligrams per kilogram (mg/kg)], benzo(a)pyrene (1,400 mg/kg), benzo(b)fluoranthene (1,300 mg/kg) and indeno (1,2,3-cd)pyrene (1,200 mg/kg) were detected in excess of their applicable human health screening criteria (220 mg/kg). Maximum concentrations of the inorganics including arsenic (39.6 mg/kg) and chromium (113 mg/kg) were detected in subsurface soil in excess of their respective human health screening criteria (28.7 and 59.1 mg/kg, respectively). Manganese was detected in groundwater at a maximum concentration of 2,250 micrograms per liter (µg/L), in excess of the human health screening criteria of 730 µg/L. Human health and ecological risk screening evaluations were conducted as part of the SSP (Tetra Tech, 2009). Tables 4-4 thru 4-8 from the SSP with the surface soil, subsurface soil, groundwater, surface water and sediment data are provided in Appendix B.

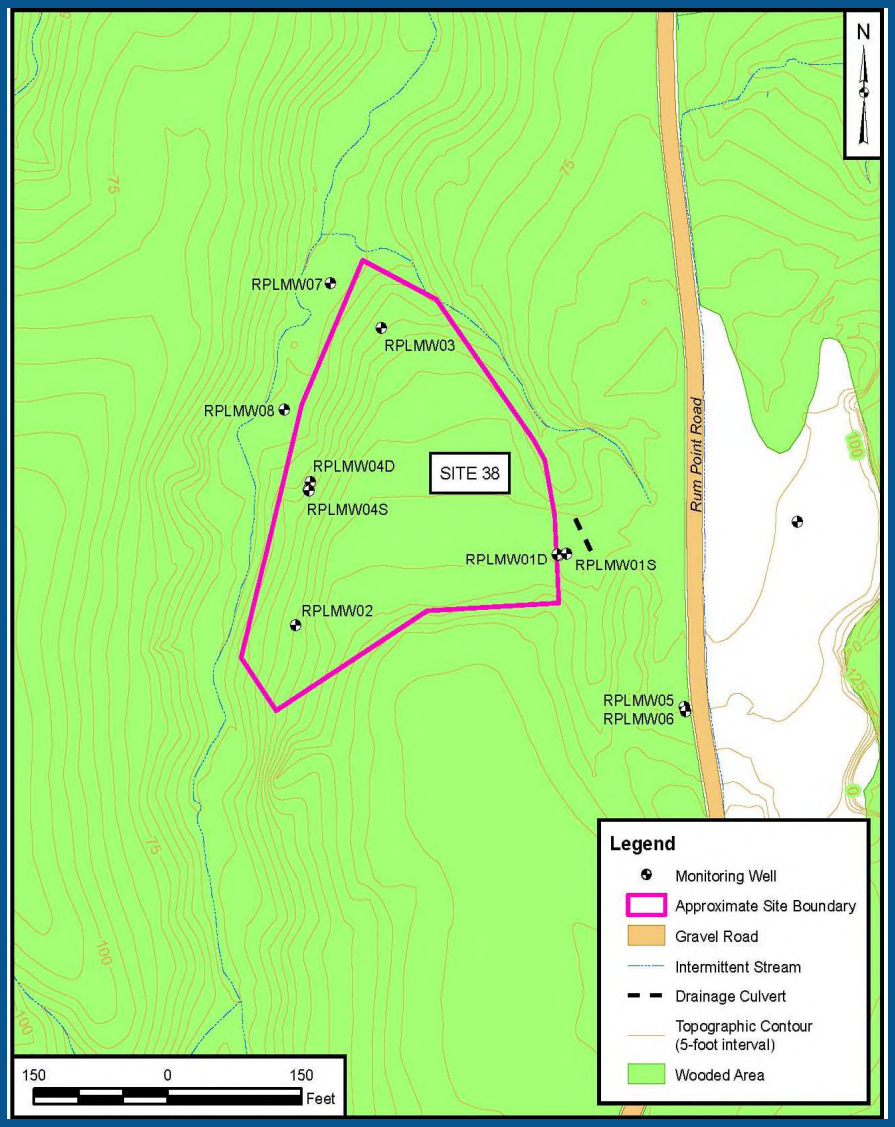
Inorganics are highly persistent and when released to the environment generally adsorb to the soil matrix and remain bound to particulate matter. In general, PAHs are also relatively persistent and preferentially adsorb to particulate matter. Because of this, these chemicals tend to migrate from source areas via bulk movement processes (e.g., transport by wind erosion of small particles, groundwater flow), and if dissolving/leaching from sources occur, it usually results in movement over relatively short distances.

2.6 CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

NSF-IH has been an active military facility since 1890 and is expected to remain active for the foreseeable future. Current military uses include operations and training; maintenance and utilities; research, development, and testing and evaluation; explosives storage; supply and non-explosives storage; administration; community facilities and services; housing; and open space. The main tenant at NSF-IH is the Naval Explosive Ordnance Technology Center, and its mission is to provide Explosive Ordnance Disposal technology and logistics management and to develop war-essential elements of intelligence, equipment, and procedures.

Site 38 is currently open green space and is not scheduled for development or use. The unconfined shallow groundwater beneath the site is not used for any purpose. Contaminated groundwater was only detected beneath and immediately adjacent to the landfill, and the Navy has no plans to develop this resource in the future. The shallow unconfined groundwater at the site is not hydraulically connected to deeper aquifers that are the principal sources of water for domestic use at NSF-IH. It is unlikely that the site area will be developed for residential use because land use at NSF-IH is expected to be associated with explosives research, testing, and evaluation for the foreseeable future. Previous landfilling at the site is also a limiting factor for future residential development to the extent that waste remains.

FIGURE 2-2. SITE MAP



2.7 SUMMARY OF SITE RISKS

Risk evaluations estimate what risks a site would pose if no action were taken, provide the basis for taking action, and identify the contaminants and exposure pathways that need to be addressed by the remedial action. Human health and ecological risk screening evaluations were conducted as part of the SSP (Tetra Tech, 2009). The SSP was conducted in accord with EPA's guidance for conducting Streamlined Risk Evaluations (SRE), as described in, *inter alia*, *Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites*, February 1991 (OSWER Directive 9355. 3-11), EPA Publication 9203.1-02I, SACM Bulletins, *Presumptive Remedies for Municipal Landfill Sites*, April 1992, Vol. 1, No. 1, and February 1993, Vol. 2, No. 1 and *Application of the CERCLA Municipal Landfill Presumptive Remedy to Military Landfills,* (OSWER Directive 9355.0-67FS), EPA Publication 540/F-96/020, December, 1996. Based on current and anticipated future land use and the

location of the site, military personnel, civilian employees, contractors, and trespassers were considered the most likely human receptors. However, in order to evaluate risks presented by the site conservatively, risks were evaluated based on a hypothetical future residential exposure scenario, which is the most sensitive exposure scenario. The risk screening evaluation included a comparison of maximum detected concentrations in soil, groundwater, surface water, and sediment to EPA risk-based screening levels and estimation of incremental lifetime cancer risks (ILCRs) for carcinogens, and hazard indices (HIs) for non-carcinogens. The ILCRs and HIs were estimated as ratios of maximum concentrations to risk screening criteria. This limited risk evaluation method was performed as it was assumed from the beginning that the remedy would be landfill capping or removal, as separately required by Maryland environmental regulations. Either remedy would protect potential receptors including military personnel, civilian employees, contractors, and trespassers because either remedy would prevent exposure to site contaminants at unacceptable levels.

2.7.1 Summary of Human Health Risk

The quantitative human health risk screening evaluation was conducted using chemical concentrations detected in surface soil, groundwater, surface water, and sediment samples during the RFI and SSP. Key steps in the risk screening process included identification of chemicals of potential concern (COPCs), exposure assessment, toxicity assessment, and risk characterization. Tables summarizing data used in the human health risk screening evaluation and associated results are presented in Appendix B.

Identification of COPCs

Tables 4-9 through 4-13 from the SSP Report (included in Appendix B) present the contaminant concentrations used to determine the COPCs identified in surface soil, subsurface soil, groundwater, surface water, and sediment, respectively, at Site 38. For the human health risk screening evaluation conducted at Site 38, maximum detected concentrations were used to estimate exposure to and associated risk from each COPC. For each COPC, the table includes the range of detected concentrations, frequency of detection (i.e., the number of times the chemical was detected in samples collected at the site), and the concentration used for screening (maximum concentration).

Exposure Assessment

The exposure assessment defines and evaluates, quantitatively or qualitatively, the type and magnitude of human exposure to the COPCs. Potential human exposure to environmental media at Site 38 is expected to be limited. Based on the current and anticipated future land use and location of the site, military personnel, civilian employees, contractors, and trespassers are the most likely individuals exposed. However, to evaluate the site on a conservative basis, risks were evaluated based on a hypothetical future residential exposure scenario. For purposes of the risk screening analysis, maximum detected site concentrations were compared with the EPA Region 3 Risk-Based Concentrations (RBCs) for soil and tap water ingestion (for soil and sediment, and groundwater and surface water, respectively) and soil screening levels (SSLs) for inhalation (transfers from soil to air) were used to assess potential exposure to environmental media. The risk evaluation conservatively assumed that shallow groundwater and surface water would be used as sources of drinking water and also assumed residential exposure to surface soil and sediment in the intermittent stream west of the landfill.

Toxicity Assessment

Toxicity assessment involves identifying the types of adverse health effects caused by exposure to site COPCs and determining the relationship between the magnitude of exposure and the severity of adverse effects (i.e., dose-response relationship) for each COPC. Because only a risk screening evaluation (comparisons to RBCs) was conducted for Site 38, site-specific toxicity values were not derived, and the default toxicity values used to generate the residential soil and tap water RBCs were used to estimate risk.

Risk Characterization

During the risk characterization, the baseline risks (cancer risks and non-cancer hazards) at the site if no action was taken to address the contamination were conservatively estimated by dividing maximum concentrations by RBCs. For carcinogens, the ILCR was calculated for each COPC by dividing the maximum concentration by the RBC based on an ILCR of $1X10^{-6}$. The individual ILCRs were then added and compared to the EPA acceptable risk range of $1X10^{-6}$ to $1X10^{-4}$. A carcinogenic risk range of $1X10^{-6}$ to $1X10^{-4}$ means that between 1 in 1 million to 1 in 10,000 individuals exposed to contaminants present at the site would be expected to contract cancer as a result of that exposure. If the total ILCR is within or less than this range, no action is generally needed at a site based on potential carcinogenic risk. For non-carcinogens, the hazard quotient (HQ) was calculated for each COPC by dividing the maximum concentration by the RBC, the level at which no adverse health effects are anticipated to occur. An HQ of 1 would therefore indicate that no adverse health effects were anticipated. The individual HQs were added to calculate the HI, which was compared to the EPA acceptable level of 1. If the HI is less than this value, no action is needed based on potential non-carcinogenic hazards. The results of these calculations are presented in Table 4-14 from the SSP Report, included in Appendix B.

The estimated total ILCR for hypothetical future residents is $2.7X10^{-4}$, which is greater than the EPA acceptable risk range of $1X10^{-6}$ to $1X10^{-4}$. The estimated ILCR for exposure to soil is $1.7X10^{-4}$, and the primary risk drivers are benzo(a)pyrene (a PAH) and arsenic. Benzo(a)pyrene was detected at 1,400 micrograms per kilogram (µg/kg) in one surface soil sample, and arsenic was detected at an average concentration of 3.2 (mg/kg) in 12 surface soil samples. There were no unacceptable carcinogenic risks to human health associated with exposure to groundwater, surface water, or sediment at the site.

The estimated total cumulative HI is 5.87, which is greater than the EPA threshold of 1. Even when target organs were considered, the cumulative HIs for several target organs are greater than 1 for exposure to soil and groundwater. The primary risk driver for soil is arsenic, and the primary risk driver for groundwater is manganese. There are no unacceptable non-carcinogenic risks for exposure to surface water or sediment.

In summary, there is potential unacceptable risk to human health associated with exposure to chemicals in soil and groundwater under a hypothetical future residential exposure scenario. COCs include arsenic and benzo(a)pyrene in soil and manganese in groundwater.

2.7.2 Summary of Ecological Risk

The screening-level ecological risk assessment (ERA) was conducted in accordance with EPA guidance (EPA, 1997 and 1998) and Navy policy (DoN, 1999). Step 1 of the ERA consisted of pathway identification/problem formulation, and Step 2 included exposure assessment and calculation of risk based on conservative exposure assumptions. Step 3a involved refinement of the list of previously identified COPCs and recalculation of risks based on more realistic exposure assumptions. Ecological risks were evaluated using data from surface soil, surface water, and sediment samples; groundwater was not evaluated because ecological receptors are not directly exposed to this medium.

Analytical results from the SSP were first compared to conservative screening criteria to develop an initial list of COPCs. Soil screening values included EPA Ecological SSLs and Region 3 Biological Technical Assistance Group (BTAG) screening levels. Region 3 BTAG screening levels for freshwater were used as surface water screening values, and BTAG screening levels for freshwater sediment were used as sediment screening values. A chemical was selected as a COPC if its maximum site concentration exceeded the applicable screening criterion (concentrations of inorganics in surface soil and sediment were also compared to background concentrations). Ecological COPCs were identified in all media sampled based on the initial conservative evaluation (see Tables 4-15 through 4-17 from the SSP in Appendix B).

To further evaluate the identified COPCs, Step 3A of EPA's guidance entitled *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments – Interim Final* (EPA 540-R-97-006, June 1997) was conducted to reduce uncertainties associated with the conservative screening process. As part of this step, COPCs were evaluated with respect to alternative screening values, and other factors such as frequency of detection and spatial analyses were considered to provide a more realistic estimation of ecological risk. Also as part of COPC refinement, food-chain modeling was conducted to evaluate risks to wildlife (upper trophic-level receptors) from bioaccumulative chemicals detected in soil, surface water, and sediment. Representative receptors identified for Site 38 included herbivores (bobwhite quail and meadow vole), insectivores (American woodcock and short-tailed shrew), and piscivores (great blue heron and raccoon). Results are summarized in Table 4-18 through 4-21 from the SSP included in Appendix B.

Based on the results of COPC refinement evaluations, minimal risks to ecological receptors are expected. In surface soil, several chemicals were initially selected as COPCs because they were either detected at concentrations that exceeded their screening levels or because these did not have screening levels. However, impacts to plants and invertebrates from the chemicals are unlikely based on comparisons to benchmarks based on risks to plants and invertebrates.

A few chemicals were initially selected as COPCs in surface water because they were detected at concentrations that exceeded their respective screening levels in several samples. However, the concentrations of metals in the downstream samples do not appear to be site related because the greatest concentrations were detected at a location upstream of the landfill. Therefore, potential risks to aquatic organisms would not be related to site activities. Food-chain modeling results indicate that there are no unacceptable risks to wildlife from exposure to surface water.

