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FINAL FIVE YEAR REVIEW REPORT NSWC INDIAN HEAD MD (PUBLIC DOCUMENT)
07/01/2013
SOVEREIGN CONSULTING

Final Five-Year Review Report

Naval Support Facility Indian Head
Indian Head, Maryland



NAVFAC Washington
Naval Facilities Engineering Command
Contract Number N40080-08-D-0498
Task Order 0009

July 2013

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FINAL FIVE-YEAR REVIEW

**NAVAL SUPPORT FACILITY INDIAN HEAD
INDIAN HEAD, MARYLAND**

**Submitted to:
Naval Facilities Engineering Command Washington
1314 Harwood St., S.E.
Washington Navy Yard, Washington, D.C. 20374-2121**

**Submitted by:
Sovereign Consulting
424 Investors Place Suite 108
Virginia Beach, VA 23462**

and

**Tetra Tech, Inc.
5700 Lake Wright Drive, Suite 309
Norfolk, VA 23502**

**Sovereign Consulting Contract No. N40080-08-D-0498
CONTRACT TASK ORDER 0009**

July 2013

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EXECUTIVE SUMMARY

The Navy conducted this Five-Year Review for Naval Support Facility Indian Head (NSF-IH) in Indian Head, Maryland, as required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in accordance with CERCLA §121(c), as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR). The Report has been prepared in accordance with the U. S. Environmental Protection Agency (USEPA) *Comprehensive Five-Year Review Guidance* and summarizes the evaluation of remedies and remedial actions that resulted in hazardous substances, pollutants, or contaminants remaining at sites above levels that allow for unlimited use and unrestricted exposure (UU/UE), and for which there is a Record of Decision (ROD) in place. The sites requiring a Five-Year Review comprise the following:

- Site 11 – Caffee Road Landfill
- Site 12 – Town Gut Landfill
- Sites 14, 15, 16, 49, 50, 53, 54, and 55 (co-located sites collectively known as “Lab Area”)
- Site 17 – Metal Parts Along Shoreline
- Site 21 – Bronson Road Landfill
- Site 36 – Closed Landfill
- Site 42 – Olsen Road Landfill
- Site 57 – Building 292 Trichloroethene (TCE) Contamination

The objective of the Five-Year Review is to evaluate the effectiveness of the remedies to determine if these continue to be protective of human health and the environment in accordance with the requirements set forth in the RODs. This evaluation was accomplished through a review of various reports and documents pertaining to post-remedy implementation activities, analytical data, and findings, and through site visits, interviews, and inspections. A summary of the sites and results of this report is presented in Table ES-1. The community was notified of the review process through public notices. The Five-Year Review report identifies circumstances that may prevent a particular remedy from functioning as designed or providing sufficient protection of human health and the environment.

The results of this Five-Year Review indicated that the sites with completed remedies are protective of human health and the environment and exposure pathways that could result in unacceptable risks are being controlled. All of the remedial action objectives (RAOs) are being satisfied. The final remedies are currently functioning as intended by the ROD. In addition, sites with remedy implementations in progress

are expected to be protective of human health and the environment and exposure pathways that could result in unacceptable risks will be controlled once the remedies are completed.

Table ES-1
Site Summaries
Naval Support Facility - Indian Head
Indian Head, Maryland
Page 1 of 2

Site	CERCLA Status	Selected Remedy	Implementation	Issues	Recommendations	Protectiveness Statement
Site 11 - Caffee Road Landfill	ROD, 2009	Area A - protective cover, ICs, groundwater LTM and five-year reviews. Area B- in situ capping, ICs, and five-year reviews.	The selected remedy has been implemented as described in the ROD. LTM will be initiated in 2012	Vegetation has not yet been established on the soil cover. Trees planted along the shoreline appear to be falling down and may not survive.	Replant or support trees and reseed as necessary to establish vegetation at the site.	The remedy is protective of human health and the environment and is currently functioning as intended by the ROD. The exposure pathways that could result in unacceptable risk are being controlled. All the RAOs are being satisfied.
Site 12 - Town Gut Landfill	ROD, 2004	Waste excavation with consolidation and/or offsite disposal, addition of soil cover and vegetation, LUCs, groundwater and surface water LTM, and five-year reviews.	The selected remedy has been implemented as described in the ROD. Surface water LTM was discontinued in October 2007.	Saplings observed growing in the drainage channels and a fallen tree was observed in one of the drainage channels.	Removal of saplings and fallen tree from the drainage channels. Collect one additional naphthalene sample at MW-10.	The remedy is protective of human health and the environment and is currently functioning as intended by the ROD. The exposure pathways that could result in unacceptable risk are being controlled. All the RAOs are being satisfied.
Sites 14, 15, 16, 49, 50, 53, 54, and 55 - Lab Area	ROD, 2011	Surface soil and wetland sediment excavation, lateral post-excavation confirmatory sampling, surface soil restoration, wetland restoration, surface water runoff management, transporting and disposing of excavated material, ICs, and five-year reviews.	The selected remedy has been implemented as described in the ROD.	No issues were identified.	No recommendations.	The remedy is protective of human health and the environment and is currently functioning as intended by the ROD. The exposure pathways that could result in unacceptable risk are being controlled. All the RAOs are being satisfied.
Site 17 - Metal Parts Along Shoreline	ROD, 2010	Clearing and removal of MEC and non-MEC metallic objects, granular ZVI application via soil mixing, short-term performance sampling, groundwater LTM, ICs, and five-year reviews.	The selected remedy is currently being planned.	No issues were identified.	No recommendations.	The remedy will be protective of human health and the environment and will function as intended by the ROD. The exposure pathways that could result in unacceptable risk will be controlled and all the RAOs will be satisfied.

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Table ES-1
Site Summaries
Naval Support Facility - Indian Head
Indian Head, Maryland
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Site	CERCLA Status	Selected Remedy	Implementation	Issues	Recommendations	Protectiveness Statement
Site 21 - Bronson Road Landfill	ROD, 2011	Verify or grade/fill a 2-foot soil cover, grade for surface water controls and storm water management, ICs, groundwater LTM, and five-year reviews.	The selected remedy implementation is scheduled for summer 2012.	No issues were identified.	No recommendations.	The remedy will be protective of human health and the environment and will function as intended by the ROD. The exposure pathways that could result in unacceptable risk will be controlled. All the RAOs will be satisfied.
Site 36 - Closed Landfill	ROD, 2011	LUCs, soil and vegetative cover maintenance, groundwater LTM, removal and recycling of metal debris, and five-year reviews.	The selected remedy is currently being implemented as described in the ROD. The existing soil and vegetative cover prevents direct exposure to landfill contents. The removal of metal debris is scheduled for late 2012 or early 2013. LTM will be initiated in 2012.	No issues were identified.	No recommendations.	The remedy will be protective of human health and the environment and will function as intended by the ROD. The exposure pathways that could result in unacceptable risk will be controlled. All the RAOs will be satisfied.
Site 42 - Olsen Road Landfill	ROD, 2005	Cap system, hot spot removal, LUCs, groundwater and surface water LTM and five-year reviews.	The selected remedy has been implemented as described in the ROD. Surface water LTM was discontinued in October 2007.	Site constituents at downgradient well MW-10 demonstrated increasing trends. Saplings and tall vegetation observed growing in drainage channels.	Develop a work plan to investigate downgradient groundwater concentrations to ensure contaminated groundwater is not migrating offsite. Removal of saplings and trimming of vegetation from the drainage channels.	The remedy is protective of human health and the environment and is currently functioning as intended by the ROD. The exposure pathways that could result in unacceptable risk are being controlled. All the RAOs are being satisfied.
Site 57 - Building 292 TCE Contamination	ROD, 2007	<i>In-situ</i> bioremediation, LUCs, groundwater LTM, and five-year reviews.	The selected remedy implementation is scheduled for summer 2012. LTM will be initiated in late 2012.	No issues were identified.	No recommendations.	The remedy will be protective of human health and the environment and will function as intended by the ROD. The exposure pathways that could result in unacceptable risk will be controlled. All the RAOs will be satisfied.

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Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): Naval Support Facility Indian Head		
EPA ID (from WasteLAN): MD7170024684		
Region: 3	State: MD	City/County: Indian Head/Charles County
SITE STATUS		
NPL status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
Remediation status (choose all that apply): <input type="checkbox"/> Under Construction <input checked="" type="checkbox"/> Operating <input type="checkbox"/> Complete		
Multiple OUs?* <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Construction completion date: To be determined	
Has site been put into reuse? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
REVIEW STATUS		
Lead agency: <input type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input checked="" type="checkbox"/> Other Federal Agency: Naval Facilities Engineering Command (NAVFAC)		
Author name: Nate Delong		
Author title: Remedial Project Manager (RPM)	Author affiliation: Department of the Navy, NAVFAC	
Review period:** August 2007–August 2012		
Date(s) of site inspections: April 26 and May 21, 2012		
Type of review: <div style="text-align: right; margin-top: 5px;"> <input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion </div>		
Review number: <input type="checkbox"/> 1 (first) <input checked="" type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify) _____		
Triggering action: <input type="checkbox"/> Actual RA Onsite Construction at OU # _____ <input type="checkbox"/> Actual RA Start at OU# _____ <input type="checkbox"/> Construction Completion <input type="checkbox"/> Previous Five-Year Review Report <input checked="" type="checkbox"/> Other (specify) Commencement of remediation at Site 12 – Town Gut Landfill		
Triggering action date (from WasteLAN): September 2002		
Due date (five years after triggering action date): September 27, 2017		

* ["OU" refers to operable unit.]

** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

This Five-Year Review applies to the remedial actions implemented at Site 11 – Caffee Road Landfill, Site 12 – Town Gut Landfill, Sites 14, 15, 16, 49, 50, 53, 54, and 55 – Lab Area, Site 17 – Metal Parts Along Shoreline, Site 21 – Bronson Road Landfill, Site 36 – Closed Landfill, Site 42 – Olsen Road Landfill, and Site 57 – Building 292 TCE Contamination.

Issues:

At Site 12, saplings were observed growing in the drainage channels and a fallen tree was observed in one of the drainage channels. At Site 42, site constituents at downgradient well MW-10 demonstrated increasing trends. In addition, tall vegetation and samplings were observed in some of the drainage channels. At Site 11, the vegetation has not been established on the soil cover and the trees planted along the shoreline are falling over and may not survive.

Recommendations and Follow-up Actions:

Based on the results of this Five-Year Review, it is recommended that the saplings be removed from the drainage channels at Site 12 and 42. In addition, the fallen tree should be removed from the drainage channel at Site 12 and the vegetation be trimmed in the drainage channels at Site 42. It is also recommended that a work plan for Site 42 be developed to investigate downgradient groundwater concentrations to ensure contaminated groundwater is not migrating offsite. Furthermore, it is recommended that the trees be replanted or supported and the soil cover reseeded as necessary to establish the vegetation at Site 11.

Protectiveness Statement(s):

The final remedial actions for Site 11 – Caffee Road Landfill, Site 12 – Town Gut Landfill, Sites 14, 15, 16, 49, 50, 53, 54, and 55 – Lab Area, Site 17 – Metal Parts Along Shoreline, Site 21 – Bronson Road Landfill, Site 36 – Closed Landfill, Site 42 – Olsen Road Landfill, and Site 57 – Building 292 TCE Contamination are protective of human health and the environment and exposure pathways that could result in unacceptable risks are being controlled. All of the RAOs are being satisfied. The remedies are functioning as intended by the ROD.

Other Comments:

None.

Next Review:

The next Five-Year Review will be completed in by September 27, 2017.

Signature of U.S. Department of the Navy and Date

P. R. Nette
Captain, U.S. Navy
Commanding Officer



Date 14 Nov 13



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Commander
Naval Facilities Engineering Command
Mr. Nate Delong
Washington Navy Yard Bldg. 212
1314 Harwood St. S.E.
Washington Navy Yard, D.C. 29374-5018

SEP 27 2012

Subject: Five-Year CERCLA Review Naval Support Facility Indian Head

Dear Mr. Delong,

Thank you for submitting the Five-Year Review report entitled: Five-Year Review Report, Naval Support Facility Indian Head, Indian Head, Maryland.

As you know, Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), requires that remedial actions which result in any hazardous substances, pollutants, or contaminants remaining at a site above levels that allow for unlimited use and unrestricted exposure be subject to a five-year review (5YR). The Naval Facilities Engineering Command (NAVFAC) submitted a draft-final 5YR for the Naval Support Facility Indian Head to the U.S. Environmental Protection Agency (EPA) dated July, 2012.

The purpose of this letter is to provide the EPA's response to NAVFAC's July, 2012 report. In accordance with EPA's June 2001 5YR guidance, and based upon the August 1, 2011 Memorandum entitled "Program Priorities for Federal Facility Five-Year Review," EPA can make an independent protectiveness determination if adequate information is available in the report to evaluate the implementation and performance of the remedy. Thus EPA expects that NAVFAC will submit a final signed report to EPA after reviewing and addressing EPA's comments as set forth in other correspondence.

There are currently two Operable Units (OUs) at Indian Head that require a 5YR protectiveness determination and are therefore addressed in this 5YR. These OUs are listed below for documentation purposes, along with a discussion of any issues EPA has identified that need to be addressed.

OU- 02: Site 12 – Town Gut landfill.

Issues: None.

Recommendations and Follow-up Actions: None

Protectiveness Statement that will be reported to Congress: The remedy at OU-01 remains protective of human health and the environment.

Remedial action objectives specified in the ROD have been met. The landfill cover prevents exposure to contaminated soil and land use controls prevent exposure to contaminants in shallow groundwater. Long-term monitoring is conducted to confirm that migration of contaminants from the site has not occurred.

OU- 05: Site 42 – Olsen Road Landfill.

Issues: Elevated levels of trichloroethene have been detected in wells MW-12 and MW-10 along the periphery of the landfill.

Recommendations and Follow-up Actions: EPA and the Navy have agreed that sampling of down gradient wells should be conducted and the installation of one or more additional side-gradient wells are necessary to ensure that contaminated groundwater is not migrating from the site. The Navy will develop a work plan to specify what additional efforts will be conducted. This plan will be submitted to the EPA for review and concurrence within six months of the date of this letter.

Protectiveness Statement that will be reported to Congress: The remedy at OU-01 remains protective of human health and the environment.

Remedial action objectives specified in the ROD have been met. The engineered cap prevents exposure to contaminated soil. Land use controls prevent exposure to contaminants in shallow groundwater. Long-term monitoring is conducted to confirm that migration of contaminants from the site has not occurred.

EPA concurs with the NAVFAC protectiveness statements for the above OUs while recognizing the need for additional sampling at the Olsen Road Landfill site. Furthermore, as a part of this Five Year review, EPA has evaluated the Government Performance and Results Act (GPRA) measures for this site and determined their status as follows:

Environmental Indicators

Human Health: Current Human Exposure Controlled

Groundwater Migration: Under control.

Sitewide Ready for Anticipated Use

The site is not Site-Wide Ready for Anticipated Use.

The next Five Year Review is due five years from the date of this letter.

If you have any questions, please contact Steve Hirsh, Acting Chief of the NPL/BRAC Federal Facilities Branch at 215-814-3351 or Dennis Orenshaw at 215-814-3361.

Sincerely,

A handwritten signature in black ink, appearing to read "Ronald J. Borsellino". The signature is fluid and cursive, with a long horizontal stroke at the end.

Ronald J. Borsellino, Director
Hazardous Site Cleanup Division

cc: Curtis DeTore, Maryland Department of the Environment

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LIST OF ACRONYMS

AA	areas of attainment
ARAR	applicable or relevant and appropriate requirement
BERA	baseline ecological risk assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	contaminant of concern
COMAR	Code of Maryland
CTO	contract task order
CWAP	Comprehensive Work Approval Process
DCE	dichloroethene
EE/CA	Engineering Evaluation/Cost Analysis
EOD	Explosive Ordnance Disposal
EVO	emulsified vegetable oil
FFS	Focused Feasibility Study
FS	Feasibility Study
ft-bgs	feet below ground surface
GIS	Geographic Information System
HHRA	human health risk assessment
HRC	Hydrogen Release Compound
HSL	Hazard Substance List
IAS	initial assessment study
IHIRT	Indian Head Installation Restoration Team
IC	institutional control
IR	Installation Restoration
ISCR	<i>in situ</i> chemical reduction
LTM	long-term monitoring
LTMP	long-term monitoring plan
LUC	land use control
MCL	maximum contaminant limit
MDE	Maryland Department of Environment
MEC	munitions and explosives of concern
mg/kg	milligram per kilogram
MNA	monitored natural attenuation
NAVFAC	Naval Facilities Engineering Command

LIST OF ACRONYMS (continued)

NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEESA	Naval Energy and Environmental Support Activity
NPL	National Priorities List
NSF-IH	Naval Support Facility Indian Head
NSWC	Naval Surface Warfare Center
NTCRA	non-time critical removal action
O&M	operation and maintenance
OWAP	Old Waste Acid Pit
PA	Preliminary Assessment
ppm	parts per million
PRG	preliminary remediation goals
RAO	remedial action objective
RD	Remedial Design
RFA	Resource Conservation Recovery Act Facility Assessment
RI	remedial investigation
ROD	record of decision
RPM	remedial project manager
SI	Site Inspection
Sovereign	Sovereign Consulting, Inc.
SRGs	site remediation goals
SSP	Site Screening Process
Tetra Tech	Tetra Tech, Inc.
TCE	trichloroethene
TCL	Target Compound List
USEPA	United States Environmental Protection Agency
UU/UE	unlimited use/unrestricted exposure
VC	vinyl chloride
VOCs	volatile organic compounds
ZVI	zero valent iron
µg/L	microgram per liter

1.0 INTRODUCTION

This document presents the results of the Five-Year Review as required by the by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121(c), as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR). Sovereign Consulting, Inc. (Sovereign) and Tetra Tech, Inc. (Tetra Tech) has prepared this Five-Year Review Report on behalf of the Navy for Naval Support Facility Indian Head (NSF-IH), Indian Head, Maryland (Figure 1-1), in accordance with the U. S. Environmental Protection Agency (USEPA) Comprehensive Five-Year Review Guidance (USEPA, 2001).