Based on comparisons of chemical concentrations in sediment to various benchmarks, potential impacts to sediment invertebrates are not expected. Food-chain modeling results indicate that there are no unacceptable risks to wildlife from exposure to sediment.

Bases on these results, it was determined that there are no unacceptable ecological risks at Site 38.

2.7.3 Basis for Action

The response action selected in this ROD is necessary to protect human health and the environment and comply with Maryland solid waste management regulations regarding landfill closure. Unacceptable human health risks were estimated for exposure to arsenic and benzo(a)pyrene in soil and manganese in shallow groundwater under a hypothetical future residential exposure scenario.

2.8 REMEDIAL ACTION OBJECTIVES

RAOs are medium-specific goals that help to define the objective of the remedial actions to protect human health and the environment. RAOs can specify the COCs, potential exposure routes and receptors, and acceptable concentrations (i.e., cleanup levels) for a site and provide a general description of what the cleanup will accomplish. RAOs typically serve as the design basis for the remedial alternatives described in Section 2.8. The RAOs for Site 38 are:

- Close the landfill in a manner that protects human health and the environment in accordance with State of Maryland solid waste management regulations.
- Prevent unacceptable risks to human receptors from exposure to manganese in groundwater until groundwater conditions allow for unlimited use and unrestricted exposure
- Return groundwater to beneficial use to the extent practicable.

2.9 DESCRIPTION OF ALTERNATIVES

To address potential unacceptable human health risks associated with Site 38, a preliminary technology screening evaluation was conducted in the FS (Tetra Tech, 2013). The general response actions that were considered are presented in Table 2-2. In-situ treatment options for soil and waste were not considered based on the heterogeneous nature of the landfill contents and type of contamination at Site 38 (i.e., relatively low concentrations of benzo(a)pyrene and metals with relatively low toxicities). A cost effective and feasible treatment technology was not identified to address the levels of manganese identified in groundwater.

TABLE 2-2. GENERAL RESPONSE ACTIONS

GENERAL RESPONSE ACTION	PROCESS OPTIONS
No Action	None
Institutional Action	Groundwater and Surface Water Monitoring
	Physical Barrier
	Shallow Groundwater and Land Use Restrictions
Containment	Multimedia Cap
	Riprap Erosion Control
	Vegetative Erosion Control
Removal	Excavation
Disposal	On-Site Consolidation
	Off-Site Landfill

The technologies and process options retained after detailed screening were assembled into three alternatives. Consistent with the NCP, the no action alternative was evaluated as a baseline for comparison with other alternatives during the comparative analysis. Table 2-3 describes the major components and provides estimated costs for each remedial alternative identified for Site 38.

TABLE 2-3. SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED

ALTERNATIVE	COMPONENTS	DETAILS	COST
Alternative 1 – No Action *No action to address contaminated groundwater or landfill materials and no use restrictions*	None	No action.	**Capital: $0** **Time frame to achieve RAO:** Not applicable
Alternative 2 – Engineered Cap, LUCs, and Monitoring *Installation of a multilayer cap and implementation of LUCs to prevent exposure to and migration of landfill materials and contaminated groundwater*	Engineered Cap	Installation over 2.2 acres of a multilayer cap system including a synthetic geomembrane with vegetative stabilization on the final grade (in compliance with Code of Maryland Regulations (COMAR) 26.04.07.21).	**Capital**: $1,127,000 **30-Year NPW of O&M**: $514,000 **30-Year NPW:** $1,614,000 **Time frame**: ~3 months
	LUCs	Implementation of LUCs to prevent unauthorized excavation, residential development, and use of shallow groundwater.	
	Monitoring	Sampling to confirm that no groundwater contaminants are migrating from the site at unacceptable levels.	
	Five-Year Reviews	Site reviews to evaluate monitoring results and site status, to review laws, and to provide direction for further action if required to ensure continued protectiveness of the remedy.	
Alternative 3 – Landfill Removal, Monitoring, and LUCs *Excavation and off-site disposal of the entire landfill to eliminate all human health and environmental exposure pathways*	Landfill Removal	Removal of an estimated 4,100 cubic yards of waste, transportation to and disposal in an off-site, permitted, hazardous or non-hazardous waste landfill, and allowing the site to revert to forest. Waste removal will allow for unrestricted use of the site.	**Capital**: $1,672,000 **30-Year NPW of O&M**: $315,000 **30-Year NPW**: $1,987,000 **Time frame**: ~3 months
	LUCs	Implementation of LUCs to prevent use of shallow groundwater until groundwater conditions allow for unlimited use and unrestricted exposure.	

TABLE 2-3. SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED			
ALTERNATIVE	COMPONENTS	DETAILS	COST
	Monitoring	Sampling to confirm that groundwater contaminants are attenuating and that no contaminants are migrating from the site at unacceptable levels.	
	Five-Year Reviews	Site reviews to evaluate monitoring results and site status, to review laws, and to provide direction for further action if required to ensure continued protectiveness of the remedy.	

2.10 COMPARATIVE ANALYSIS OF ALTERNATIVES

Table 2-4 and subsequent text in this section summarize the comparison of the remedial alternatives with respect to the nine CERCLA evaluation criteria, which are categorized as threshold, primary balancing, and modifying, and are outlined in the NCP at 40 Code of Federal Regulations (CFR) 300.430(e)(9)(iii). Further information on the detailed comparison of remedial alternatives is presented in the Site 38 FS.

TABLE 2-4. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES		
CERCLA CRITERION	2 - ENGINEERED CAP, LUCS, AND MONITORING	3 - LANDFILL REMOVAL, MONITORING, AND LUCS
Overall Protection of Human Health and the Environment	●	●
Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)	●	●
Long-Term Effectiveness and Permanence	●	●
Reduction of Toxicity, Mobility, and Volume through Treatment	○	○
Short-Term Effectiveness	●	●
Implementability	●	●
Total Cost (Present Net Worth)	$1,614,000	$1,987,000
State Acceptance	●	●
Community Acceptance	●	●

● - Satisfies Criterion.
◐ - Partially Satisfies Criterion.
○ - Poorly Satisfies Criterion.

Threshold Criteria

Overall Protection of Human Health and the Environment. All of the alternatives, except Alternative 1, would provide adequate protection of human health, with Alternative 3 providing the greatest protection. Alternative 2 would require the implementation of LUCs that would restrict land use to ensure protection of human health and the environment while LUCs would be required under Alternatives 2 and 3 to restrict use of groundwater at the site. Because Alternative 1 does not meet this threshold criterion and would not achieve the RAOs, it will not be considered further in this analysis.

Compliance with ARARs. ARARs include any federal or state standards, requirements, criteria, or limitations determined to be legally applicable or relevant and appropriate to the site or remedial action. There are no chemical-specific ARARs associated with the site. Alternative 2 would comply with this ARAR. Alternatives 2 and 3 equally comply with all location-specific and action-specific ARARs, all of which are summarized in Appendix C. Principal ARARs applicable to the remedial action at Site 38 include restrictions under several federal statutes that limit excavation or other construction activities that affect wetlands or other water bodies, and which govern the handling of hazardous waste (to the extent present at the Site). The State of Maryland landfill closure requirement at COMAR Section 26.04.07.21 would apply to Alternative 2, which is compliant with this ARAR.

Primary Balancing Criteria

Long-Term Effectiveness and Permanence. Alternative 3 would be the most protective over the long term because the landfill waste would be removed from the site, although long-term monitoring would be required to evaluate the attenuation of groundwater contamination. Alternative 2 would be less effective in the long term because the landfill waste would remain on site, and LUCs would be needed to restrict land and groundwater use. Monitoring included under Alternative 2 would confirm the effectiveness of this alternative, determining whether contaminants are migrating off site at unacceptable levels and evaluating whether future action is required.

Implementation of Alternatives 2 and 3 would require that all existing vegetation be removed from the site. For Alternative 2, this would destroy the existing ecological habitat until the vegetation planted on the engineered cap became established. Following implementation of Alternative 3, the existing terrestrial habitat would revert to forest.

Reduction in Toxicity, Mobility, or Volume Through Treatment. None of the alternatives would use treatment to reduce the toxicity, mobility, or volume of hazardous substances.

Short-Term Effectiveness. There would be limited adverse impact on the community from implementation of Alternative 2, primarily through the delivery of construction materials to the site. For Alternative 3, hauling wastes off site would generate additional traffic. Although there would be a potential for spills during transport, all materials would be solids that could easily be placed back into the transport container.

Implementation of Alternatives 2 and 3 could have short-term impacts on the nearby surface water bodies. Erosion controls would be provided during earth-moving activities to prevent migration of soil off site and to the adjacent streams. Any dust generated during implementation of Alternatives 2 or 3 could be adequately controlled.

Implementability. Alternatives 2 and 3 are readily implementable. Equipment and services necessary to construct an engineered cap or for waste removal are readily available. Land and/or groundwater use restrictions could be strictly enforced because the site is located within a military facility.

Cost. The estimated present-worth cost is greatest for Alternative 3 at $1,987,000 and least for Alternative 2 at $1,614,000.

Modifying Criteria

State Acceptance. State involvement has been solicited throughout the CERCLA process. MDE has indicated its support for Alternatives 2 and 3; MDE concurs with the Selected Remedy (Appendix D).

Community Acceptance. Written questions received during the formal public comment period for the Proposed Plan and Navy responses are provided in Section 3.0. The questions raised at the public meeting on August 21, 2013, were general inquiries for informational purposes only; no objections to the proposed alternative were voiced.

2.11 PRINCIPAL THREAT WASTE

The NCP at 40 CFR 300.430(a)(1)(iii)(A) establishes an expectation that treatment will be used to address the principal threats posed by a site wherever practicable. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or that would present a significant risk to human health or the environment should exposure occur. A source material is a material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or air, or acts as a source for direct exposure. Contaminated groundwater generally is not considered to be a source material. There are no Principal Threat Wastes in any of the media at Site 38, and the contaminants onsite are not categorized as "highly toxic" or "highly mobile."

2.12 SELECTED REMEDY

2.12.1 Rationale for Selected Remedy

The Selected Remedy for Site 38 is Alternative 3 – Landfill Removal, Monitoring, and LUCs, which was selected because it provides the best balance of tradeoffs with respect to the nine evaluation criteria. Based on the results of investigations conducted, the Navy, EPA, and MDE have determined that this alternative will be protective of human health and the environment through removal of the landfill contents and by implementing groundwater use restrictions and monitoring as long as necessary.

The principal factors in the selection of this remedy included the following:

- It is the most effective solution that addresses the RAOs and can be implemented in a short time frame (approximately 3 months) while returning the site to its original condition.
- The remedy is consistent with the reasonably anticipated future use of the site.
- Landfill Removal (Alternative 3) is expected to allow for unlimited use and unrestricted exposure in the future, unlike Landfill Capping (Alternative 2).

2.12.2 Description of Selected Remedy

The Selected Remedy includes the removal of the landfill and instituting LUCs to protect human health by ensuring that there is no use of groundwater. Monitoring will be performed to confirm that groundwater contaminants are attenuating and not migrating off site at unacceptable levels. A cleanup goal of 320 µg/L has been established for manganese in site groundwater to ensure protection of human health.

The debris and landfill contents would be excavated, characterized, and transported off site for disposal at a permitted hazardous or non-hazardous waste landfill as appropriate. All of the waste encountered at the site is believed to be present above the water table, and it would not be difficult to excavate. All excavated material would be screened and inspected for MEC before it is transported off site. It is estimated that 4,080 cubic yards of materials would require excavation. The excavation would proceed until waste is no longer encountered, based on visual inspection of the material being excavated. Soil samples would then be collected from the excavated area to verify the adequacy of the removal and confirm that contaminants are not present in the subsurface soil. This soil sampling data will be used in human health and ecological risk assessments to determine if residual contamination is present in the soil at concentrations that present risk to human health and the environment. If unacceptable risks are identified, soil excavation will continue in those areas with elevated concentrations of contaminants. Soil sampling, risk evaluation, and soil excavation will then be repeated until human health and ecological risks are determined to be acceptable.

The site would not be backfilled following excavation, to return the area to the approximate elevation prior to use as a landfill. The site would be regraded to match the surrounding area. For cost estimation

purposes, it was assumed that only top soil and seeding would be required following excavation and regrading.

LUCs will be implemented within the Site 38 boundaries to prevent use of groundwater (refer to Figure 2-2). Consistent with the RAOs developed for the site, the specific performance objectives for the LUCs to be implemented at Site 38 are:

- To prohibit all uses of groundwater from beneath Site 38, including, but not limited to, human consumption, dewatering, irrigation, heating/cooling purposes, and industrial processes until contaminants at the site are at levels that allow for unlimited use and unrestricted exposure, unless prior written approval is obtained from the Navy, EPA, and MDE.

- To maintain the integrity of any existing or future monitoring or remediation system(s).

The following generally describes those LUCs that will be implemented at Site 38 to achieve the aforementioned LUC performance objectives:

- Incorporation of the LUCs and the associated site area into the facility's geographic information system.

- Incorporation of use restrictions into any real estate property documents (i.e., deeds or leases) associated with future sale or lease of the site.

- Annual inspections to ensure that there are no violations of these restrictions and to evaluate the effectiveness of the selected remedy. The Installation Commander will provide annual certification of the inspections to EPA and MDE.

- If a violation of the restrictions occurs, a description of the violation and the corrective actions to be taken to restore protectiveness will be reported to EPA and MDE.

LUCs will be required as long as groundwater contamination remains in place at the site. The Navy is responsible for implementing, maintaining, reporting on, and enforcing the LUCs described in this ROD. Although the Navy may later transfer these procedural responsibilities to another party by contract, property transfer agreement, or through other means, the Navy shall retain ultimate responsibility for the remedy integrity.

The LUC implementation actions including monitoring and enforcement requirements will be provided in an LUC RD that will be prepared by the Navy as the LUC component of the overall RD. Within 90 days of ROD signature, the Navy shall prepare and submit to EPA and MDE for review and comment (pursuant to those Primary Document review procedures stipulated in the FFA) the LUC RD for Site 38 that shall contain implementation and maintenance actions, including periodic inspections. The Navy will maintain, monitor, and enforce the LUCs according to the LUC RD. LUCs will be developed as part of the remedial design. Implementation of this remedy will require a survey of the site, annual visual inspections, and a five-year review with report preparation.