The purpose of this Five-Year Review Report is to document the evaluation of the effectiveness of remedies and remedial actions for sites having a Record of Decision (ROD) in place and hazardous substances, pollutants, or contaminants remaining on-site at concentrations that do not allow for unlimited use and unrestricted exposure (UU/UE). The locations of the sites within the Five-Year Review process are shown on Figure 1-2.

NSF-IH is required to conduct an installation-wide Five-Year Review that includes all sites with remedies in place based on the remedy initiation trigger date for the first site. In accordance with the Navy guidance, a Five-Year Review is required five years from the initiation of the first remedial action that leaves hazardous substances, pollutants, or contaminants at a site above levels that allow for UU/UE. If a site contains multiple remedies, all are subject to a Five-Year Review when at least one remedy is initiated. This Five-Year Review also includes sites where the remedy implementation is in progress.

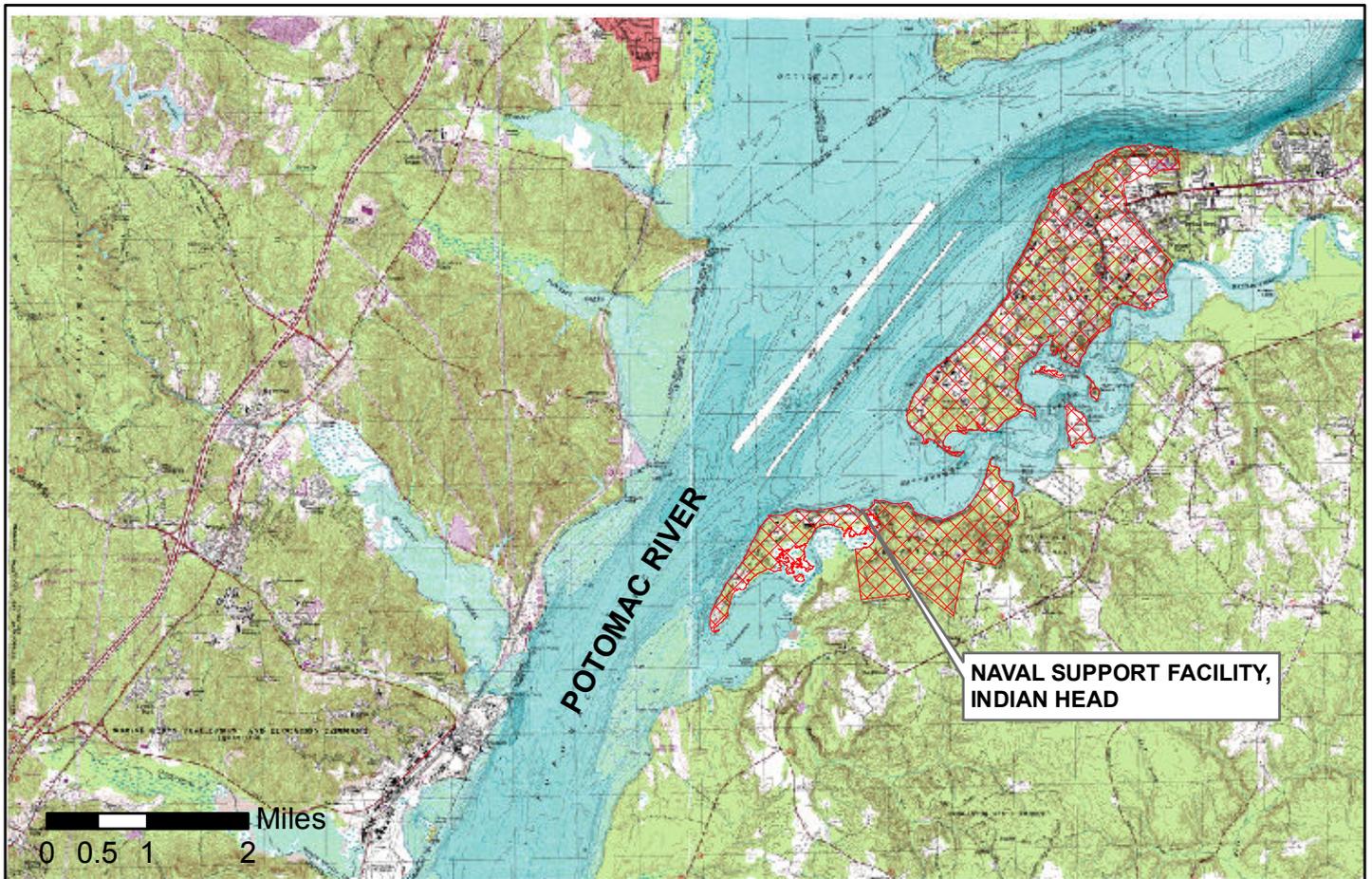
This Five-Year Review was prepared pursuant to CERCLA §121(c) and the NCP. CERCLA §121(c) states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section 104 or 106, the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The USEPA interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such actions no less often than every five years after the initiation of the selected remedial action.

The triggering action of the statutory review process was the remedial action for Site 12, as described in the ROD signed by the Navy/USEPA on September 29, 2004. The first Five-Year Review for Sites 12 and 42 was signed on July 26, 2007, which is the triggering action for this second Five-Year Review for Sites 12 and 42 and the first Five-Year Review for the remaining sites, consistent with Section 1.1.3 of the Comprehensive Five-Year Review Guidance (USEPA, 2001). This Five-Year Review for NSF-IH was accomplished through a review of various reports and documents pertaining to post remedy-implementation activities, analytical data, and findings, and through site visits, inspections, and interviews. The community was notified of the review process through public notices.



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SCALE AS NOTED	

FACILITY LOCATION MAP
NAVAL SUPPORT FACILITY - INDIAN HEAD
INDIAN HEAD, MARYLAND

CONTRACT NUMBER 112G03107	
APPROVED BY	DATE
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FIGURE NO.	REV
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REVISED BY	DATE
SCALE AS NOTED	

FACILITY MAP
NAVAL SUPPORT FACILITY - INDIAN HEAD
INDIAN HEAD, MARYLAND

CONTRACT NUMBER 112G03107	
APPROVED BY	DATE
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FIGURE NO.	REV
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2.0 FIVE YEAR REVIEW PROCESS

2.1 ADMINISTRATIVE COMPONENTS

The USEPA and Maryland Department of Environment (MDE) were notified in March 2012 of the initiation of the Five-Year Review process which includes data and document reviews as well as site inspections and interviews. The Five-Year Review team was led by Mr. Nate Delong, the RPM for the Navy. Sovereign and Tetra Tech assisted in the site review under contract to the Navy. Mr. Nicholas Carros, the NSF-IH Installation Restoration (IR) Coordinator, assisted in the review as the representative of the base. Mr. Dennis Orenshaw, the USEPA RPM, and Mr. Curtis DeTore, the MDE RPM, assisted in the review as the representatives of the support agencies.

Information relevant to the ROD sites is presented in Sections 4 through 11. The components of the Five Year Review Process include the following:

- Community involvement
- Document Review
- Data Review
- Site Inspection
- Interviews

2.2 COMMUNITY INVOLVEMENT

A public notice was posted in the Maryland Independent on May 25, 2012 to notify the public that this Five-Year Review has been initiated.

Upon completion of the report, a notice will be sent to the above-listed newspaper to report the completion of the Five-Year Review Report and that the results of the review and the report will be available to the public at the following repository;

Naval Support Facility – Indian Head
General Library
Building 620 (The Crossroads)
Indian Head, MD 20640

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3.0 BACKGROUND INFORMATION

3.1 FACILITY PHYSICAL CHARACTERISTICS

NSF-IH is located in northwestern Charles County, Maryland, approximately 25 miles southwest of Washington, D.C. (Figure 1-1). The NSF-IH is a military facility consisting of the main area on the Cornwallis Neck Peninsula and the Annex on Stump Neck. The Main Installation contains approximately 2,500 acres and is bounded by the Potomac River to the northwest, west and south; Mattawoman Creek to the south and east; and the town of Indian Head to the northeast. Included as part of the Main Installation are Marsh Island and Thoroughfare Island, which are in Mattawoman Creek. Stump Neck Annex is located across Mattawoman Creek. The Bullitt Neck Annex covers approximately 50 acres and is bounded by Mattawoman Creek to the north, east, and west and private property to the south. The two islands and Bullitt Neck Annex are not on the National Priorities List (NPL) with the Main Installation and Stump Neck Annex.

NSF-IH is located on a peninsula on the eastern bank of the Potomac River which lies within the Atlantic Coastal Plain Physiographic Province, approximately 8 to 10 miles east of the Fall Line that marks the western extent of the Physiographic Province. NSF-IH has gently rolling and undulating topography with elevation ranging from sea level to greater than 100 feet above mean sea level. The higher elevations exist in the northwestern portion of the facility. Generally, the land surface slopes to the southwest and southeast. The northwestern side of the facility, along the Potomac River, is characterized by 20- to 100-foot bluffs, and the southeastern side, along Mattawoman Creek, is more gently sloping (McCartan, 1989).

The stratigraphy at NSF-IH consists of Cambrian and Precambrian bedrock overlain by Cretaceous sedimentary deposits and capped by Quarternary surficial sediments. Figure 3-1 represents a generalized cross-section showing site stratigraphy. The sedimentary deposits are the Patuxent and Arundel Clay formations of Lower Cretaceous age, the Raritan and Patapsco formations of Upper Cretaceous age, and the surficial Columbia formation of Quarternary Age (AWARE, 1982). The principal sources of water for domestic use within the Town of Indian Head are the Patapsco and Patuxent Formations. The aquifers are separated by the Arundel Formation confining unit (Hart, 1983). The water supply wells for the Town of Indian Head are located laterally of any potential NSF-IH discharges. There are no private or public water supply wells affected by the ROD sites.

3.2 LAND AND RESOURCE USE

NSF-IH was established in 1890 and is the Navy's oldest continually 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. NSF-IH is expected to remain active for the foreseeable future. Current military 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.

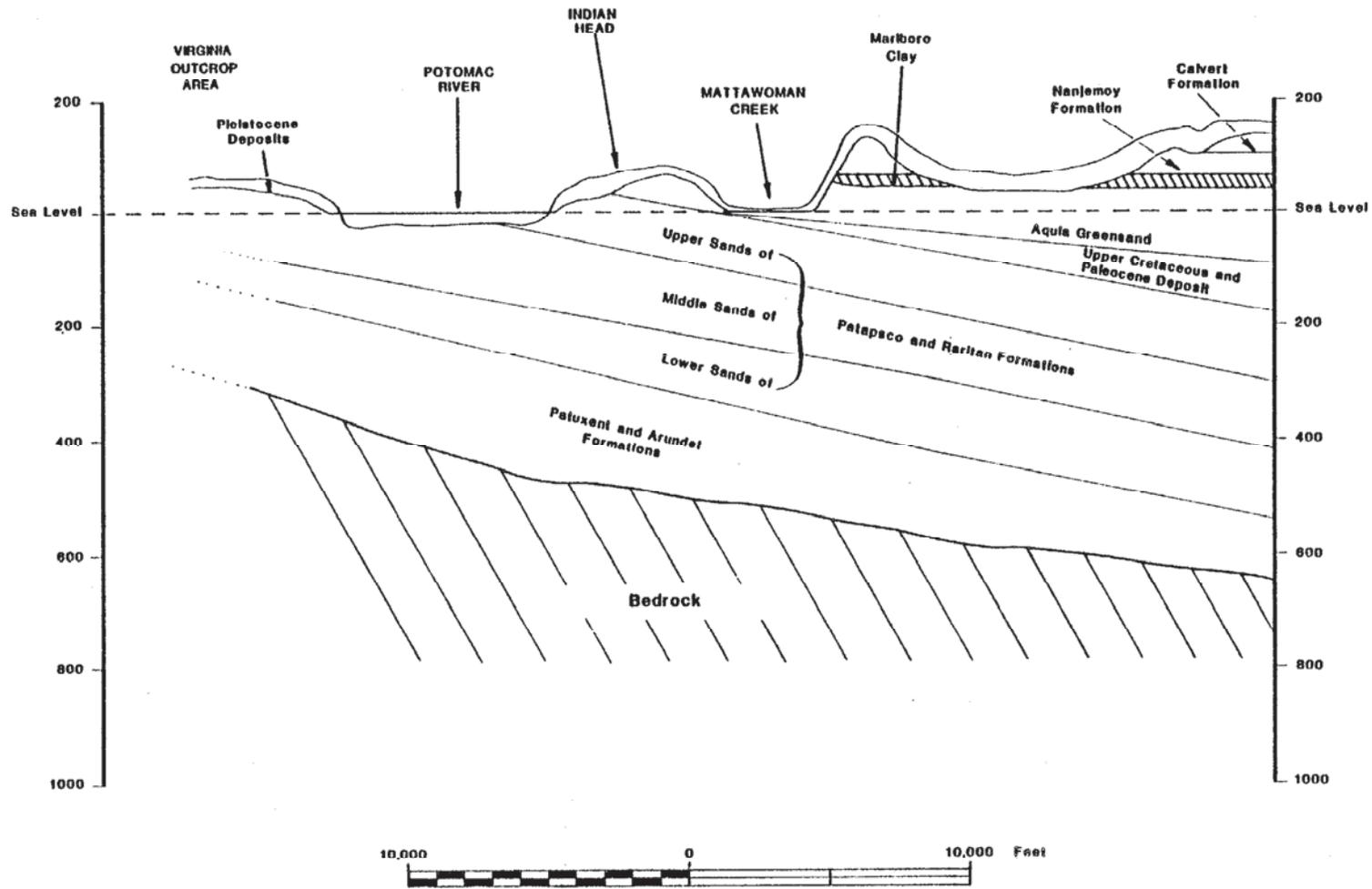


Figure 3-1
Generalized Cross-Section Showing Stratigraphy
Naval Support Facility - Indian Head
Indian Head, Maryland

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4.0 SITE 11 – CAFFEE ROAD LANDFILL

4.1 SITE CHRONOLOGY

Site 11, Caffee Road Landfill, is situated at the southern end of Caffee Road, extending about 200 feet on either side of the road. The landfill is bordered by an unnamed creek and wetland to the west and by Mattawoman Creek to the south (Figure 4-1). A review of historical aerial photographs (1956 to 1987) indicated that Site 11 was created by landfilling activities, which occurred after 1956. By 1963, most of the area within Site 11 had been cleared and filled. The filling activities extended the shoreline into Mattawoman Creek by as much as 150 feet from its original position from the deposition of concrete, debris, and fill.

Because of different historical uses of this site, it is divided into two areas: (1) Area A and the Upland Area where landfilling and disposal activities occurred; and (2) Area B where incineration or waste-burning activities occurred. The Area A landfill was used until the early 1960s for the disposal of bulk metal items and trash, rocket motor casings, exploded building debris, rifles, demilitarized ordnance, propellant grains, and open-burning residues (Fred C. Hart Associates, Inc., 1983). In addition, metal parts were flashed in the area just west of wetland Area Two (IH-02) (Figure 4-1). Flashed metal refers to metal debris that was burned to remove trace amounts of explosives residue. The Upland Area is northwest of Area A and will be addressed as part of Site 66. A literature search conducted during the Remedial Investigation (RI) (CH2M HILL, 2004) revealed that four open-burning pits previously existed along the eastern edge of Site 11. This area was designated as Area B and was investigated as part of the RI. The original burn location, reportedly used to incinerate classified documents, was just west of IH-02 in Area A. Burning in this area stopped when the area was cleaned up and regraded in 2001.

A chronology of events for Site 11 is presented in Table 4-1 and a photograph of the site is presented as Figure 4-2.



Figure 4-2. Photograph of Site 11 facing southeast.

4.2 BACKGROUND

4.2.1 Land and Resource Use

Site 11 is currently maintained as an unvegetated open space surrounded by wooded areas. No future land use changes are projected for Site 11, and no other land use for this site is planned by the Navy. Shallow groundwater beneath the site is not used for any purpose and the Navy has no plans to develop the groundwater resource in the future. Residential development of Site 11 is restricted by the ROD. However, hypothetical future residential use of the site was evaluated in the risk assessment to determine if restrictions would be necessary at the site.

4.2.2 Basis for Remedial Action

The need for remedial action at Site 11 was based on the history of site activities, nature and extent of the contamination, a risk assessment to determine the effects of contamination on human and ecological receptors, and the comparison of contaminants of concern (COC) levels to calculated, or established site remediation goals (SRGs).

4.2.3 Summary of Contamination

Surface soil, subsurface soil, waste, groundwater, surface water, and sediment were sampled during previous investigations. COCs have been identified in soil, solid waste and nearshore sediment. These COCs have been identified based on the risk drivers from the human health risk assessment (HHRA) and ecological risk assessment (ERA), and exceedances of regulatory criteria. The COCs identified for soil

and solid waste in Area A include arsenic, cadmium, copper, and manganese. In addition, zinc was identified as a COC in nearshore sediment in Area A and adjacent to Area B. Table 4-2 provides a summary of Site 11 SRGs.