Monitoring of shallow groundwater will be conducted to confirm that groundwater contaminants are attenuating and that migration is not occurring at unacceptable levels. The removal of the landfill waste is expected to alter groundwater chemistry and reduce contaminant concentrations to levels suitable for unlimited use and unrestricted exposure. Monitoring would be performed until results confirm that there are no risks associated with its use (estimated 15 years). A long-term monitoring plan will be developed, with EPA and MDE concurrence, to finalize the sampling program. The long-term monitoring plan will include sampling locations, analytical parameters, and frequency. If contaminant levels in the groundwater do not decrease at a rate to achieve acceptable levels in a reasonable timeframe (estimated to be approximately 15 years), the Navy and EPA will evaluate whether the long-term monitoring program should be extended or this ROD should be amended to provide for an active remedy to ensure that cleanup goals are attained.

Five-Year Reviews will be required until such time that groundwater contaminants have attenuated and allow unlimited use and unrestricted exposure. Five year reviews will evaluate the protectiveness of the remedy and determine if additional action is necessary. These Five-year reviews are required because this alternative would allow groundwater contaminants to remain at the site in excess of levels that allow for unlimited use and unrestricted exposure.

2.12.3 Expected Outcomes of Selected Remedy

Through implementation of the selected remedy, the site will be suitable for unlimited use and unrestricted exposure. Land use controls will ensure protectiveness until groundwater contamination has achieved acceptable levels.

There are no anticipated socio-economic, community revitalization, or economic impacts associated with the Selected Remedy.

Table 2-5 describes how the Selected Remedy mitigates risk and achieves RAOs for Site 38.

TABLE 2-5. HOW SELECTED REMEDY MITIGATES RISK AND ACHIEVES RAOS

RISK	RAO	COMMENTS
Inherent risk from exposure to soil and landfill materials and migration of associated contaminants	Close the landfill in a manner that protects human health and the environment in accordance with the applicable and relevant federal and state requirements, including specifically State of Maryland solid waste management regulations.	Removal of the landfill contents will remove all direct exposure and contaminant migration risks.
Unacceptable risk from hypothetical future use of groundwater under a residential scenario	Close the landfill in a manner that protects human health and the environment in accordance with the applicable and relevant federal and state requirements.	LUCs will prevent exposure to groundwater contaminants by prohibiting groundwater use.
Unacceptable risk from hypothetical future use of groundwater under a residential scenario	Return groundwater to beneficial reuse to the extent practicable.	Removal of the landfill contents is expected to alter groundwater chemistry and reduce contaminant concentrations to acceptable levels.

Because groundwater contamination will remain at the site, LUCs are expected to be required until contaminant levels attenuate, which is anticipated within 15 years from implementation of the selected remedy.

2.13 STATUTORY DETERMINATIONS

In accordance with the NCP, the Selected Remedy meets the following statutory determinations:

- **Protection of Human Health and the Environment** – The Selected Remedy will protect human health by eliminating the potential for human exposure to landfill waste through dermal contact and exposure to groundwater within the landfill through ingestion and dermal contact.
- **Compliance with ARARs** – The Selected Remedy will comply with all associated ARARs.
- **Cost-Effectiveness** – The Selected Remedy is a cost-effective alternative that complies with all associated ARARs and protects human health and the environment.

- **Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable** – The Selected Remedy represents the maximum extent to which permanent solutions and alternative treatment technologies can be used in a practical manner at Site 38. Based on the type and volume of contamination at Site 38 (i.e., large volume of waste posing a relatively low long-term threat), no treatment alternatives were evaluated for the landfill contents in the FS (Tetra Tech, 2013). Implementing LUCs and monitoring provides the best balance of tradeoffs for long-term effectiveness and permanence with ease of implementation for reasonable cost.

- **Preference for Treatment as a Principal Element** – Treatment is not an element of the Selected Remedy at Site 38 because there are no principal threat wastes at the site, and the removal of the landfill waste combined with LUCs and monitoring provides the best balance of tradeoffs with respect to long-term effectiveness and permanence at a reasonable cost.

- **Five-Year Review Requirement** – Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on site in excess of levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within 5 years after initiation of remedial action and every 5 years thereafter to ensure that the remedy is, or will be, protective of human health and the environment.

2.14 DOCUMENTATION OF SIGNIFICANT CHANGES

CERCLA Section 117(b) requires an explanation of significant changes from the Selected Remedy presented in the Proposed Plan that was published for public comment. Several general questions were asked during the public meeting held on August 21, 2013, and formal comments were received from the public during the comment period. No significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

3.0 Responsiveness Summary

3.1 Stakeholder Comments and Lead Agency Responses

The 30-day public comment period for the Selected Remedy for Site 38 began on July 29, 2013, and ended on August 28, 2013. A public meeting was held on August 21, 2013, at the Indian Head Senior Center, 100 Cornwallis Square, Indian Head, Maryland, to accept oral and written comments on this decision. A summary of the oral and written comments received during the public comment period, and responses to those comments, are included as Appendix E.

3.2 Technical and Legal Issues

No technical or legal issues associated with the Site 38 ROD were identified.

References

Battelle Memorial Institute, 2010. Final User's guide: Guidance for Optimizing Remedy Evaluation, Selection, and Design. Prepared for Naval Facilities Engineering Command, Port Hueneme, California.

B&R Environmental, 1998. RCRA Facility Investigation/Verification Investigation Report for Stump Neck Annex, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland. Prepared for Engineering Field Activity Chesapeake, Naval Facilities Engineering Command, Washington Navy Yard, D.C. King of Prussia, Pennsylvania.

EPA (United States Environmental Protection Agency), 1988a. Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites. EPA/540/G-88-003, OSWER Directive 9283.1-2, Office of Emergency and Remedial Response, Washington, D.C.

EPA, 1988b. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. EPA/540/G-89/004, OSWER Directive 9355.3-01, Office of Emergency and Remedial Response, Washington, D.C.

EPA, 1995. Land Use in the CERCLA Remedy Selection Process. EPA/540/G-89-004, OSWER Directive 9355.3.01, Office of Emergency and Remedial Response, Washington, D.C.

EPA, 1996. Application of the CERCLA Municipal Landfill Presumptive Remedy to Military Landfills. EPA/540/F-96/020, OSWER Directive 9355.0-67FS, Office of Emergency and Remedial Response, Washington, D.C.

Hart (Fred C. Hart Associates), 1983. Initial Assessment Study, Naval Ordnance Station, Indian Head, Maryland. Prepared for Navy Assessment and Control of Installation Pollutants (NACIP) Department, Naval Energy and Environmental Support Activity, Port Hueneme, California. New York, New York.

Tetra Tech, 2008. Site Screening Process Report, Site 38 – Rum Point Landfill, Naval Support Facility, Indian Head, Maryland. Prepared for Naval Facilities Engineering Command Washington, Washington Navy Yard, D.C. King of Prussia, Pennsylvania.

Tetra Tech, 2013. Feasibility Study, Site 38 – Rum Point Landfill, Naval Support Facility, Indian Head, Maryland. Prepared for Naval Facilities Engineering Command Washington, Washington Navy Yard, D.C. King of Prussia, Pennsylvania.

Appendix A
Cost Estimate for Selected Remedy

NAVAL SUPPORT FACILITY - INDIAN HEAD
Indian Head, Maryland
Site 38 - Rum Point Landfill
Alternative 3: Landfill Removal with Land Use Controls
Capital Cost

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare LUC Documents	150	hr			$39.00		$0	$0	$5,850	$0	$5,850
1.2 Prepare Documents & Plans including Permits	300	hr			$39.00		$0	$0	$11,700	$0	$11,700
1.3 Prepare Monitoring Plan	120	hr			$39.00		$0	$0	$4,680	$0	$4,680
1.4 Completion Report	100	hr			$39.00		$0	$0	$3,900	$0	$3,900
2 MOBILIZATION AND DEMOBILIZATION											
2.1 Site Support Facilities (trailers, phone, electric, etc.	1	ls		$1,000.00		$3,500.00	$0	$1,000	$0	$3,500	$4,500
2.2 Equipment Mobilization/Demobilization	7	ea			$188.00	$566.00	$0	$0	$1,316	$3,962	$5,278
2.3 Utility Connection/Disconnection (phone/electric)	1	ls	$1,500.00				$1,500	$0	$0	$0	$1,500
3 FIELD SUPPORT											
3.1 Office Trailer	2	mo				$365.00	$0	$0	$0	$730	$730
3.2 Field Office Equipment, Utilities, & Support	2	mo		$508.00			$0	$1,016	$0	$0	$1,016
3.3 Storage Trailer	2	mo				$94.00	$0	$0	$0	$188	$188
3.4 Construction Layout Survey	5	day	$1,150.00				$5,750	$0	$0	$0	$5,750
3.5 Site Superintendent	45	day		$134.00	$480.00		$0	$6,030	$21,600	$0	$27,630
3.6 Site Health & Safety and QA/QC	45	day		$134.00	$360.00		$0	$6,030	$16,200	$0	$22,230
4 DECONTAMINATION											
4.1 Decontamination Services	2	mo		$1,250.00	$2,350.00	$1,550.00	$0	$2,500	$4,700	$3,100	$10,300
4.2 Equipment Decon Pad	1	ls		$5,500.00	$7,200.00	$3,540.00	$0	$5,500	$7,200	$3,540	$16,240
4.3 Decon Water	2,000	gal		$0.20			$0	$400	$0	$0	$400
4.4 Decon Water Storage Tank, 6,000 gallon	2	mo				$813.00	$0	$0	$0	$1,626	$1,626
4.5 Clean Water Storage Tank, 4,000 gallon	2	mo				$731.00	$0	$0	$0	$1,462	$1,462
4.6 Disposal of Decon Waste (liquid & solid)	2	mo	$990.00				$1,980	$0	$0	$0	$1,980
5 SITE PREPARATION											
5.1 Underground Utility Clearance	1	ls	$7,500.00				$7,500	$0	$0	$0	$7,500
5.2 Tree Chipper	3	day				$710.60	$0	$0	$0	$2,132	$2,132
5.3 Stump Chipper	3	day				$170.70	$0	$0	$0	$512	$512
5.4 Dozer, 200 hp	10	day			$372.40	$1,243.00	$0	$0	$3,724	$12,430	$16,154
5.5 Site Labor, (3 laborers)	30	day			$280.80		$0	$0	$8,424	$0	$8,424
5.6 UXO Technician	10	day		$134.00	$345.00		$0	$1,340	$3,450	$0	$4,790
5.7 Debris Removal & Disposal	40	ton	$56.00				$2,240	$0	$0	$0	$2,240
6 EXCAVATION AND DISPOSAL											
6.1 Excavator	20	day			$372.40	$1,652.00	$0	$0	$7,448	$33,040	$40,488
6.2 Dump Trucks (2)	40	day			$372.40	$1,271.00	$0	$0	$14,896	$50,840	$65,736
6.3 Loader (2)	40	day			$372.40	$960.00	$0	$0	$14,896	$38,400	$53,296
6.4 Dozer, 200 hp	20	day			$372.40	$1,243.00	$0	$0	$7,448	$24,860	$32,308
6.5 Screening Plant	20	day			$372.40	$614.10	$0	$0	$7,448	$12,282	$19,730
6.6 Site Labor, (3 laborers)	60	day			$280.80		$0	$0	$16,848	$0	$16,848
6.7 UXO Technician (2)	40	day		$134.00	$345.00		$0	$5,360	$13,800	$0	$19,160
6.8 Transportation and Disposal, Subtitle D	6,150	ton	$75.00				$461,250	$0	$0	$0	$461,250
7 SITE RESTORATION											
7.1 Topsoil, 6" thick	810	cy		$27.33			$0	$22,137	$0	$0	$22,137
7.2 Seed Cover	45	msf	$96.50				$4,343	$0	$0	$0	$4,343
7.3 Dozer, 200 hp	5	day			$372.40	$1,243.00	$0	$0	$1,862	$6,215	$8,077
7.4 Site Labor, (3 laborers)	15	day			$280.80		$0	$0	$4,212	$0	$4,212
Subtotal							$484,563	$51,313	$181,602	$198,819	$916,297

NAVAL SUPPORT FACILITY - INDIAN HEAD
Indian Head, Maryland
Site 38 - Rum Point Landfill
Alternative 3: Landfill Removal with Land Use Controls
Capital Cost

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
Overhead on Labor Cost @ 30%									$54,481		$54,481
G & A on Sub, Material, Labor, & Equipment Cost @ 10%							$48,456	$5,131	$18,160	$19,882	$91,630
Tax on Materials and Equipment Cost @ 6%								$3,079		$11,929	$15,008
Total Direct Cost							$533,019	$59,523	$254,243	$230,630	$1,077,415
Indirects on Total Direct Cost @ 20%	(excluding transportation and disposal cost)										$122,837
Profit on Total Direct Cost @ 10%											$107,741
Subtotal											$1,307,993
Health & Safety Monitoring @ 2%											$26,160
Total Field Cost											$1,334,153
Contingency on Total Field Costs @ 20%											$266,831
Engineering on Total Field Cost @ 5%											$66,708
TOTAL CAPITAL COST											**$1,667,692**

NAVAL SUPPORT FACILITY - INDIAN HEAD
Indian Head, Maryland
Site 38 - Rum Point Landfill
Alternative 3: Landfill Removal with Land Use Controls
Annual Cost

Item	Item Cost years 1 - 30	Item Cost every 5 years	Notes
Site Inspection	$6,586		Labor and supplies to visit site once a year to inspect Land Use Controls with Report
Monitoring Sampling	$7,500		Labor and supplies to collect samples from 4 wells, annually years 1-30.
Monitoring Sampling Analysis/Water	$1,680		Analyze groundwater samples for SVOCs, and inorganics including QA/QC cost.
Site Review		$23,000	Five-Year Site Reviews
SUBTOTAL	$15,766	$23,000	
Contingency @ 10%	$1,577	$2,300	
TOTAL	**$17,343**	**$25,300**	

NAVAL SUPPORT FACILITY - INDIAN HEAD
Indian Head, Maryland
Site 38 - Rum Point Landfill
Alternative 3: Landfill Removal with Land Use Controls
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate 2.0%	Present Worth
0	$1,667,692		$1,667,692	1.000	$1,667,692
1		$17,343	$17,343	0.980	$17,003
2		$17,343	$17,343	0.961	$16,669
3		$17,343	$17,343	0.942	$16,342
4		$17,343	$17,343	0.924	$16,022
5		$42,643	$42,643	0.906	$38,623
6		$17,343	$17,343	0.888	$15,400
7		$17,343	$17,343	0.871	$15,098
8		$17,343	$17,343	0.853	$14,802
9		$17,343	$17,343	0.837	$14,512
10		$42,643	$42,643	0.820	$34,982
11		$17,343	$17,343	0.804	$13,948
12		$17,343	$17,343	0.788	$13,675
13		$17,343	$17,343	0.773	$13,406
14		$17,343	$17,343	0.758	$13,144
15		$42,643	$42,643	0.743	$31,684
				TOTAL PRESENT WORTH	**$1,952,999**

CLIENT:	NAVAL SUPPORT FACILITY, INDIAN HEAD			JOB NUMBER:	112G02050.0000.1120
SUBJECT:	Site 38 - Rum Point Landfill				
BASED ON:				DRAWING NUMBER:	
BY:	TJR	CHECKED BY:	SMV	APPROVED BY:	DATE:
Date:	6-28-12	Date:	7-12-12		

Landfill Area & Volume

37,500 sf of landfill
4,100 cy landfill volume

Alternative 1: Capping and Land Use Controls

Capital Cost

Site Preparation

Clear & grub area, chip stumps, spread under cap: 37,500 sf
Regrade landfill with UXO Technician posted
Remove debris & surface landfill materials, disposal offsite: assume 40 tons
Proof-roll landfill

Landfill Cap

Geotextile, 8 oz.	37,500	sf
Gas management layer (6" thick) is the top of the interim grade:		
	37,500	sf
	0.5	ft
	18,750	cf or
	694	cy
Geotextile, 12 oz.	37,500	sf
Liner, 40 mil	37,500	sf
Geotextile, 12 oz.	37,500	sf
Drainage Layer, 12" thick	37,500	sf
	1	ft
	37,500	cf or
	1,389	cy
Common Fill, 18" thick	37,500	sf
	1.5	ft
	56,250	cf or
	2,083	cy
Topsoil, 6" thick	37,500	sf
	0.5	ft
	18,750	cf or
	694	cy
Seed, area + 15%	43	msf

CLIENT:	NAVAL SUPPORT FACILITY, INDIAN HEAD			JOB NUMBER:	112G02050.0000.1120
SUBJECT:	Site 38 - Rum Point Landfill				
BASED ON:				DRAWING NUMBER:	
BY:	TJR	CHECKED BY:	SMV	APPROVED BY:	DATE:
Date:	6-28-12	Date:	7-12-12		

Time to Complete

	days
Mobilization	5
Site prep	5
Earthwork	20
Liner/Geotextile Placement	5
Demob	5
	40 days
	2 months

Annual Cost

LUC Inspection/Report: Annually

Assume out of town travel to site for two days/two people.