4.3 REMEDIAL ACTIONS

4.3.1 Remedial Action Objectives

Based on the evaluation of site conditions, an understanding of the contaminants, the physical properties in media of concern, the results of risk assessments, and an analysis of applicable or relevant and appropriate requirements (ARARs), the following remedial action objectives (RAOs) were developed:

- Reduce or minimize human and ecological receptors' direct contact with the solid waste in the former landfill in Area A
- Reduce or minimize exposures to COCs in soil that pose unacceptable risks to humans in Area A
- Reduce or minimize potential risk to ecological receptors (e.g., fish) from sediment
- Minimize and control soil erosion and runoff to surface water and migration of COCs to Mattawoman Creek

These RAOs were developed following guidance provided in Land Use in the CERCLA Remedy Selection Process (USEPA, 1995). According to this guidance, RAOs should reflect the reasonably anticipated future land use or uses.

4.3.2 Selected Remedy

The selected remedy for Site 11 consisted of the following:

Area A

- Construction of a 2 foot soil cover in Area A, consisting of 18 inches of clean fill and 6 inches of topsoil or topsoil created using Class "A" pelletized sewage sludge per Code of Maryland Regulation (COMAR) 26.04.07; the seed mixture for the cover vegetation will be designed so that it will serve as a bio-barrier to burrowing animals;
- Stabilizing the existing shoreline by partially removing surface rubble from the top of the slope, creating a rock and gravel foundation fill to the high tide level, installing an earth fill to extend the soil cover over the remaining rubble and foundation fill, installing a permanent high-velocity erosion control matting, and vegetating the slope with wetland plants and native grasses;

- Implementing institutional controls (ICs), which consist of land-use and groundwater-use restrictions; these restrictions will prohibit any intrusive activities that will compromise the integrity of the soil cover and ensure compliance with the ARARs; the objectives of the ICs are to: (1) prohibit digging into or disturbing the existing cover or contents of the landfill, (2) prohibit residential development on the site, and (3) prohibit the use of the shallow groundwater beneath the site;
- Performing long-term groundwater quality monitoring. The detailed description of the monitoring program was included in the long-term monitoring plan (LTMP), which was prepared after the ROD was signed; and
- Conducting 5-year reviews.

Area B

- Constructing a gravel blanket on the nearshore sediment area. The area encompasses approximately 5,000 square feet;
- Implementing ICs in the form of waterway use restrictions, such as prohibiting swimming and anchoring of vessels; and
- Conducting 5-year reviews.

The soil cover and shoreline construction was completed in January 2012 (AGVIQ/CH2M HILL, 2012). The wetland plantings were completed in April 2012. Long-term monitoring (LTM) will be initiated in 2012.

4.4 PROGRESS SINCE THE LAST REVIEW

This is the first Five-Year Review Report for Site 11.

4.5 FIVE YEAR REVIEW PROCESS

4.5.1 Document Review

Part of the Five-Year Review consisted of a review of relevant documents. Historical documents are referenced in Table 4-1 and Section 12.0.

4.5.2 Data Review

Long-term monitoring of shallow groundwater shall be implemented to determine if the remedy is functioning as intended and is achieving the RAOs.

4.5.3 Site Inspection

An inspection of the site was conducted on May 21, 2012 by representatives of Tetra Tech. The purpose of the inspection was to assess the protectiveness of the remedy. Appendix A contains the site inspection checklist. Photographs taken during the site inspection are included in Appendix B.

During the site inspection it was noted that the vegetation on the soil cover has not yet been established. In addition, the trees planted along the shoreline appear to be falling down and may not survive. However, the selected remedy appears to be effective and functioning as designed to be protective of human health and the environment, and control exposure pathways that could result in unacceptable risk.

4.5.4 Interviews

Interviews have been conducted with MDE and NAVFAC and are included in Appendix C.

4.6 TECHNICAL ASSESSMENT

4.6.1 Question A: Is The Remedy Functioning As Intended By The Decision Documents?

The review of documents, ARARs, and the site inspection indicates that the final remedy is functioning as intended by the ROD. Soil cover and gravel blanket installation has achieved the RAOs both to minimize the human and ecological risk, and to reduce/or eliminate erosion, thus reducing migration of contaminants to groundwater, surface water and sediment. The effective implementation of institutional controls has also helped achieve the RAOs that minimize human receptor contact.

Long-term monitoring of shallow groundwater will be implemented to confirm that groundwater contaminant migration is not occurring at unacceptable levels and that the remedy is functioning as intended.

The institutional controls include restrictions on breaching the soil cover and any other activities or actions that might interfere with the implemented final remedy. NAVFAC manages and maintains a base-wide Geographic Information System (GIS). All IR Sites are identified on the GIS. All work that is performed on the Activity must be approved by the Navy.

No signs of intrusion or invasive development of the site were observed. No activities were observed that would have violated the institutional controls. In summary, the remedy is in place to successfully prevent exposure to the site-related contaminants.

4.6.2 Question B: Are The Exposure Assumptions, Toxicity Data, Clean-Up Levels, And RAOs Used At The Time Of The Remedy Selection Still Valid?

The exposure assumptions, toxicity data, cleanup levels, and RAOs are still valid based on confirmation that the applicable State and Federal standards for the COCs have not changed significantly. The remedy is in compliance with the ARARs.

The HHRA presumed unacceptable risks for exposure to landfill materials and soils. There have been no changes to the RAOs used for the selection of a soil cover remedy. The shoreline rehabilitation (including capping) addressed ecological risk associated with zinc in sediments. There are no exposure assumptions or toxicity value changes that warrant discussion as related to revising cleanup levels, especially considering the landfill cover (exposure barrier) will remain in place with no residential development. The groundwater at the site is subject to monitoring under Maryland's post-closure rules.

The remedy is functioning as intended and the soil cover and shoreline will be maintained as long as wastes remain in place. Because wastes remain in place, Site 11 will continue to be subject to the requirement for five-year reviews and for the Maryland's post-closure groundwater monitoring requirements.

4.6.3 Question C: Has Any Other Information Come To Light That Calls Into Question The Protectiveness Of The Remedy?

No other information has been made available that calls into question the protectiveness of the remedial action.

4.6.4 Technical Assessment Summary

According to the site inspection, the final remedy is functioning as intended by the ROD. There have been no changes in the physical conditions of Site 11 that would affect the protectiveness of the final remedy. All ARARs cited in the ROD have been met by construction of the remedial action. There is no other information that calls into question the protectiveness of the final remedy.

4.7 ISSUES

Vegetation has not yet been established on the soil cover. In addition, the trees planted along the shoreline appear to be falling down and may not survive.

4.8 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Based on the results of this Five-Year Review, it is recommended that Site 11 be reseeded as necessary to establish vegetation and the trees along the shoreline be replanted or supported.

4.9 PROTECTIVENESS STATEMENT

The remedy for Site 11 is protective of human health and the environment, and is functioning as intended by the ROD. The exposure pathways that could result in unacceptable risks are controlled and all of the RAOs are satisfied. The exposure assumptions, toxicity data, clean up levels, and RAOs used at the time of the final remedy selection are still valid. No other information that could call into question the protectiveness of the final remedy has been identified in this review.

4.10 NEXT REVIEW

The next Five-Year Review for Site 11 is required by 2017, five years from the date of this review.

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TABLE 4-1
Chronology of Site 11 Events
Site 11 – Caffee Road Landfill
Naval Support Facility - Indian Head
Indian Head, Maryland

Event	Date
Site 11 Caffee Road Landfill Operation	Approximately 1950s – 1960s
Approximately 5,000 to 6,000 cubic yards of deposited material removed	Late 1980
Initial Assessment Study (IAS) (Hart, 1983)	1983
Remedial Investigation (RI) Completed (CH2M HILL, 2004)	April 2004
Wetland Delineation Completed	February 2005
Baseline Ecological Risk Assessment (BERA) Completed (CH2M HILL, 2005)	July 2005
Feasibility Study (FS) Completed (CH2M HILL, 2008)	July 2008
Geophysical Survey Completed	May 2006
Hydrographic Survey Completed	November 2007
Proposed Plan Completed (CH2M HILL, 2008)	August 2008
ROD Completed (NAVFAC, 2009)	September 2009
Remedial Design (RD) Submitted (CH2M HILL, 2012)	May 2010
LTMP completed (AGVIQ/CH2M HILL, 2011)	January 2012
Land Use Control (LUC) RD Plan completed (CH2M HILL, 2012)	January 2012
Soil Cover and Shoreline Construction Completed	January 2012
Wetland Planting Completed	April 2012

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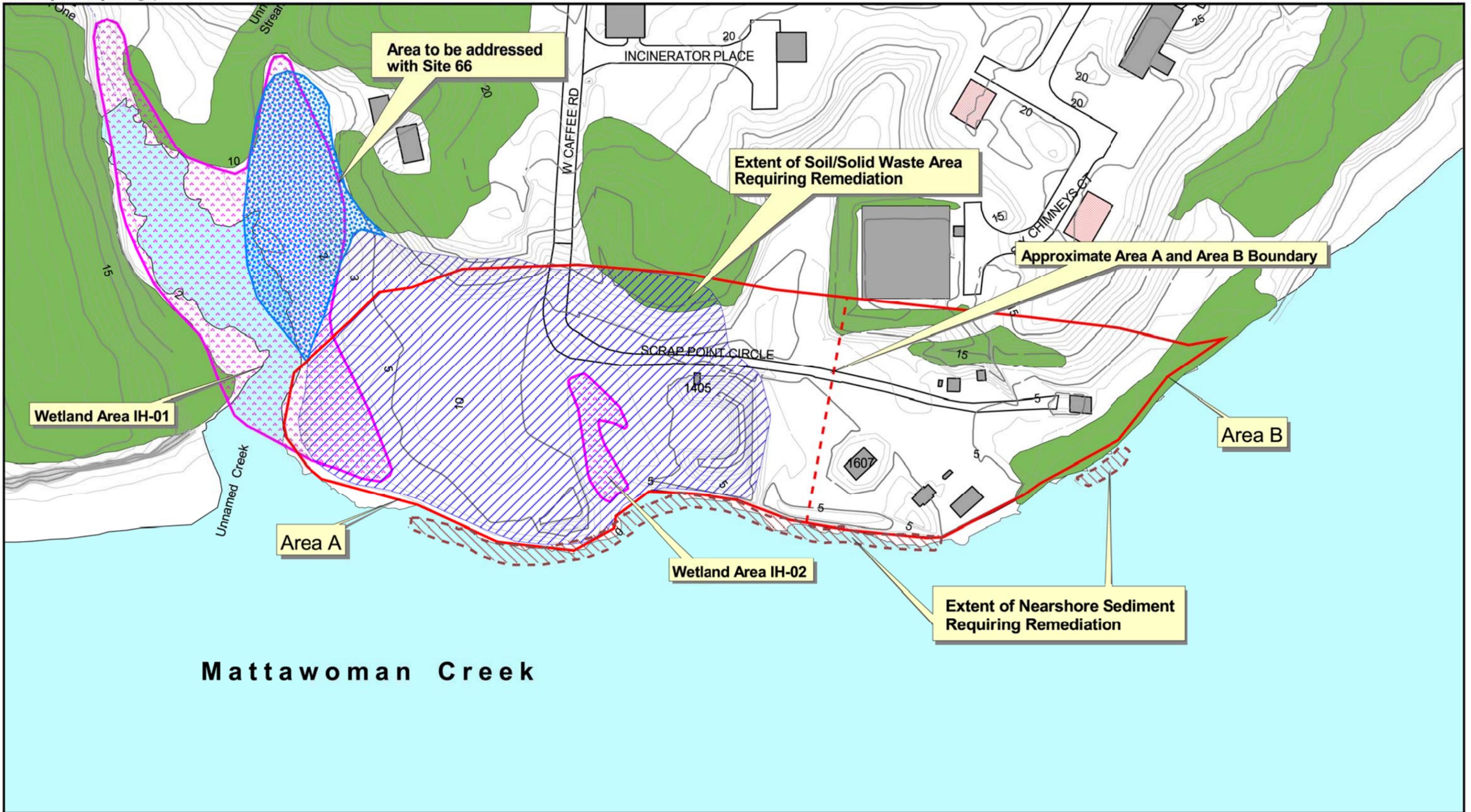
TABLE 4-2
Summary of Site 11 SRGs
Site 11 - Caffee Road Landfill
Naval Support Facility-Indian Head
Indian Head, Maryland

COCs	SRGs (mg/kg)
Area A Soil and Solid Waste	
Arsenic	18.3
Cadmium	36
Copper	1,500
Manganese	533
Sediment	
Zinc	450

Notes:

From Site 11 ROD (NAVFAC, 2009)

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LEGEND

- | | | |
|-----------------------------------|------------------------------------|---|
| Approximate Site Boundary | Wooded Area | Topographic Index |
| Limits of Waste | Buildings | Contours (5 foot Interval) |
| Area to be addressed with Site 66 | Demolished Buildings | Stream |
| Wetland Area | Boundary between Area A and Area B | Roads |
| Sediment Area of Attainment | | 5.5 = Estimated Thickness of Waste (feet) |

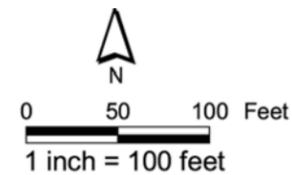


FIGURE 4-1
 SITE 11 LAYOUT
 NAVAL SUPPORT FACILITY - INDIAN HEAD
 INDIAN HEAD, MARYLAND

5.0 SITE 12 – TOWN GUT LANDFILL

5.1 SITE CHRONOLOGY

Site 12 - Town Gut Landfill covers an area of approximately 4 acres in the central portion of NSF-IH. The site features are shown on Figure 5-1. Between 1968 and June 1980, Site 12 was used by NSF-IH to dispose of landscaping waste, fill material, and rubble. Reportedly, material from outside the facility was also disposed at the site until 1972 (IAS, Hart, 1983). Unauthorized dumping of trash may also have occurred. Some of the unauthorized items reportedly disposed at Site 12 included paint, varnish, and other chemical waste.

A chronology of events for Site 12 is presented in Table 5-1 and a photograph of the site is presented as Figure 5-2



Figure 5-2. Photograph of Site 12 facing south along western portion of sloped landfill.

5.2 BACKGROUND

5.2.1 Land and Resource Use

Site 12 is currently maintained as an open space. No future land use changes are projected and no other land use for this site is planned by the Navy. Shallow groundwater beneath the site is not used for any purpose and the Navy has no plans to develop the groundwater resource in the future. Residential

development of Site 12 is restricted by the ROD. Land use controls (LUCs) restrict the use of groundwater as a potable water supply and prevent intrusive activities on the landfill cover.

5.2.2 Basis for Remedial Action

The need for remedial action at Site 12 was based on the history of site activities, nature and extent of the contamination, and a risk assessment to determine the effects of contamination on human and ecological receptors.

5.2.3 Summary of Contamination

Surface soil, groundwater, surface water, and sediment were sampled during previous investigations. COCs have been identified in groundwater and soil. These COCs have been identified based on the risk drivers from the HHRA, ERA, and exceedances of regulatory criteria. The COCs identified for groundwater include cis-1,2-dichloroethene (DCE), trichloroethene (TCE), vinyl chloride (VC), arsenic, iron, lead, and manganese. The COCs identified for soil include arsenic and iron. A summary of the COCs is shown on Table 5-2.

5.3 REMEDIAL ACTIONS

5.3.1 Remedial Action Objectives

Based on the evaluation of site conditions, an understanding of the contaminants, the physical properties in media of concern, the results of risk assessments, and an analysis of ARARs, the following RAOs were developed:

- Close the landfill in a manner that protects human health and the environment and controls air, water, and land pollution in accordance with State Solid Waste Management Regulations COMAR 26.04.07.
- Prevent future residential receptor exposure to contaminated soil and shallow groundwater.
- Prevent ecological receptor exposure to contaminated soil.

These RAOs were developed following guidance provided in Land Use in the CERCLA Remedy Selection Process (USEPA, 1995). According to this guidance, RAOs should reflect the reasonably anticipated future land use or uses. The need for RAOs for groundwater was evaluated following Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites (USEPA, 1988).

5.3.2 Selected Remedy

The selected remedy for Site 12 identified in the ROD included:

- Completion of a removal action. An Engineering Evaluation/Cost Assessment (EE/CA) (U.S. Navy, 2002) and Action Memorandum for a non-time-critical removal action were prepared in 2002 (U.S. Navy, 2002). A non-time-critical removal action that closed the landfill to the satisfaction of the state was then implemented. The removal action included the following major components:
 - Large items of exposed waste and debris found along the shores of the ponds were excavated and removed for off-site disposal. Soil, sediment, and small objects were excavated to remove contaminated material from near the ponds and were consolidated under the cover of the site. Wetland soil and vegetation disturbed during the removal action were replaced.
 - An area of approximately 4.3 acres was covered with soil. Additional soil was placed as needed over the landfill so that all waste was covered with a minimum of 2-foot layer of soil. A type of vegetation that would discourage animals from burrowing into the landfill was planted on the soil cover.
- LUCs, which prohibit the use of shallow groundwater as a potable water source, prohibit residential use, and prevent land disturbance activities that could compromise the integrity of the soil cover.
- LTM of groundwater and surface water. The LTMP titled Post-Closure Long-Term Monitoring Plan for Site 12 - Town Gut Landfill (Tetra Tech, 2002) provides for the periodic collection and analysis of groundwater and surface water samples.
- Review of removal action performance every five years.