Air	$1,400	
Car	$200	
Per Diem	$536	
Hours	$4,200	(60 hours * $70/hr)
Misc	$250	
	$6,586	

Monitoring Sampling (once a year)

Labor & Materials, per round (4 wells)

Assume 2 days to sample with 2 people, local plus 1 day of preparations

2 people @ $70.00 per hour for 10 hours per for 3 days =	$4,200
car for 3 days =	$300
report @ $75.00 per hour for 30 hours =	$2,250
IDW disposal =	$350
Misc supplies, copying, etc. =	$400
	$7,500

Analytical, per round for 30 years

Collect 4 samples and analyze for VOCs, SVOCs, & inorganics

type	cost each	number	total
VOCs	$110	4	$440
SVOCs	$150	4	$600
inorganics	$150	4	$600
			$1,640
		40% QA/QC & Data Validation	$656
			$2,296

Five Year Review Cost

Assume $23,000

CLIENT:	NAVAL SUPPORT FACILITY, INDIAN HEAD			JOB NUMBER:	112G02050.0000.1120
SUBJECT:	Site 38 - Rum Point Landfill				
BASED ON:				DRAWING NUMBER:	
BY:	TJR	CHECKED BY:	SMV	APPROVED BY:	DATE:
Date:	6-28-12	Date:	7-12-12		

Alternative 2: Landfill Removal and Land Use Controls

Capital Cost

Assumptions

UXO Technician posted at excavation area and at dewatering/screening area.
Excavation and disposal rate of 440 tons per day.
Water collected during excavation and dewatering activities to be returned to excavation after filtering.
Regrade remaining soil to provide positive drainage
Cover excavated area with 6 inches of topsoil.

Site Preparation

Clear area of trees & bushes, use chipped material for temporary roads.
Remove debris & disposal offsite: assume 40 tons
Construct screening area

Excavations & Disposal

Load soil onto trucks and haul to dewatering/screening pad (150' by 25').
Spread for visual screening and dry if necessary.
Once dry, mechanically screen material.
Dispose of material offsite in subtitle D landfill as non-hazardous.
All explosive materials to be removed by the Navy at no cost to the contractor.

Volume of material to be excavated:	4,100	cy
disposal at 1.5 tons per cy	6,150	tons
haul & dispose at 440 tons per day	14	days
additional time for screening excavated soil	6	days

Site Restoration

Cover area (1 acre) with 810 cy of topsoil
Seed area 45 msf

Time to Complete	days	
Mobilization	5	
Site prep	10	
Excavation/Screening/Disposal	20	
Site Restoration	5	
Demob	5	
	45	days
	2	months

CLIENT:	NAVAL SUPPORT FACILITY, INDIAN HEAD			JOB NUMBER:	112G02050.0000.1120
SUBJECT:	Site 38 - Rum Point Landfill				
BASED ON:				DRAWING NUMBER:	
BY:	TJR	CHECKED BY:	SMV	APPROVED BY:	DATE:
Date:	6-28-12	Date:	7-12-12		

Annual Cost

LUC Inspection/Report: Annually

Assume out of town travel to site for two days/two people.

Air	$1,400	
Car	$200	
Per Diem	$536	
Hours	$4,200	(60 hours * $70/hr)
Misc	$250	
	$6,586	

Monitoring Sampling (once a year)

Labor & Materials, per round (4 wells)

Assume 2 days to sample with 2 people, local plus 1 day of preparations

2 people @ $70.00 per hour for 10 hours per for 3 days =	$4,200
car for 3 days =	$300
report @ $75.00 per hour for 30 hours =	$2,250
IDW disposal =	$350
Misc supplies, copying, etc. =	$400
	$7,500

Analytical, per round for 15 years

Collect 4 samples and analyze for SVOCs & inorganics

type	cost each	number	total
SVOCs	$150	4	$600
inorganics	$150	4	$600
			$1,200
	40% QA/QC & Data Validation		$480
			$1,680

Five Year Review Cost

Assume $23,000

Appendix B
Analytical and Risk Screening Results

TABLE 4-4

SUMMARY OF POSITIVE DETECTIONS - SURFACE SOIL
SITE 38 - RUM POINT LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION	RPLCP01	RPLCP01	RPLCP01	RPLCP02	RPLCP03	RPLCP04	RPLSS01	RPLSS01	RPLSS01	RPLSS02
SAMPLE NUMBER	RPLCP0010101	RPLCP0010101-AVG	RPLCP0010101-D	RPLCP0020101	RPLCP0030101	RPLCP0040101	RPLSS0010101	RPLSS0010101-AVG	RPLSS0010101-D	RPLSS0020101
DEPTH RANGE (FEET)	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	7/31/1997	7/31/1997	7/31/1997	7/31/1997	7/31/1997	7/31/1997	7/11/1997	7/11/1997	7/11/1997	7/12/1997
Volatile Organics (µg/kg)										
4-METHYL-2-PENTANONE	6 U	6 U	6 U	3 J	6 U	6 U	5 U	5 U	5 U	6 U
ACETONE	70 J	46.5	23 J	11 U	11 U	23 J	41 B	11 U	11 U	58 B
METHYLENE CHLORIDE	14 B	14 B	14 B	9 B	20 B	22 B	5 U	5 U	2 B	6 U
TOLUENE	6 U	6 U	6 U	6 U	6 U	6 U	5 U	5 U	5 U	6 U
TRANS-1,2-DICHLOROETHENE	6 U	6 U	6 U	6 U	6 U	1 J	5 U	5 U	5 U	6 U
TRICHLOROETHENE	6 U	6 U	6 U	6 U	1 J	6 U	5 U	5 U	5 U	6 U
Semivolatile Organics (µg/kg)										
ACENAPHTHENE	370 U	370 U	370 U	38 J	370 U	380 U	350 UJ	350 UJ	350 UJ	390 UJ
ACENAPHTHYLENE	370 U	370 U	370 U	600	370 U	380 U	350 UJ	350 UJ	350 UJ	390 UJ
ANTHRACENE	370 U	370 U	370 U	170 J	370 U	380 U	350 UJ	350 UJ	350 UJ	390 UJ
BENZALDEHYDE										
BENZO(A)ANTHRACENE	370 U	370 U	370 U	920	370 U	380 U	350 UJ	350 UJ	350 UJ	390 UJ
BENZO(A)PYRENE	370 U	370 U	370 U	1400 J	370 UJ	380 UJ	350 UJ	350 UJ	350 UJ	390 UJ
BENZO(B)FLUORANTHENE	370 U	370 U	370 U	1300 J	370 UJ	380 UJ	350 UJ	350 UJ	350 UJ	390 UJ
BENZO(G,H,I)PERYLENE	370 U	37 J	37 J	1500 J	370 UJ	380 UJ	350 UJ	350 UJ	350 UJ	390 UJ
BENZO(K)FLUORANTHENE	370 U	370 U	370 U	970 J	370 UJ	380 UJ	350 UJ	350 UJ	350 UJ	390 UJ
BIS(2-ETHYLHEXYL)PHTHALATE	370 U	370 U	370 U	370 U	370 U	380 U	350 UJ	350 UJ	350 UJ	96 J
CHRYSENE	370 U	370 U	370 U	970	370 U	380 U	350 UJ	350 UJ	350 UJ	390 UJ
FLUORANTHENE	370 U	370 U	370 U	1000	370 U	380 U	350 UJ	350 UJ	350 UJ	390 UJ
FLUORENE	370 U	370 U	370 U	96 J	370 U	380 U	350 UJ	350 UJ	350 UJ	390 UJ
INDENO(1,2,3-CD)PYRENE	370 U	370 U	370 U	1200	370 U	380 U	350 UJ	350 UJ	350 UJ	390 UJ
NAPHTHALENE	370 U	370 U	370 U	40 J	370 U	380 U	350 UJ	350 UJ	350 UJ	390 UJ
PHENANTHRENE	370 U	370 U	370 U	440	370 U	380 U	350 UJ	350 UJ	350 UJ	390 UJ
PYRENE	370 U	370 U	370 U	1800	59 J	380 U	350 UJ	350 UJ	350 UJ	390 UJ
Explosives (mg/kg)										
NITROCELLULOSE										
Inorganics (mg/kg)										
ALUMINUM										
ANTIMONY	0.76 B	0.79 B	0.82 B	0.72 B	1.2 B	0.88 B	0.31 L	0.21 L	0.21 UL	0.31 L
ARSENIC	6.2 K	5.85 K	5.5 K	2.8 K	4.2 K	3.7 K	1.9	1.19	0.96 B	2.5
BARIUM	18.4	18.35	18.3	28.9	40.9	42.7	16.0	15.25	14.5	18.6
BERYLLIUM	0.42	0.38	0.34	0.19	0.21	0.20	0.26	0.235	0.21	0.32
CADMIUM	0.12 U	0.12 U	0.12 U	0.15 K	0.14 U	0.14 U	0.22 K	0.185 K	0.15 K	0.33 K
CALCIUM										
CHROMIUM	24.9 K	23.7 K	22.5 K	13.3 K	16.5 K	18.4 K	8.2 J	7.05	5.9 J	10.3 J
COBALT	2.7	2.95	2.6	4.5	4.6	3.2	1.8	1.75	1.7	1.6
COPPER	10.0	8.35	6.7	12.9	11.3	9.4	2.7 B	2.35 B	2.0 B	3.3 B
IRON										
LEAD	7.2 K	7.1 K	7.0 K	20.3 K	20.1 K	14.7 K	7.8 J	6.05	4.3 J	9.3 J
MAGNESIUM										
MANGANESE										
MERCURY	0.06	0.055	0.05	0.31	0.03	0.05	0.02	0.02	0.02	0.07
NICKEL	4.9	4.6	4.3	8.2	8.7	5.5	3.7	3.8	3.9	5.2
POTASSIUM										
SELENIUM	1.1 L	0.985	0.87 L	0.42 L	0.53 L	0.74 L	0.48	0.39	0.30	0.63

TABLE 4-4

SUMMARY OF POSITIVE DETECTIONS - SURFACE SOIL
SITE 38 - RUM POINT LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION	RPLCP01	RPLCP01	RPLCP01	RPLCP02	RPLCP03	RPLCP04	RPLSS01	RPLSS01	RPLSS01	RPLSS02
SAMPLE NUMBER	RPLCP0010101	RPLCP0010101-AVG	RPLCP0010101-D	RPLCP0020101	RPLCP0030101	RPLCP0040101	RPLSS0010101	RPLSS0010101-AVG	RPLSS0010101-D	RPLSS0020101
DEPTH RANGE (FEET)	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	7/31/1997	7/31/1997	7/31/1997	7/31/1997	7/31/1997	7/31/1997	7/11/1997	7/11/1997	7/11/1997	7/12/1997
Inorganics (mg/kg) (continued)										
THALLIUM	0.83 B	0.57 B	0.31 B	0.24 U	0.28 U	0.37 B	0.43 B	0.23 U	0.23 U	0.29 U
VANADIUM	30.6	28.45	26.3	21.4	28.9	31.5	13.5	11	8.5	12.5
ZINC	19.5 J	18.45	17.4 J	28.2 J	30.7 J	32.0 J	11.7 J	10.95	10.2 J	14.8 J
Miscellaneous Parameters (mg/kg)										
CYANIDE										

B - Detected in blank; false positive.
J - Estimated.
K - Biased high.
L - Biased low.
U - Not detected.
UJ - Not detected; est. detection limit.