Groundwater remediation was not included in the selected remedy because contaminated groundwater was not identified outside the footprint of the landfill.

The installation of the soil cover was completed in 2002. Long-term monitoring was initiated in March 2004.

5.4 PROGRESS SINCE THE LAST REVIEW

The first Five-Year Review of Site 12 was completed in August 2007 (JMWA, 2007). The report concluded that the remedy at Site 12 was protective of human health and the environment. The following recommendations were identified during the review:

- The landfill vegetation should be cut once per year to prevent the establishment of trees and brush. The cut height should be appropriate for the time of year (not too short in mid-summer to avoid killing the vegetation).
- As a preventive maintenance measure, it is recommended that excess vegetation and debris be removed from the rip rap area so that surface water can flow freely through the channel and so that brush and saplings do not become established.
- New brass locks, all with the same key, should be placed on all the monitoring well covers.

The site inspection, conducted as part of the Five-Year Review, showed that the vegetation on the cover is greater than 6 inches in height in accordance with the site requirements. However, some minor vegetation, including several saplings, were observed in the drainage ditches. Brass locks have been installed on the monitoring wells.

The Indian Head Installation Restoration Team (IHIRT) reviewed the surface water monitoring at Site 12. Based on the results of ecological risk evaluation performed subsequent to the July 2007 sampling event, none of the chemicals detected in surface water are expected to cause site-related adverse effects to aquatic biota at Site 12 (Tetra Tech, 2007). Therefore, it was determined by the IHIRT that additional surface water sampling at Site 12 was not required for any monitoring event after October 2007.

In addition, the IHIRT reviewed optimization measures for the groundwater monitoring. Groundwater monitoring at Site 12 has historically been conducted on a quarterly basis in accordance with the decision logic presented in the LTMP (Tetra Tech, July 2002). A total of eight years of monitoring for selected analytes, including multiple full Hazardous Substances List (HSL) sampling events, have been completed and provide a comprehensive history of the concentrations of the site constituents. Overall, the statistical trend analyses from the 2010 Site 12 End-of-Sequence Report (Sovereign, 2010) indicated that the site constituents have become relatively stable based on the lack of trends observed for the majority of the constituents. The human health risk evaluation from the Site 12 October 2010 Event Report (Sovereign, 2011) indicated that there are some risks associated with exposure to arsenic, cobalt, iron, manganese, and naphthalene in site groundwater.

On March 23, 2011, the IHIRT agreed to cease the monitoring of select volatile organic compounds (VOCs) (TCE, cis-1,2-DCE, and VC) and lead based on the monitoring results and lack of risk associated with these constituents. Due to the risks associated with arsenic, cobalt, iron, and manganese, the IHIRT agreed to continue monitoring these constituents. However, because the trend analysis indicated that the concentrations of the majority of the site constituents have become relatively stable, the frequency of monitoring for these constituents was reduced to once every 15 months. The Team also agreed to evaluate the concentrations of naphthalene from a future monitoring event to determine the appropriate path forward.

5.5 FIVE YEAR REVIEW PROCESS

5.5.1 Document Review

Part of the Five-Year Review consisted of a review of relevant documents. Historical documents are referenced in Table 5-1 and Section 12.0.

5.5.2 Data Review

Monitoring data has been collected since the implementation of the remedial action. A LTMP (Tetra Tech, 2002) was developed to comply with the groundwater and surface water monitoring requirements of the CERCLA Program. As previously discussed in Section 5.4, the surface water monitoring was discontinued after October 2007.

The groundwater monitoring data (frequency of detections) for the period of this review (September 2007 – August 2012) is summarized in Table 5-3. The analytical results show that there were isolated detections of pesticides, however, the concentrations were below the screening criteria. Isolated concentrations of VOCs and SVOCs were detected that exceeded the screening criteria. In addition, the metals concentrations exceeded the screening criteria at all of the monitoring wells. The current groundwater monitoring program at Site 12 consists of the analysis of select metals (arsenic, cobalt, iron, and manganese) at a frequency of 15 months. The analytical results from the most recent sampling event (April 2012) sampling event are shown on Figure 5-1.

As part of the monitoring, a human health risk evaluation was conducted utilizing the HSL data collected during the October 2010 sampling event (Sovereign, 2011). The risk evaluation showed that the majority of the site constituents that exceeded the screening criteria did not contribute to site risks. However, there are some risks associated with exposure to arsenic, cobalt, iron, and manganese in site groundwater. In addition, the risk evaluation results indicated that a detection of naphthalene posed an unacceptable risk at MW-10, however, naphthalene has not been previously detected at the site. Following the naphthalene detection during the October 2010 event, subsequent sampling events for

naphthalene were conducted at MW-10 in April 2011 and April 2012. The results indicate that naphthalene was detected in April 2011, however, naphthalene was not detected in April 2012. Therefore, the IHIRT agreed on July 25, 2012 that naphthalene will be sampled at MW-10 during the next monitoring event (July 2013) to evaluate naphthalene trends.

Trend analyses were performed on the monitoring data to evaluate the concentrations of site constituents over time (Sovereign, 2011). The results from the short-term trend tests (using data from four monitoring events) are presented in Table 5-4. The short-term statistical analysis identified increasing and decreasing trends for cobalt. The results of the long-term trend tests (using data from all of the monitoring events) are presented in Table 5-5. The long-term statistical analysis identified increasing trends for arsenic (MW-10, MW-11, and MW-13), iron (MW-8 and MW-10), and lead (MW-8).

There are exceedances of the screening criteria for metals. In addition, increasing trends were observed for some of the site constituents at four downgradient monitoring wells. However, the majority of the site constituent concentrations either demonstrated no trend or a decreasing trend. Furthermore, the implementation of the soil cover and LUCs preventing potable use of site groundwater has prevented exposure to site constituents. Also, the remedy did not include groundwater remediation because contaminated groundwater was not identified outside of the footprint of the landfill. Therefore, the remedy continues to be protective of human health and the environment.

5.5.3 Site Inspection

An inspection of the site was conducted on April 26, 2012 by representatives of Tetra Tech. The purpose of the inspection was to assess the protectiveness of the remedy, including the integrity of the soil cover. Appendix A contains the site inspection checklist. Photographs taken during the site inspection are included in Appendix B.

The selected remedy appears to be effective and functioning as designed to be protective of human health and the environment and control exposure pathways that could result in unacceptable risk. There is no evidence of damage to the cover and inspection of the drainage channels and road indicate that these are in good working condition. However, some saplings were observed growing in the drainage channels, and a fallen tree was observed in one of the drainage channels. These issues may obstruct surface water flow on the landfill cover, however, this does not impact the effectiveness of the remedy.

5.5.4 Interview

Interviews have been conducted with MDE and NAVFAC and are included in Appendix C.

5.6 TECHNICAL ASSESSMENT

5.6.1 Question A: Is The Remedy Functioning As Intended By The Decision Documents?

The review of documents, monitoring results, and site inspection indicate the final remedy which includes a soil cover with vegetation, LUCs, and LTM is functioning as intended by the ROD. The site inspection did not identify any problems or disturbances of the soil cover and vegetation. The land use controls are responsible for the remedial action functioning as intended. The institutional controls include restrictions on intrusive activities at the site and any other activities or actions that might interfere with the implemented final remedy. NAVFAC manages and maintains a base-wide GIS. All IR Sites are identified on the GIS. All work performed on the activity must be approved by the Navy.

The groundwater monitoring indicated that the concentrations of the majority of the site constituents in groundwater were relatively stable based on a lack of trends over time. Some site constituents exceeded their respective screening criteria. However, the soil cover and LUCs prevent use of groundwater at Site 12. The site is bounded by surface water bodies, therefore, the monitoring wells are located within the footprint of the landfill.

No evidence of any activities of an intrusive, residential, or disturbing nature were observed during the site inspection that would have violated any of the land use controls. In summary, the LUCs, presence of a soil cover, operation and maintenance (O&M) inspections, and long-term monitoring are in place to successfully prevent human exposure to the site-related contaminants at Site 12.

5.6.2 Question B: Are The Exposure Assumptions, Toxicity Data, Clean-Up Levels, And RAOs Used At The Time Of The Remedy Selection Still Valid?

The physical conditions of Site 12 have not changed since execution of the ROD in a way that would affect the protectiveness of the remedy. Based on the remedy evaluation for data in existing documents and confirmation that the applicable State and Federal standards for the COCs have not changed significantly, the exposure assumptions, toxicity data, cleanup levels, and RAOs are still valid, especially considering the intact soil cover (exposure barrier). The remedy is in compliance with the ARARs.