TABLE 4-4

SUMMARY OF POSITIVE DETECTIONS - SURFACE SOIL
SITE 38 - RUM POINT LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND
PAGE 3 OF 4

LOCATION	RPLSS03	RPLSS04	RPLSS04	RPLSS04	S38SS005	S38SS006	S38SS007	S38SS008	S38SS008	S38SS008
SAMPLE NUMBER	RPLSS0030101	RPLSS0040101	RPLSS0040101-AVG	RPLSS0040101-D	S38SS0050102	S38SS0060102	S38SS0070102	S38SS0080102	S38SS0080102-AVG	S38SS0080102-D
DEPTH RANGE (FEET)	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	7/12/1997	7/15/1997	7/15/1997	7/15/1997	6/22/2005	6/22/2005	6/22/2005	6/22/2005	6/22/2005	6/22/2005
Volatile Organics (µg/kg)										
4-METHYL-2-PENTANONE	6 UJ	6 U	5.5 U	5 U	12 U	12 U	17 U	14 U	14 U	14 U
ACETONE	2200	80 B	85 B	90 B	8 J	12 U	120 J	14 U	14 U	14 U
METHYLENE CHLORIDE	2 B	7 B	7 B	7 B	12 U	4 J	17 U	14 U	5 J	5 J
TOLUENE	6 UJ	2 J	2 J	5 U	12 U	12 U	17 U	1 J	1 J	14 U
TRANS-1,2-DICHLOROETHENE	6 UJ	6 U	5.5 U	5 U	12 U	12 U	17 U	14 U	14 U	14 U
TRICHLOROETHENE	6 UJ	6 U	5.5 U	5 U	12 U	12 U	17 U	14 U	14 U	14 U
Semivolatile Organics (µg/kg)										
ACENAPHTHENE	390 UJ	400 UJ	380 UJ	360 UJ	390 U	430 U	470 U	460 U	465 U	470 U
ACENAPHTHYLENE	390 UJ	400 UJ	380 UJ	360 UJ	390 U	430 U	470 U	460 U	465 U	470 U
ANTHRACENE	390 UJ	400 UJ	380 UJ	360 UJ	390 U	430 U	470 U	460 U	465 U	470 U
BENZALDEHYDE					390 U	61 J	110 J	89 J	82.5 J	76 J
BENZO(A)ANTHRACENE	390 UJ	400 UJ	380 UJ	360 UJ	390 U	430 U	470 U	460 U	465 U	470 U
BENZO(A)PYRENE	390 UJ	400 UJ	380 UJ	360 UJ	390 U	430 U	470 U	460 U	465 U	470 U
BENZO(B)FLUORANTHENE	390 UJ	400 UJ	380 UJ	360 UJ	390 U	430 U	470 U	460 U	465 U	470 U
BENZO(G,H,I)PERYLENE	390 UJ	400 UJ	380 UJ	360 UJ	390 U	430 U	470 U	460 U	465 U	470 U
BENZO(K)FLUORANTHENE	390 UJ	400 UJ	380 UJ	360 UJ	390 U	430 U	470 U	460 U	465 U	470 U
BIS(2-ETHYLHEXYL)PHTHALATE	390 UJ	400 UJ	380 UJ	360 UJ	170 B	530	200 B	68 B	184 B	300 B
CHRYSENE	390 UJ	400 UJ	380 UJ	360 UJ	390 U	430 U	470 U	460 U	465 U	470 U
FLUORANTHENE	390 UJ	400 UJ	380 UJ	360 UJ	390 U	430 U	470 U	460 U	465 U	470 U
FLUORENE	390 UJ	400 UJ	380 UJ	360 UJ	390 U	430 U	470 U	460 U	465 U	470 U
INDENO(1,2,3-CD)PYRENE	390 UJ	400 UJ	380 UJ	360 UJ	390 U	430 U	470 U	460 U	465 U	470 U
NAPHTHALENE	390 UJ	400 UJ	380 UJ	360 UJ	390 U	430 U	470 U	460 U	465 U	470 U
PHENANTHRENE	390 UJ	400 UJ	380 UJ	360 UJ	390 U	430 U	470 U	460 U	465 U	470 U
PYRENE	390 UJ	400 UJ	380 UJ	360 UJ	390 U	430 U	470 U	460 U	465 U	470 U
Explosives (mg/kg)										
NITROCELLULOSE					2.5 L	2.7 L	1.1 J	2.3 L	1.505 L	0.71 J
Inorganics (mg/kg)										
ALUMINUM					2720	3890	3090	3670	3260	2850
ANTIMONY	0.26 UL	0.52 B	0.545 B	0.57 B	0.36 B	0.36 UL	0.38 B	0.45 B	0.445 B	0.44 B
ARSENIC	1.8	3.1	3.55	4.0	2.6	2.3	2.4	5.9	5.05	4.2
BARIUM	12.5	21.7	23.7	25.7	23.6	31.3	24	22.7	19.6	16.5
BERYLLIUM	0.1 B	0.39 K	0.40 K	0.41 K	0.29	0.31	0.30	0.57	0.495	0.42
CADMIUM	0.25 K	0.13 U	0.125 U	0.12 U	0.12	0.09	0.10	0.17	0.095	0.039 U
CALCIUM					2250	2050	1310	1990	1740	1490
CHROMIUM	9.6 J	20.4	21.2	22.0	10.4	7.1	10.9	22.4	20	17.6
COBALT	0.84	2.7	2.9	3.1	1.3	2.9	1.3 B	1.2 B	1.03 B	0.86 B
COPPER	4.5 B	3.4 B	3.45 B	3.5 B	5.4 B	8.1 B	6.2 B	5.4 B	5.05 B	4.7 B
IRON					5030	5870	5790	12800	11315	9830
LEAD	3.5 J	5.3 K	4.9 K	4.5 K	24.8	23.9	18.8	16.3	14.75	13.2
MAGNESIUM					541	653	548	853	748.5	644
MANGANESE					199 K	266 K	140 K	363 K	305.5 K	248 K
MERCURY	0.08	0.01 B	0.02 B	0.03 B	0.054 U	0.053 U	0.062 U	0.056 U	0.058 U	0.06 U
NICKEL	2.2	5.9	6.35	6.8	4.1 K	7.9 K	4.2 K	7.9 K	6.75 K	5.6 K
POTASSIUM					755	388	654	1580	1380	1180
SELENIUM	0.65	0.64	0.695	0.75	0.49 U	0.53 U	0.57 U	0.60 U	0.595 U	0.59 U

TABLE 4-4

SUMMARY OF POSITIVE DETECTIONS - SURFACE SOIL
SITE 38 - RUM POINT LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND
PAGE 4 OF 4

LOCATION	RPLSS03	RPLSS04	RPLSS04	RPLSS04	S38SS005	S38SS006	S38SS007	S38SS008	S38SS008	S38SS008
SAMPLE NUMBER	RPLSS0030101	RPLSS0040101	RPLSS0040101-AVG	RPLSS0040101-D	S38SS0050102	S38SS0060102	S38SS0070102	S38SS0080102	S38SS0080102-AVG	S38SS0080102-D
DEPTH RANGE (FEET)	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	7/12/1997	7/15/1997	7/15/1997	7/15/1997	6/22/2005	6/22/2005	6/22/2005	6/22/2005	6/22/2005	6/22/2005
Inorganics (mg/kg) (continued)										
THALLIUM	0.28 U	0.52 B	0.46 K	0.66 K	0.32 U	0.36 U	0.38 U	0.40 U	0.395 U	0.39 U
VANADIUM	13.6	21.5	23.75	26.0	13.9	12.8	16	20.6	18.2	15.8
ZINC	7 J	19.4	21.25	23.1	21.6	28.8	19.2 B	28.3	24.75	21.2
Miscellaneous Parameters (mg/kg)										
CYANIDE					0.84	0.13 U	0.14 U	0.17	0.16	0.15

B - Detected in blank; false positive.
J - Estimated.
K - Biased high.
L - Biased low.
U - Not detected.
UJ - Not detected; est. detection limit.

TABLE 4-5

SUMMARY OF POSITIVE DETECTIONS - SUBSURFACE SOIL
SITE 38 - RUM POINT LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION	RPLSB01	RPLSB01	RPLSB01	RPLSB01	RPLSB02	RPLSB02	RPLSB02	RPLSB03	RPLSB03	RPLSB04	RPLSB04	RPLSB04
SAMPLE NUMBER	RPLSB0010101	RPLSB0010201	RPLSB0010301	RPLSB0010401	RPLSB0020101	RPLSB0020201	RPLSB0020301	RPLSB0030101	RPLSB0030201	RPLSB0040101	RPLSB0040201	RPLSB0040301
DEPTH RANGE (FEET)	16 - 18	30 - 32	4 - 6	10 - 12	4 - 6	10 - 12	14 - 16	4 - 6	10 - 12	4 - 6	10 - 12	14 - 16
SAMPLE DATE	7/11/1997	7/11/1997	7/12/1997	7/11/1997	7/12/1997	7/12/1997	7/12/1997	7/12/1997	7/12/1997	7/15/1997	7/15/1997	7/15/1997
Volatile Organics (µg/kg)												
ACETONE	160 B	85 B	38 B	210 B	12 UJ	5000 K	12 U	1800	3800	12 U	610	46 B
CARBON DISULFIDE	6	6 U	6 U	6 U	6 UJ	6 UJ	6 U	6 UJ	6 UJ	6 U	6 U	6 U
Semivolatile Organics (µg/kg)												
BIS(2-ETHYLHEXYL)PHTHALATE	410 UJ	430 UJ	390 UJ	400 UJ	270 J	57 J	190 J	370 UJ	390 UJ	400 UJ	410 UJ	420 UJ
Inorganics (mg/kg)												
ANTIMONY	0.53 L	0.34 L	0.43 L	0.62 L	0.86 L	1.0 L	0.39 L	0.21 UL	0.42 L	1.5 B	1.4 B	1.5 B
ARSENIC	9.4	7.5	2.4	3.9	13.0	39.6	12.6	2	7.6	7.7	12.1	10.1
BARIUM	21.7	22.0	11.2	14.2	8.2	17.2	30.8	15	12.5	19.3	30.0	24.3
BERYLLIUM	0.41	0.69	0.42	1.0	1.0	1.9	0.50	0.12	0.33	1.4 K	1.8 K	1.9 K
CADMIUM	0.89	0.51 K	0.44 K	0.83 K	0.81 K	1.5	1.4	0.23 K	0.37 K	0.14 U	0.16 U	0.14 U
CHROMIUM	34.9 J	30.2 J	42.4 J	47.2 J	65.6 J	89.6 J	38.0 J	10 J	38.0 J	113	83.5	99.3
COBALT	0.69	2.2	0.63	2.8	1.0	3.2	0.70	0.86	0.34	1.7	2.1	0.25
COPPER	3.5 B	3.8 B	3.4 B	3.7 B	6.4	6.9	4.4 B	4.5 B	5.2	4.4 B	3.8 B	3.7 B
LEAD	3.6 J	3.8 J	4.5 J	4.8 J	4.5 J	5.7 J	3.2 J	4 J	3.4 J	5.7 K	5.2 K	4.3 K
MERCURY	0.02	0.02 U	0.03	0.02	0.03	0.02 U	0.02 U	0.07	0.02	0.02	0.02 U	0.02 U
NICKEL	7.5	7.7	2.5	8.6	5.7	25.8	10.7	3	1.9	9.5	16.7	9.2
SELENIUM	2.2	1.7	1.3	2.0	3.4	3.6	2.8	0.68	2.6	1.0	1.9	2.2
THALLIUM	0.55 B	0.77 B	0.29 U	1.3 B	1.2 B	1.9 B	1.1 B	0.23 B	0.66 B	0.66 K	2.2 K	2.7 K
TIN	3.1 B	2.9 B	2.9 B	2.8 B	2.9 B	4.1 L	2.5 B	1.9 B	2.0 B	3.8 B	4.2 B	3.9 B
VANADIUM	27.9	30.6	41.8	29.9	51.8	56.4	26.1	16.7	28.4	84.2	59.9	79.6
ZINC	24.1 J	34.4 J	14.6 J	37.5 J	26.5 J	100 J	28.5 J	10.3 J	8.2 J	39.4	43.6	37.5

B - Detected in blank; false positive.
J - Estimated.
K - Biased high.
L - Biased low.
U - Not detected.
UJ - Not detected; estimated detection limit.
UL - Not detected; detection limit biased low.

TABLE 4-6

SUMMARY OF POSITIVE DETECTIONS - GROUNDWATER
SITE 38 - RUM POINT LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION	RPLMW01	RPLMW01S	RPLMW01D	RPLMW01D	RPLMW01D	RPLMW01D
SAMPLE NUMBER (UNFILTERED)	S38MW0010102	RPLMW01S0103	RPLMW001U001	S38MW0010102D	S38MW0010102D-D	S38MW01D0103
SAMPLE NUMBER (FILTERED)	S38MW0010102-F	RPLMW01S0103F	RPLMW001F001	NA	NA	S38MW01D0103F
SAMPLE DATE	20050728	20070124	19970806	20050726	20050726	20070123
Volatile Organics (ug/L)						
2-BUTANONE	5 U	10 U	10 UR	5 U	5 U	10 U
ACETONE	5 UJ	10 U	10 U	5 UJ	5 UJ	10 U
CARBON DISULFIDE	0.50 U	10 U	6	0.50 U	0.50 U	10 U
CHLOROFORM	0.50 U	10 U	2 J	0.50 U	0.50 U	10 U
TOLUENE	0.50 U	10 U	7	0.50 U	0.50 U	10 U
TRICHLOROETHENE	0.50 U	10 U	5 U	0.31 J	0.50 U	10 U
Semivolatile Organics (ug/L)						
2-METHYLPHENOL	10 U	11 U	11 U	10 U	10 U	11 U
4-METHYLPHENOL	10 U	11 U		10 U	10 U	11 U
ACETOPHENONE	10 U	11 U	11 U	10 U	10 U	11 U
BIS(2-ETHYLHEXYL)PHTHALATE	10 U	11 U	1 J	10 U	10 U	11 U
DI-N-BUTYL PHTHALATE	10 U	11 U	1 J	10 U	10 U	11 U
DIETHYL PHTHALATE	10 U	11 U	3 J	10 U	10 U	11 U
DIMETHYL PHTHALATE	10 U	11 U	11 U	10 U	10 U	11 U
ISOPHORONE	10 U	11 U	11 U	10 U	10 U	11 U
NAPHTHALENE	10 U	11 U	11 U	10 U	10 U	11 U
PHENOL	10 U	11 U	11 U	10 U	10 U	11 U
Explosives (ug/L)						
HMX	0.1 U	0.47 U		0.10 U	0.10 U	0.46 U
NITROBENZENE	0.1 U	0.47 U		0.10 U	0.10 U	0.46 U
NITROGUANIDINE	20 U	10 U		20 U	20 U	10 U
RDX	0.1 U	0.47 U		0.10 U	0.10 U	0.46 U
Inorganics (ug/L)						
ALUMINUM	605	50 U		61.3 B	30.3 B	50 U
ARSENIC	5.7	3 U	1.9 UL	2 U	3	3 U
BARIUM	36.8 L	25.1	60.3	54.8	55.1	46.5
CADMIUM	0.26 K	1 U	1.3 U	0.20 U	0.20 U	1 U
CALCIUM	539000	560000		40900	41700	40900
CHROMIUM	2.7 K	2 U	2.5	0.67 B	0.56 B	2 U
COBALT	1.4 L	5 U	0.7 U	0.40 U	0.40 U	5 U
COPPER	1 U	5 U	3.3 U	1.1 B	2.9 B	5 U
IRON	2480	5690		205	190	106
LEAD	2.3 J	2.8 B	5.2 B	0.90 UL	0.90 UL	1.5 UJ
MAGNESIUM	16100	14800		4990	5090	4310
MANGANESE	1580	2250		70.8	71.7	87.5
MERCURY	0.13 U	0.08 U	0.13	0.13 U	0.13 U	0.08 U
NICKEL	4.4 B	5 U	1.1 U	0.70 U	0.70 U	5 U
POTASSIUM	10800	7870		3660	3730	3140
SELENIUM	6.5 J	3 U	2.5 U	3 UL	3 UL	3 U
SODIUM	22700	15600		3770	3820	3320
VANADIUM	2.2 L	5 U	2.4 B	0.42 B	0.40 U	5 U
ZINC	14 B	5 U	6.4 B	11.4 B	13.2 B	5 U

TABLE 4-6

SUMMARY OF POSITIVE DETECTIONS - GROUNDWATER
SITE 38 - RUM POINT LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND
PAGE 2 OF 8

LOCATION	RPLMW01	RPLMW01S	RPLMW01D	RPLMW01D	RPLMW01D	RPLMW01D
SAMPLE NUMBER (UNFILTERED)	S38MW0010102	RPLMW01S0103	RPLMW001U001	S38MW0010102D	S38MW0010102D-D	S38MW01D0103
SAMPLE NUMBER (FILTERED)	S38MW0010102-F	RPLMW01S0103F	RPLMW001F001	NA	NA	S38MW01D0103F
SAMPLE DATE	20050728	20070124	19970806	20050726	20050726	20070123
Inorganics, Filtered (ug/L)						
ARSENIC	5.8	3 U	1.9 UL			3 U
BARIUM	32.9 L	25.1	60.3			46.2
CALCIUM	519000	556000				39600
COBALT	1.2 L	5 U	0.7 U			5 U
COPPER	1 U	5 U	3.3 U			5 U
IRON	449	4090				67
LEAD	1.9 J	5.4 B	2.3 B			1.5 UJ
MAGNESIUM	15600	14400				4310
MANGANESE	1550	2150				89.6
MERCURY	0.10 U	0.08 U	0.16			0.08 U
NICKEL	3.3 B	5 U	1.1 U			5 U
POTASSIUM	10500	8220				3240
SELENIUM	6.2 J	3 U	2.5 U			3 U
SODIUM	22400	14800				3120
VANADIUM	0.40 UL	5 U	0.7 U			5 U
ZINC	7.3 B	5 U	6.1 B			5 U
Miscellaneous Parameters (ug/L)						
CYANIDE	2 U	5 UL		2 U	4.9	5 UL
PERCHLORATE		0.5 U				0.5 U

TABLE 4-6

SUMMARY OF POSITIVE DETECTIONS - GROUNDWATER
SITE 38 - RUM POINT LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND
PAGE 3 OF 8

LOCATION	RPLMW02	RPLMW02	RPLMW02	RPLMW03	RPLMW03	RPLMW03
SAMPLE NUMBER (UNFILTERED)	RPLMW002U001	S38MW0020102	S38MW020103	RPLMW003U001	S38MW0030102	S38MW030103
SAMPLE NUMBER (FILTERED)	RPLMW002F001	NA	S38MW020103F	RPLMW003F001	NA	S38MW030103F
SAMPLE DATE	19970812	20050728	20070122	19970806	20050726	20070123
Volatile Organics (ug/L)						
2-BUTANONE	10 UR	5 U	10 U	10 UR	5 U	10 U
ACETONE	95	5 UJ	10 U	10 U	5 UJ	10 U
CARBON DISULFIDE	5 U	0.50 U	10 U	5 U	0.50 U	10 U
CHLOROFORM	5 U	0.50 U	10 U	5 U	0.50 U	10 U
TOLUENE	5 U	1.3	10 U	5 U	0.50 U	10 U
TRICHLOROETHENE	5 U	5.7	10 U	5 U	0.86	10 U
Semivolatile Organics (ug/L)						
2-METHYLPHENOL	11 U	10 U	12 U	11 U	90 J	11 U
4-METHYLPHENOL		10 U	12 U		50 J	11 U
ACETOPHENONE	11 U	10 U	12 U	11 U	230	11 U
BIS(2-ETHYLHEXYL)PHTHALATE	11 U	10 U	12 U	4 J	100 U	11 U
DI-N-BUTYL PHTHALATE	11 U	10 U	12 U	11 U	100 U	11 U
DIETHYL PHTHALATE	11 U	10 U	12 U	11 U	100 U	11 U
DIMETHYL PHTHALATE	11 U	10 U	12 U	11 U	14 J	11 U
ISOPHORONE	11 U	10 U	12 U	11 U	270	11 U
NAPHTHALENE	11 U	10 U	12 U	11 U	100 U	11 U
PHENOL	11 U	10 U	12 U	11 U	430	11 U
Explosives (ug/L)						
HMX		0.013 J	0.46 U		0.10 U	0.49 U
NITROBENZENE		0.1 U	0.46 U		0.10 U	0.49 U
NITROGUANIDINE		20 U	10 U		20 U	10 U
RDX		0.1 U	0.46 U		0.10 U	0.49 U
Inorganics (ug/L)						
ALUMINUM		60.4 B	50 U		34.7 B	50 U
ARSENIC	1.9 UL	2.5	3 U	3.0 L	2.8	3 U
BARIUM	55.8	66.7	56.9	64.3	89.6	61.4
CADMIUM	1.3 U	0.20 U	1 U	1.3 U	0.20 U	1 U
CALCIUM		39700	38900		59400	56600
CHROMIUM	16	0.81 B	2 U	8	0.88 B	2 U
COBALT	0.78	0.40 U	5 U	0.70 U	0.41	5 U
COPPER	3.3 U	3.1 B	5 U	3.8 B	2 B	5 U
IRON		198	30 U		103	31.2
LEAD	2.7 B	0.90 UL	1.5 UJ	2.8 B	0.90 UL	1.5 UJ
MAGNESIUM		6610	6100		7700	6670
MANGANESE		59.5	51.3		124	182
MERCURY	0.10 U	0.13 U	0.08 U	0.1	0.13 U	0.08 U
NICKEL	11.8	0.70 U	5 U	1.1 U	5.1	5 U
POTASSIUM		4450	3650		4850	3650
SELENIUM	2.5 UL	3 UL	3 U	2.5 U	3 UL	3 U
SODIUM		5940	4310		6720	4420
VANADIUM	0.85	0.78 B	5 U	6.8	1.2 B	5 U
ZINC	6	15.5 B	5 U	11.0 B	41.5	5 U

TABLE 4-6

SUMMARY OF POSITIVE DETECTIONS - GROUNDWATER
SITE 38 - RUM POINT LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND
PAGE 4 OF 8

LOCATION	RPLMW02	RPLMW02	RPLMW02	RPLMW03	RPLMW03	RPLMW03
SAMPLE NUMBER (UNFILTERED)	RPLMW002U001	S38MW0020102	S38MW020103	RPLMW003U001	S38MW0030102	S38MW030103
SAMPLE NUMBER (FILTERED)	RPLMW002F001	NA	S38MW020103F	RPLMW003F001	NA	S38MW030103F
SAMPLE DATE	19970812	20050728	20070122	19970806	20050726	20070123
Inorganics, Filtered (ug/L)						
ARSENIC	1.9 UL		3 U	2.2 L		3 U
BARIUM	60.9		55.7	55.8		63.5
CALCIUM			36700			54400
COBALT	0.70 U		5 U	0.70 U		5 U
COPPER	3.3 U		5 U	3.3 U		5 U
IRON			30 U			30 U
LEAD	2.2 B		1.5 UJ	2.0 B		1.5 UJ
MAGNESIUM			5820			6650
MANGANESE			53.3			185
MERCURY	0.10 U		0.08 U	0.14		0.08 U
NICKEL	6.8		5 U	1.1 U		5 U
POTASSIUM			3690			3950
SELENIUM	2.5 UL		3 U	2.5 U		3 U
SODIUM			4070			4100
VANADIUM	0.70 U		5 U	0.92 B		5 U
ZINC	6.9		5 U	4.3 B		5 U
Miscellaneous Parameters (ug/L)						
CYANIDE		2.3	5 UL		2 U	5 UL
PERCHLORATE			0.5 U			0.5 U

TABLE 4-6

SUMMARY OF POSITIVE DETECTIONS - GROUNDWATER
SITE 38 - RUM POINT LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND
PAGE 5 OF 8

LOCATION	RPLMW04	RPLMW04	RPLMW04S	RPLMW04D	RPLMW04D	RPLMW05
SAMPLE NUMBER (UNFILTERED)	RPLMW004U001	S38MW0040102S	S38MW04S0103	S38MW0040102D	S38MW04D0103	S38MW050103
SAMPLE NUMBER (FILTERED)	RPLMW004F001	NA	S38MW04S0103F	S38MW0040102D-F	S38MW04D0103F	S38MW050103F
SAMPLE DATE	19970813	20050727	20070122	20050727	20070122	20070124
Volatile Organics (ug/L)						
2-BUTANONE	10 UR	5 U	10 U	5 U	10 U	10 U
ACETONE	10 U	5 UJ	10 U	5 UJ	10 U	10 U
CARBON DISULFIDE	5 U	0.50 U	10 U	0.50 U	10 U	10 U
CHLOROFORM	5 U	0.50 U	10 U	0.50 U	10 U	10 U
TOLUENE	5 U	0.50 U	10 U	0.50 U	10 U	1.2 J
TRICHLOROETHENE	5 U	0.35 J	10 U	0.49 J	10 U	10 U
Semivolatile Organics (ug/L)						
2-METHYLPHENOL	11 U	10 U	10 U	10 U	12 U	11 U
4-METHYLPHENOL		10 U	10 U	10 U	12 U	11 U
ACETOPHENONE	11 U	10 U	10 U	10 U	12 U	11 U
BIS(2-ETHYLHEXYL)PHTHALATE	11 U	10 U	10 U	10 U	12 U	11 U
DI-N-BUTYL PHTHALATE	11 U	10 U	10 U	10 U	12 U	11 U
DIETHYL PHTHALATE	11 U	10 U	10 U	10 U	12 U	11 U
DIMETHYL PHTHALATE	11 U	10 U	10 U	10 U	12 U	11 U
ISOPHORONE	11 U	10 U	10 U	10 U	12 U	11 U
NAPHTHALENE	11 U	10 U	10 U	10 U	12 U	11 U
PHENOL	11 U	10 U	10 U	10 U	12 U	11 U
Explosives (ug/L)						
HMX		0.10 U	0.16 J	0.1 U	0.47 U	0.49 U
NITROBENZENE		0.10 U	0.47 U	0.1 U	0.47 U	0.26 J
NITROGUANIDINE		20 U	10 U	20 U	10 U	12
RDX		0.10 U	0.47 U	0.1 U	0.47 U	0.26 J
Inorganics (ug/L)						
ALUMINUM		18 U	50 U	525	98.3	149
ARSENIC	1.9 UL	2 U	3 U	3.1	3 U	3 U
BARIUM	26.4	68.6	57.5	42.8	46.4	130
CADMIUM	1.3 U	0.20 U	1 U	0.20 U	1 U	1 U
CALCIUM		184000	146000	20900	28500	142000
CHROMIUM	29.6	0.51 B	2 U	1.2 B	2 U	2 U
COBALT	1.2	0.40 UL	5 U	0.43	5 U	8.6
COPPER	7.4	1 U	5 U	5.9 B	5 U	5 U
IRON		61.5 B	30 U	622	159	626
LEAD	4.5 B	0.90 UL	2.3 B	0.90 UL	1.5 UJ	1.5 UJ
MAGNESIUM		1720	1390	4140	5290	12100
MANGANESE		21.5	4.8	36.8	31.8	1550
MERCURY	0.10 U	0.13 U	0.08 U	0.13 U	0.08 U	0.08 U
NICKEL	15.3	0.70 U	5 U	0.70 U	5 U	5 U
POTASSIUM		1350	1000 U	3610	3360	6980
SELENIUM	2.5 UL	3 UL	3 U	3 UL	3 U	3 U
SODIUM		6050	5090	32600	17700	87200
VANADIUM	1.8	0.40 UL	5 U	6.2	5 U	5 U
ZINC	12.6	13.2 B	5 U	22.1 B	5 U	5 U

TABLE 4-6

SUMMARY OF POSITIVE DETECTIONS - GROUNDWATER
SITE 38 - RUM POINT LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND
PAGE 6 OF 8

LOCATION	RPLMW04	RPLMW04	RPLMW04S	RPLMW04D	RPLMW04D	RPLMW05
SAMPLE NUMBER (UNFILTERED)	RPLMW004U001	S38MW0040102S	S38MW04S0103	S38MW0040102D	S38MW04D0103	S38MW050103
SAMPLE NUMBER (FILTERED)	RPLMW004F001	NA	S38MW04S0103F	S38MW0040102D-F	S38MW04D0103F	S38MW050103F
SAMPLE DATE	19970813	20050727	20070122	20050727	20070122	20070124
Inorganics, Filtered (ug/L)						
ARSENIC	1.9 UL		3 U	2.4	3 U	3 U
BARIUM	24.7		56	39.1	46.6	126
CALCIUM			139000	21200	27900	132000
COBALT	0.83		5 U	0.40 U	5 U	8.4
COPPER	3.3		5 U	1.8 B	5 U	5 U
IRON			30 U	53.5 B	30 U	327
LEAD	2.2 B		1.5 UJ	0.90 UL	1.5 UJ	1.5 UJ
MAGNESIUM			1370	4250	5270	11400
MANGANESE			4.5	22.6	17.8	1480
MERCURY	0.10 U		0.08 U	0.10 U	0.08 U	0.08 U
NICKEL	12.3		5 U	0.70 U	5 U	5 U
POTASSIUM			1000 U	3660	3430	7110
SELENIUM	2.5 UL		3 U	3 UL	3 U	3 U
SODIUM			4510	33000	14400	80900
VANADIUM	0.70 U		5 U	5.2	5 U	5 U
ZINC	8.4		5 U	21 B	5 U	5 U
Miscellaneous Parameters (ug/L)						
CYANIDE		3.9	5 UL	2 U	5 UL	5 UL
PERCHLORATE			0.07 J		0.5 U	0.41 J

TABLE 4-6

SUMMARY OF POSITIVE DETECTIONS - GROUNDWATER
SITE 38 - RUM POINT LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND
PAGE 7 OF 8

LOCATION	RPLMW06	RPLMW07	RPLMW08	RPLMW08
SAMPLE NUMBER (UNFILTERED)	S38MW060103	S38MW070103	S38MW080103	S38MW080103-D
SAMPLE NUMBER (FILTERED)	S38MW060103F	S38MW070103F	S38MW080103F	S38MW080103F-D
SAMPLE DATE	20070124	20070124	20070124	20070124
Volatile Organics (ug/L)				
2-BUTANONE	10 U	210	10 U	10 U
ACETONE	10 U	10 U	10 U	10 U
CARBON DISULFIDE	10 U	10 U	10 U	10 U
CHLOROFORM	10 U	10 U	10 U	10 U
TOLUENE	10 U	10 U	10 U	10 U
TRICHLOROETHENE	10 U	10 U	10 U	10 U
Semivolatile Organics (ug/L)				
2-METHYLPHENOL	12 U	11 U	11 U	11 U
4-METHYLPHENOL	12 U	11 U	11 U	11 U
ACETOPHENONE	12 U	11 U	11 U	11 U
BIS(2-ETHYLHEXYL)PHTHALATE	12 U	11 U	11 U	11 U
DI-N-BUTYL PHTHALATE	12 U	11 U	11 U	11 U
DIETHYL PHTHALATE	12 U	11 U	11 U	11 U
DIMETHYL PHTHALATE	12 U	11 U	11 U	11 U
ISOPHORONE	12 U	11 U	11 U	11 U
NAPHTHALENE	12 U	11 U	11 U	2.5 J
PHENOL	12 U	11 U	11 U	11 U
Explosives (ug/L)				
HMX	0.42 U	0.49 U	0.49 U	0.44 U
NITROBENZENE	0.42 U	0.49 U	0.49 U	0.44 U
NITROGUANIDINE	10 U	10 U	10 U	10 U
RDX	0.42 U	0.49 U	0.49 U	0.44 U
Inorganics (ug/L)				
ALUMINUM	256	50 U	50 U	50 U
ARSENIC	3 U	3 U	4	3 U
BARIUM	73.2	92.7	64.7	65.3
CADMIUM	1 U	1 U	1 U	1 U
CALCIUM	52300	131000	113000	114000
CHROMIUM	2.2	2 U	2 U	2 U
COBALT	5 U	5 U	5 U	5 U
COPPER	5 U	5 U	5 U	5 U
IRON	734	5450	2950	2990
LEAD	1.5 UJ	1.6 B	1.7 B	1.5 UJ
MAGNESIUM	5470	3600	1920	1940
MANGANESE	98.8	593	115	118
MERCURY	0.08 U	0.08 U	0.08 U	0.08 U
NICKEL	5 U	5 U	5 U	5 U
POTASSIUM	5230	1690	1240	1250
SELENIUM	3 U	3 U	3 U	3 U
SODIUM	7040	22100	6710	6790
VANADIUM	5 U	5 U	5 U	5 U
ZINC	5 U	5 U	5 U	5 U

TABLE 4-6

SUMMARY OF POSITIVE DETECTIONS - GROUNDWATER
SITE 38 - RUM POINT LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND
PAGE 8 OF 8

LOCATION	RPLMW06	RPLMW07	RPLMW08	RPLMW08
SAMPLE NUMBER (UNFILTERED)	S38MW060103	S38MW070103	S38MW080103	S38MW080103-D
SAMPLE NUMBER (FILTERED)	S38MW060103F	S38MW070103F	S38MW080103F	S38MW080103F-D
SAMPLE DATE	20070124	20070124	20070124	20070124
Inorganics, Filtered (ug/L)				
ARSENIC	3 U	3 U	3.2	3.6
BARIUM	69.5	96.7	66.6	67.5
CALCIUM	35700	124000	107000	110000
COBALT	5 U	5 U	5 U	5 U
COPPER	5 U	5 U	5 U	5 U
IRON	30 U	5710	2990	3040
LEAD	1.5 UJ	1.5 UJ	1.5 UJ	2 B
MAGNESIUM	5250	3480	1900	1940
MANGANESE	93.6	596	118	121
MERCURY	0.08 U	0.08 U	0.08 U	0.08 U
NICKEL	5 U	5 U	5 U	5 U
POTASSIUM	5330	1760	1320	1330
SELENIUM	3 U	3 U	3 U	3 U
SODIUM	6410	20700	6270	6240
VANADIUM	5 U	5 U	5 U	5 U
ZINC	5 U	5 U	5 U	5 U
Miscellaneous Parameters (ug/L)				
CYANIDE	5 UL	5 UL	5 UL	5 UL
PERCHLORATE	0.5 U	0.5 U	0.5 U	0.5 U

B - Detected in blank; false positive
J - Estimated.
K - Biased high.
L - Biased low.
U - Not detected.
UJ - Not detected; detection limit estimated.
UL - Not detected; detection limit biased low.
UR - Non-detect result rejected.

TABLE 4-7

SUMMARY OF POSITIVE DETECTIONS - SURFACE WATER
SITE 38 - RUM POINT LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION SAMPLE NUMBER SAMPLE DATE	RPLSW01 RPLSW0010001 6/27/1997	RPLSW02 RPLSW0020001 6/27/1997	RPLSW02 RPLSW0020001-AVG 6/27/1997	RPLSW02 RPLSW0020001-D 6/27/1997	RPLSW03 RPLSW0030001 6/27/1997	S38SW005 S38SW0050102 6/22/2005	S38SW005 S38SW0050102-AVG 6/22/2005	S38SW005 S38SW0050102-D 6/22/2005	S38SW006 S38SW0060102 6/22/2005	S38SW007 S38SW0070102 6/22/2005
Volatile Organics (µg/L)										
CARBON DISULFIDE	5 U	7	4.75	5 U	5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Semivolatile Organics (ug/L)										
DI-N-BUTYL PHTHALATE	12 U	1 J	1 J	11 U	11 U	10 U	10 U	10 U	10 U	10 U
Explosvies (µg/L)										
3-NITROTOLUENE						0.50 U	0.066 J	0.066 J	0.50 U	0.053 J
Inorganics (ug/L)										
BARIUM	22.9	33.6	32.7	31.8	31.2	62.8	61.35	59.9	48.8	41.5
CALCIUM						22000	22100	22200	41400	36200
COPPER	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	116 J	68.7 J	42.7 B	12.6 B	41.8 B
IRON						1550 J	1237.5 J	925 J	511 J	468 J
MAGNESIUM						2690 J	2675 J	2660 J	2420 J	2070 J
MANGANESE						101	86.9	72.8	62.8	54.3
POTASSIUM						1730	1725	1720	1580	1520
SODIUM						31100	31050	31000	23600	21300
VANADIUM	0.87	1.1	1.1	1.1	0.70 U	1.2 B	0.86 B	0.52 B	0.40 U	0.40 U
ZINC	7.4	3.9	2.575	2.5 U	9.9	99.6 J	58.05 J	33 B	11.4 B	28.3 B

B - Detected in blank; false positive.
J - Estimated.
U - Not detected.

TABLE 4-8

SUMMARY OF POSITIVE DETECTIONS - SEDIMENT
SITE 38 - RUM POINT LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION	RPLSD01	RPLSD02	RPLSD02	RPLSD02	RPLSD03	S38SD004	S38SD005	S38SD005	S38SD005	S38SD006	S38SD007
SAMPLE NUMBER	RPLSD0010001	RPLSD0020001	RPLSD0020001-AVG	RPLSD0020001-D	RPLSD0030001	S38SD0040102	S38SD0050102	S38SD0050102-AVG	S38SD0050102-D	S38SD0060102	S38SD0070102
DEPTH RANGE (FEET)	--	--	--	--	--	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
SAMPLE DATE	6/27/1997	6/27/1997	6/27/1997	6/27/1997	6/27/1997	6/22/2005	6/22/2005	6/22/2005	6/22/2005	6/22/2005	6/22/2005
Volatile Organics (µg/kg)											
CHLOROBENZENE	6 U	6 U	6 U	6 U	6 U	3 J	13 U	1 J	1 J	13 U	13 U
METHYLENE CHLORIDE	2 B	3 B	2.5 B	2 B	3 B	4 J	4 J	3.5 J	3 J	13 U	6 J
TOLUENE	6 U	6 U	6 U	6 U	6 U	3 J	1 J	1 J	13 U	13 U	13 U
TRICHLOROFLUOROMETHANE	6 U	6 U	6 U	6 U	6 U	2 J	13 U	13 U	13 U	13 U	13 U
Semivolatile Organics (µg/kg)											
BENZALDEHYDE						64 J	390 UJ	405 U	420 U	420 U	450 U
BENZO(A)ANTHRACENE	430 U	410 U	415 U	420 U	390 U	460 U	390 U	405 U	420 U	420 U	88 J
BENZO(A)PYRENE	430 U	410 U	415 U	420 U	390 U	460 U	390 U	405 U	420 U	420 U	150 J
BENZO(B)FLUORANTHENE	430 U	410 U	415 U	420 U	390 U	460 U	390 U	44 J	44 J	420 U	190 J
BENZO(G,H,I)PERYLENE	430 U	410 U	415 U	420 U	390 U	460 U	390 U	405 U	420 U	420 U	94 J
BENZO(K)FLUORANTHENE	430 U	410 U	415 U	420 U	390 U	460 U	390 U	405 U	420 U	420 U	75 J
BIS(2-ETHYLHEXYL)PHTHALATE	430 U	410 U	415 U	420 U	390 U	99 B	63 B	69.5 B	76 B	150 B	730
CHRYSENE	430 U	410 U	415 U	420 U	390 U	460 U	390 U	405 U	420 U	420 U	92 J
DI-N-BUTYL PHTHALATE	430 U	410 U	415 U	420 U	390 U	460 U	41 J	42.5 J	44 J	420 U	62 J
DI-N-OCTYL PHTHALATE	430 U	410 U	44 J	44 J	390 U	460 U	390 U	405 U	420 U	420 U	450 U
FLUORANTHENE	430 U	410 U	415 U	420 U	390 U	460 U	390 U	79 J	79 J	420 U	450 U
INDENO(1,2,3-CD)PYRENE	430 U	410 U	415 U	420 U	390 U	460 U	390 U	405 U	420 U	420 U	94 J
PHENANTHRENE	430 U	410 U	415 U	420 U	390 U	460 U	390 U	45 J	45 J	420 U	450 U
PYRENE	430 U	410 U	415 U	420 U	390 U	460 U	390 U	72 J	72 J	420 U	450 U
Explosives (mg/kg)											
3-NITROTOLUENE						0.25 U	0.25 U	0.04 J	0.04 J	0.25 U	0.25 U
4-NITROTOLUENE						0.25 U	0.25 U	0.25 U	0.25 U	0.036 J	0.25 U
NITROCELLULOSE						1.4 J	0.82 J	0.70 J	0.58 J	1 J	0.95 J
Inorganics (mg/kg)											
ALUMINUM						5550	817	1043.5	1270	769	2190
ARSENIC	2.6	0.63 L	0.68 L	0.73 L	0.91 L	2.4 K	1.2	1.6	2	0.96	1.9
BARIUM	13.0 J	4.3 J	4.1 J	3.9 J	5.8 J	58.7	8.4	10.85	13.3	7.5	19.2
BERYLLIUM	0.21	0.08 B	0.10 B	0.12 B	0.16	0.50	0.15	0.19	0.23	0.13	0.31
CADMIUM	0.54	0.23	0.195	0.16	0.28	0.21	0.044	0.048	0.052	0.036 U	0.074
CALCIUM						788	383 B	391.75	592	339 B	907
CHROMIUM	15.4 J	5.7 J	5.5	5.3 J	8.3 J	13.1	5.4	12.1	6.7	4.9	9.3
COBALT	0.87	0.41	0.405	0.40	0.44	8	1.1 B	0.925	1.3	0.70 B	1.7
COPPER	2.9	0.71	0.69	0.67	0.75	19.5	3.4 B	3.55 B	3.7 B	2.7 B	4.1 B
IRON						9400	3400	3860	4320	3040	6120
LEAD	5.4	1.6	1.85	2.1	2.8	20.4	2.5	2.9	3.3	2.3	5.4
MAGNESIUM						771 J	167 J	216 J	265 J	141 B	408 J
MANGANESE						85.4	43.6	49.1	54.6	31.3	83
MERCURY	0.03	0.02 U	0.02	0.03	0.02 U	0.056 U	0.05 U	0.053 U	0.056 U	0.053 U	0.054 U
NICKEL	2.6	0.64	0.65	0.66	0.72	10.5 K	1.8 K	2.15 K	2.5 K	1.2 B	3.1 K
POTASSIUM						478	257	340	423	282	727
SELENIUM	0.96 J	0.43 J	0.275 J	0.24 UJ	0.35 J	0.58 U	0.48 U	0.515 U	0.55 U	0.54 U	0.55 U
VANADIUM	15.7	4.7	4.65	4.6	7.2	18.4	4.5	5.25	6	4.3	8.4
ZINC	11.4	4.5	4.6	4.7	7.0	24.6	12 B	13.65 B	15.3 B	7.9 B	18.2 B

B - Detected in blank; false positive.
J - Estimated.
K - Biased high.
L - Biased low.
U - Not detected.

Appendix C
Applicable or Relevant and Appropriate Requirements

TABLE 2-1

CHEMCIAL-SPECIFIC ARARs AND TBC CRITERIA
SITE 38 – RUM POINT LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND

Location	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Federal					
Groundwater, Residential water supplies	Groundwater manganese concentrations must meet non-carcinogenic risk-based limits based on a hazardous index of 1.	Potential drinking water source.	USEPA Integrated Risk Information System Reference Dose (RfD)	To be considered.	RfDs are used to calculate risk and PRG for manganese.

ARARs Applicable or relevant and appropriate requirement.

TABLE 2-2

LOCATION-SPECIFIC ARARs AND TBC CRITERIA
SITE 38 – RUM POINT LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND

Location	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Federal					
United States Fish and Wildlife Service (USFWS) Biological Opinion, 2007					
Habitat for Bald and Golden Eagle	The Navy will take the appropriate measures to minimize impacts to Bald Eagles including time-of-year restrictions for construction activities.	Actions that will impact Bald Eagle habitat.	USFWS Biological Opinion, letter to Mr. Jeffrey Bossart, August 2007	Selected Performance Standard	Construction activities will be limited to a time of year that will not impact Bald Eagle nesting.
Procedures for Implementing the Requirements of the Council on Environmental Quality on the National Environmental Policy Act and Executive Order 11990, Protection of Wetlands					
Wetlands	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	Executive Order 11990 Section 7	To be considered.	This regulation may be an ARAR for activities occurring in areas that meet the definition of a wetland. Due to the proximity of the streams and the presence of plant life associated with a nontidal wetland remedial activities must minimize the destruction, loss, or degradation of the wetlands.

TABLE 2-2

LOCATION-SPECIFIC ARARs AND TBC CRITERIA
SITE 38 – RUM POINT LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND

Location	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Clean Water Act, Section 404					
Wetlands	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)	Applicable	This regulation may be an ARAR for activities occurring in areas that meet the definition of a wetland. Due to the proximity of the streams and the presence of plant life associated with a nontidal wetland remedial activities must minimize the destruction, loss, or degradation of the wetlands.
Fish and Wildlife Coordination Act					
Area affecting stream or other water body	Provides protection for actions that would affect streams, wetlands, other bodies of water, and protected habitats. Any action taken near water bodies should protect fish and wildlife.	Activities that modify the streams and affect fish and wildlife.	16 USC Part 661 et seq.	Applicable	The rule may be an ARAR if excavation or cover placement activities impact the streams that border the site.

TABLE 2-2

LOCATION-SPECIFIC ARARs AND TBC CRITERIA
SITE 38 – RUM POINT LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND

Location	Requirement	Prerequisite	Citation	ARAR Determination	Comments
State					
Nontidal Wetlands Protection Act					
Area affecting non-tidal wetlands	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 26.23.02.01, 26.23.02.04, 26.23.03.01-02	Applicable	This regulation may be an ARAR for activities occurring in areas that meet the definition of a wetland. Due to the proximity of the streams and the presence of plant life associated with a nontidal wetland remedial activities must minimize the destruction, loss, or degradation of the wetlands.

ARARs Applicable or relevant and appropriate requirement.

TABLE 2-3

ACTION-SPECIFIC ARARs AND TBC CRITERIA
SITE 38 – RUM POINT LANDFILL
NSV-IH, INDIAN HEAD, MARYLAND

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Federal					
Hazardous Waste Management					
On-site waste generation	Waste generator to determine whether waste is hazardous waste.	Generation (e.g., excavation) of solid waste.	40 CFR 262.10(a) and 262.11	Applicable	Material to be transported off site would need to be tested to determine whether it is a hazardous waste.
Generation of hazardous waste	Manifest requirements and pre-transport requirements (i.e., packaging, labeling, placarding).	Preparation for off-site transport of hazardous waste.	40 CFR 262 Subpart B and C	Applicable	Applicable only for off-site shipment of hazardous waste.
Staging of hazardous waste within an AOC prior to off-site disposal	The Area of Contamination (AOC) policy allows wastes to be consolidated or treated in-situ within an AOC without triggering land disposal restrictions or minimum technology requirements. An AOC would be defined for the entire site so that contaminated material can be stockpiled prior to characterization and off-site disposal.	Landfill material that is classified as hazardous waste will be consolidated on-site prior to off-site disposal.	Management of Remediation Waste Under RCRA - Area of Contamination Policy, EPA 530-F-98-026, October 1998	To be considered.	Pertinent only for waste that is classified as hazardous waste.

TABLE 2-3

ACTION-SPECIFIC ARARs AND TBC CRITERIA
SITE 38 – RUM POINT LANDFILL
NSV-IH, INDIAN HEAD, MARYLAND

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Solid Waste Management					
On-site disposal of non-hazardous waste	Closure and post-closure care requirements for municipal waste landfills, including final cover system, inspection, maintenance, and monitoring.	On-site disposal of municipal solid waste.	40 CFR 258.60(a), 258,60(b), 258.61(a), and 258.61(b)	Applicable	Applicable for on-site disposal of non-hazardous waste. Only constituents identified as COCs in groundwater would be included in the groundwater monitoring program.
Clean Water Act					
Discharge to surface water	NPDES permit requirements.	Discharge of storm water from construction activity with an area of disturbance of 1 acre or more to surface water.	40 CFR 122.26	Applicable	Applicable for alternatives that will need to control and manage storm water during construction.
State					
Hazardous Waste Management					
On-site waste generation	Waste generator to determine whether waste is hazardous waste.	Generation (e.g., excavation) of solid waste.	COMAR 26.13.03.02	Applicable	Material to be transported off site would need to be tested to determine whether it is a hazardous waste.
Generation of hazardous waste	Manifest requirements and pre-transport requirements (i.e., packaging, labeling, and placarding).	Temporary storage and off-site transport of hazardous waste.	COMAR 26.13.03.04 and 26.13.03.05	Applicable	Applicable only for off-site shipment of hazardous waste.

TABLE 2-3

ACTION-SPECIFIC ARARs AND TBC CRITERIA
SITE 38 – RUM POINT LANDFILL
NSV-IH, INDIAN HEAD, MARYLAND
PAGE 3 OF 5

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Solid Waste Management					
Closure of solid waste landfill	Closure and post-closure care requirements for non-hazardous waste landfills, including capping, inspection, maintenance, and monitoring.	Landfill not closed in accordance with state regulations.	COMAR 26.04.07.21 and 26.04.07.22	Applicable	Applicable for design of soil cover, impermeable capping systems, and long-term monitoring program.
Water Management					
Discharge to surface water	NPDES permit requirements – storm water associated with construction activity..	Discharge of storm water from construction activity with area of disturbance of 1 acre or more to surface water.	COMAR 26.08.04.09	Applicable	Applicable for alternatives that disturb 1 or more acre of land that will need to control and manage storm water during construction. Activities must meet the substantive requirements of a General Permit for Construction Activity.
Discharge to surface water	NPDES permit requirements	Discharge of storm water from construction activity in contaminated area.	COMAR 26.08.02.02-1 26.08.02.03 26.08.02.03-1 26.08.02.03-2 26.08.02.03-3 26.08.02.03-4 26.08.02.04-1 26.08.02.05 26.08.02.09 26.08.03	Applicable	Applicable for alternatives that disturb 1 or more acre of land that will need to control and manage storm water during construction that may contain contaminants not found in typical construction activities and where general permit is not sufficient..

TABLE 2-3

ACTION-SPECIFIC ARARs AND TBC CRITERIA
SITE 38 – RUM POINT LANDFILL
NSV-IH, INDIAN HEAD, MARYLAND
PAGE 4 OF 5

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Land-disturbing activities	Requirements for erosion and sediment control.	Land clearing, grading, and other earth disturbance.	COMAR 26.17.01.05, 26.17.01.07B, 26.17.01.07C, 26.17.01.11.	Applicable	Applicable for alternatives that will disturb earth.
Land development	Requirements for storm water management.	Construction activities.	COMAR 26.17.02.06, 26.17.02.08, 26.17.02.09	Applicable	Applicable for alternatives where storm water management and control are needed.
Air Quality					
Air emissions	Emission standards for particulate matter.	Soil excavation and handling.	COMAR 26.11.06.03D	Applicable	Applicable for alternatives where there may be fugitive dust emissions from material handling.
Monitoring Wells					
Well construction and abandonment	Requirements for constructing and abandoning wells.	Groundwater monitoring.	COMAR 26.04.04.03, 26.04.04.04, 26.04.04.07, 26.04.04.08, 26.04.04.10, 26.04.04.11.	Applicable	Applicable for alternatives that include construction of new monitoring wells or abandoning existing monitoring wells.
Occupational, Industrial, and Residential Hazards					
Noise generation	Established limits on noise levels not to be exceeded at the property boundary.	Action that will generate noise.	COMAR 26.02.03.02A(2), 26.02.03.02B(2), and 26.02.03.03A	Applicable	Applicable for alternatives that will generate noise.

TABLE 2-3

ACTION-SPECIFIC ARARs AND TBC CRITERIA
SITE 38 – RUM POINT LANDFILL
NSV-IH, INDIAN HEAD, MARYLAND

ARARs	Applicable or relevant and appropriate requirements.
CFR	Code of Federal Regulations.
COMAR	Code of Maryland Regulations.
NPDES	National Pollutant Discharge Elimination System.

Appendix D
Maryland Department of the Environment Concurrence Letter

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
MDE 410-537-3000 • 1-800-633-6101 • www.mde.maryland.gov

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Robert M. Summers, Ph.D.
Secretary

March 18, 2014

Mr. Joseph Rail, P.E.
NAVFAC Washington
Washington Navy Yard, Bld. 212
1314 Harwood Street SE
Washington, DC 20374-5018

Re: Final Record of Decision Site 38 – Rum Point Landfill, Naval Support Facility Indian Head – March 2014

Dear Mr. Rail:

As the original Final Record of Decision for Site 38 – Rum Point Landfill was to be printed in November 2013, the Federal Facilities Division (FFD) of the Maryland Department of the Environment's Land Restoration Program issued a concurrence letter dated November 14, 2013. Due to administrative delays, the final version of this document was delayed until March 2014.

Thererfore, at the request of the Navy, the FFD is sending this letter to confirm that the State still concurs with the selected remedy for Site 38.

If you have any questions, please contact me at (410) 537-3791.

Sincerely,

Curtis DeTore
Geological Supervisor
Federal Facilities Division

CD:cd

cc: Mr. Dennis Orenshaw
Mr. Horacio Tablada
Mr. James Carroll

Appendix E
Summary of Comments and Responses on Proposed Plan

APPENDIX E

Responses to Public Comments on the Site 38 Proposed Plan

The 30-day public comment period for the Selected Remedy for Site 38 began on July 29, 2013, and ended on August 28, 2013. A public meeting was held on August 21, 2013, at the Indian Head Senior Center, 100 Cornwallis Square, Indian Head, Maryland, to accept oral and written comments on this decision. Several questions were raised during the open discussion at the August 21, 2013 public meeting on the Site 38 Proposed Plan; these are paraphrased below along with the Navy, EPA, and MDE's consolidated response in italics. In addition, several other questions and comments were received during the public comment period. These comments are presented below as received, and include Navy, EPA, and MDE's consolidated response in italics.

Comments during Public Meeting - Received on August 21, 2013

1. Site 38 underwent numerous Site Screening Process (SSP) investigations. Why wasn't such a robust SSP investigation completed for other sites?

Response: *Investigations at NSF Indian Head Environmental Restoration Program Sites were conducted following the CERCLA process. It is believed that the appropriate level of effort was used in the investigation of each site including expanded or more thorough SSP investigations, where warranted. For Site 38, the SSP investigations were the equivalent of a Remedial Investigation (RI) which is often completed at many other sites. The CERCLA process allows a site to undergo an SSP investigation, an RI, or a combination of both, if needed.*

2. What is the issue with manganese in groundwater and why is it a problem?

Response: *Manganese was detected in groundwater at Site 38 at concentrations that might present an unacceptable human health risk if used as the primary potable water source for a hypothetical resident who might live at the site following the removal of the landfill. It is anticipated that the removal of the landfill contents will alter groundwater chemistry at the site such that manganese concentrations will be reduced to levels that will allow for groundwater use for any purpose in the future. Furthermore, the Environmental Protection Agency enforces Secondary Contaminant Levels (SCLs) for manganese. High manganese in groundwater may yield a foul odor or poor taste, if ingested.*

3. Once remediated, will this site be replanted with trees and grass? Will native grasses be planted?

Response: *Yes; following removal of the landfill, the disturbed areas of the site will be revegetated with native grasses to limit erosion and restore the site to a natural condition. There are no plans for tree planting as part of the site restoration efforts, though it is expected that trees will volunteer on the site in the years following the waste removal activities.*

4. Have changes in historical operations at Indian Head and Stump Neck affected your choice for selection of the chosen remedial alternative? Will future land use or realty transfer be considered in selection of the remedy?

Response: *Yes, historical operations were taken into account during the identification of COPCs and designing an appropriate investigation for the site. Potential future land uses were considered in the development of remedial alternatives; however, future land use is expected to remain the same. The proposed remedy would allow for future residential use of the property with a prohibition on the use of groundwater as a potable source until contaminant concentrations were reduced to acceptable levels. The restriction would be implemented through the development of a Land Use Control plan.*

5. How much money has been spent at Site 38 and what is the cost of cleanup?

Response: *Approximately $725,000 has been spent on the investigations and reporting conducted at Site 38 to date. The total present work cost of the proposed remedial alternative is approximately $1.987M which includes construction and long-term monitoring costs associated with the remedy.*

Written Comments from Mr. Jim Long, Mattawoman Watershed Society (dated 9/4/13)

1. In the discussion of Ecological Risk (p. 6), the information provided is insufficient for the public to understand the rational for concluding "no unacceptable risks to ecological receptors." Specifically, it is here we learn that "maximum chemical concentrations [in surface water] were detected in a sample collected upstream of the landfill." The chemical in question is not given. It presumably is manganese, as this is mentioned in conjunction with surface water under Site Screening Process (p. 3). It appears manganese is dismissed because it does not pertain to the site activities, as it originates upstream. Hence, it seems that the necessity for bureaucratic compartmentalization in dealing with a complex mosaic of sites is the rationale for not considering the chemical an ecological risk. Yet it evidently occurs at levels of concern, and so in reality might pose a risk. If this is so, it should be made clear, and in any event further actions should be discussed.

Response: *The inorganic analytes identified in the surface water samples at and upstream of Site 38 at concentrations requiring further evaluation in the ecological screening evaluation were barium, copper, and iron (Tetra Tech, 2008). All of the surface water data collected at the site were screened against the appropriate peer-reviewed risk standards to determine if a potential risk to ecological receptors was present. From this review it was determined that no unacceptable risk was present regardless of the sample location.*

2. In the revegetation plan, we recommend that only native species adapted to the specific ecology of the area be employed. If erosion control plantings are used, again only suitable vegetation free from nonnative species should be employed. If a natural succession is planned, the monitoring plan should include surveys for nonnative

invasive species, which often opportunistically invade disturbed soils. Removal of these species if they invade should be part of follow-up monitoring.

Response: *Following removal of the landfill, the disturbed areas of the site will be revegetated with native grasses to limit erosion and restore the site to a natural condition. Inspections and monitoring will be performed following site stabilization to ensure that the vegetation becomes well established and that no erosion is occurring. These inspections will include the identification and eradication of nonnative invasive species, as needed.*

Written Comments from ARARAT (dated 8/27/13)

1. The Site screening process seemed to cover considerable detail. Why was Site Screening not used for either Site 28 or UXO 32?

Response: *Investigations at NSF Indian Head Environmental Restoration Program Sites were conducted following the CERCLA process. It is believed that the appropriate level of effort was used in the investigation of each site including expanded or more thorough SSP investigations, where warranted. For Site 38, the SSP investigations were the equivalent of a Remedial Investigation (RI) which is often completed at many other sites. The CERCLA process allows a site to undergo an SSP investigation, an RI, or a combination of both, if needed.*

2. What I find missing in the Proposed Plan is the current and future plan for the use of the proposed Stump Neck facility. The Site History points out the shift that has taken place since the Vietnam conflict and that the mission of NSF-IH is now a highly technical engineering support operation. What does this mean as far as the use of the Stump Neck facility in the identified specialized fields? What is the level of activity current and planned for use in an area near Site 38? To what extent would this increase or decrease the potential health risk for personnel or visiting individuals whether site 38 be alternative 2 or 3? Does the future role of Stump Neck impact on the potential increase in Institutional Control at Site 38 if it is modified along the requirements of alternative 2? I would like answers to the above before supporting alternative three.

Response: *A discussion of the future operations at NSF Indian Head and the Stump Neck Annex are believed to be beyond the scope of the Site 38 PRAP and ROD.*

Alternatives 2 and 3 would be equally protective of human health regardless of the future land use at or near Site 38. The implementation of either remedy would require a prohibition on the use of site groundwater as a potable source until contaminant concentrations were reduced to acceptable levels. The need for this restriction would be required regardless of the future property use or mission of the Sump Neck Annex.