The HHRA presumed unacceptable risks for hypothetical future residential exposure to soils and landfill materials, as well as groundwater. There have been no changes to the RAOs used for the selection of a soil cover remedy. There are no changes to exposure assumptions or toxicity values that warrant discussion as related to revising cleanup levels, especially considering the landfill cover (exposure barrier) will remain in place with no residential development. Vapor intrusion was not considered as an

exposure pathway in the HHRA. However, the two buildings located nearest to the site are located adjacent to both of the upgradient monitoring wells (MW-07, and MW-12). These buildings are occupied infrequently and VOCs were removed from the LTM program based on the monitoring results and lack of risk. Based on these factors, there appears to be little potential for vapor intrusion at Site 12.

The remedy is functioning as intended and the soil cover will be maintained as long as wastes remain in place. Because wastes remain in place, Site 12 will continue to be subject to the requirement for five-year reviews and for the Maryland's post-closure groundwater monitoring requirements.

The LTMP (Tetra Tech, 2002) provided screening criteria for site COCs. However, since implementation of the LTMP, the screening criteria for arsenic and iron in groundwater has been revised to 10 micrograms per liter (ug/L) [current USEPA maximum contaminant limit (MCL)] and 300 ug/L (USEPA secondary MCL), respectively. The criteria identified in the LTMP were 5 ug/L for arsenic and 22,000 ug/L for iron. The change in the screening values provides a more conservative evaluation of the site concentrations.

5.6.3 Question C: Has Any Other Information Come To Light That Calls Into Question The Protectiveness Of The Remedy?

Naphthalene was identified as a risk driver during the October 2010 monitoring event at MW-10. As previously discussed in Section 5.5.2, two subsequent monitoring events have been completed for naphthalene. Naphthalene was not detected during the most recent sampling event. One additional monitoring event for naphthalene will be completed in July 2013 to allow the IHIRT Team to further evaluate naphthalene concentrations.

5.6.4 Technical Assessment Summary

The final remedy consisting of a soil cover with vegetation, institutional controls, which include land use controls, O&M inspections, and LTM, are successful in achieving the RAOs in the ROD by restricting exposure to site-related contaminants. Analytical data from LTM of groundwater indicates that there is no significant increase in the organic or metals concentrations. The LUCs, through the permitting process and the GIS, are the primary reason that the RAOs have been met. There is no other information that calls into question the protectiveness of the final remedy.

5.7 ISSUES

Two issues were identified during the site inspection as follows:

- Saplings were observed growing in the rip rap lined drainage channel east of the center portion of the landfill,
- A fallen tree was observed in the rip rap lined drainage channel east of the northern portion of the landfill.

These issues do not represent an immediate impact to the protectiveness of the remedy. However, these issues should be addressed to ensure that surface water can drain from the site.

5.8 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Based on the results of this Five-Year Review, it is recommended that the saplings and fallen tree be removed from the drainage channels. In addition, it is recommended to conduct one additional monitoring event for naphthalene at MW-10.

5.9 PROTECTIVENESS STATEMENT

The remedy for Site 12 is protective of human health and the environment and is functioning as intended by the ROD. The exposure pathways that could result in unacceptable risks have been controlled and the RAOs have been satisfied. The exposure assumptions, toxicity data, and RAOs used at the time of the final remedy selection are still valid. No other information that could call into question the protectiveness of the remedy has been identified in this review.

5.10 NEXT REVIEW

The next Five-Year Review for Site 12 is required by 2017, five years from the date of this review.

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TABLE 5-1
 Chronology of Site 12 Events
 Site 12 – Town Gut Landfill
 Naval Support Facility - Indian Head
 Indian Head, Maryland

Event	Date
Unauthorized dumping at Town Gut Landfill	1968-1980
IAS (Hart, 1983)	1983
Confirmation Study (CH2M HILL, 1985)	1985
RI initiated	1997
Additional field investigation performed and RI report prepared (Tetra Tech, 1999)	1999
FS Report (Tetra Tech, 2001) and Proposed Plan published	2001
Engineering Evaluation/Cost Analysis (EE/CA) prepared (U.S. Navy, 2002)	2002
Removal Action completed (Shaw, 2003)	2002
ROD signed (USEPA et al., 2004)	2004
LTMP completed (Tetra Tech, 2002)	2002
LTM initiated	2004
First Five-Year Review (JWMA, 2007)	2007

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TABLE 5-2
 Summary of Site 12 COCs
 Site 12 - Town Gut Landfill
 Naval Support Facility-Indian Head
 Indian Head, Maryland

Exposure Point	Chemical of Concern
Soil - ingestion, dermal contact, inhalation	Arsenic
	Iron
Groundwater - ingestion, dermal contact, inhalation	cis-1,2-Dichloroethene
	Trichloroethene
	Vinyl Chloride
	Arsenic
	Iron
	Lead
	Manganese

Notes:

From the Site 12 RI (Tetra Tech, 1999)

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TABLE 5-3
Site 12 Frequency of Detections
September 2007 - August 2012
Site 12 - Town Gut Landfill
Naval Support Facility-Indian Head
Indian Head, Maryland
Page 1 of 2

Parameter	Frequency of Detection	Min Res	Max Res	Location of Max Detect	Sample of Max Detect	Min ND	Max ND	Average of Positive Results	Overall Average	Standard Deviation
Inorganics (ug/L)										
ALUMINUM	2/14	31.4	55.8	S12MW009	S12MW0090026	4.9	129	43.6	32.955357	23.11435239
ANTIMONY	3/14	2.5	4	S12MW009	S12MW0090018	0.048	1.9	2.741666	0.887857	1.171083907
ARSENIC	45/105	0.22 J	39.7	S12MW010	S12MW0100022	0.5	10	8.518111	4.656285	6.607060036
BARIUM	14/14	12.7	350	S12MW008	S12MW0080026			173.271428	173.271428	141.7429441
BERYLLIUM	2/14	0.32 J	2.2	S12MW009	S12MW0090026	0.2	4.4	1.26	0.562857	0.717232165
CADMIUM	2/14	0.091 J	0.11 J	S12MW009	S12MW0090026	0.2	0.4	0.1005	0.150071	0.051947406
CALCIUM	14/14	601	139000	S12MW008	S12MW0080026			68415.78571	68415.78571	46709.29269
CHROMIUM	11/14	0.19 J	104 K	S12MW009	S12MW0090018	0.87	1	11.024545	8.764642	27.46608821
COBALT	68/98	0.46 J	1200	S12MW009	S12MW0090028	0.25	8.7	140.072647	97.513418	288.8233109
COPPER	7/14	0.24 J	0.91 J	S12MW007	S12MW0070026	0.7	0.7	0.501428	0.425714	0.179431336
IRON	84/105	26.5 J	130000	S12MW013	S12MW0013028	6.27	100	67411.59643	53932.17319	41809.18573
LEAD	14/49	0.07 J	8 K	S12MW008	S12MW0080024	0.2	7.4	2.472285	1.770142	1.577161202
MAGNESIUM	14/14	587	203000	S12MW009	S12MW0090018			39469.57143	39469.57143	58664.99488
MANGANESE	105/105	20.8	17000	S12MW009	S12MW0090028			3190.160952	3190.160952	4212.457443
NICKEL	9/14	0.41 J	851	S12MW009	S12MW0090018	0.2	0.98	146.391111	94.255714	238.6976403
POTASSIUM	14/14	245 J	11500	S12MW013	S12MW0130026			5469.285714	5469.285714	3849.678237
SELENIUM	6/14	0.29 J	4.3 J	S12MW009	S12MW0090026	0.4	4.7	1.705833	1.920357	1.044944725
SODIUM	14/14	27100	534000	S12MW009	S12MW0090018			112735.7143	112735.7143	167846.4814
VANADIUM	6/14	0.63 J	2.1 J	S12MW008	S12MW0080026	0.56	3	1.29	1.0325	0.550429028
ZINC	10/14	10.5	796 J	S12MW009	S12MW0090018	0.79	7.2	129.965	93.306428	221.8333388
Filtered Inorganics (ug/L)										
ALUMINUM	5/14	30.4	65.6	S12MW007	S12MW007A0018	4.5	384	44.34	43.273214	46.64396909
ARSENIC	42/105	1.1	46.5	S12MW013	S12MW0130020	0.5	14.6	12.882142	6.439238	9.500244627
BARIUM	14/14	12.6	397 J	S12MW011	S12MW0110018-D			185.771428	185.771428	152.710437
BERYLLIUM	2/14	0.33 J	2.1	S12MW009	S12MW0090026	0.2	4	1.215	0.470892	0.677259471
CADMIUM	1/14	0.1 J	0.1 J	S12MW009	S12MW0090026	0.2	0.4	0.1	0.15	0.051887452
CALCIUM	14/14	634	140000	S12MW009	S12MW0090018			71311.5	71311.5	49875.13977
CHROMIUM	6/14	0.28 J	97.2 K	S12MW009	S12MW0090018	0.87	1	17.771666	7.879642	25.77466529
COBALT	67/98	0.37 J	1220	S12MW009	S12MW0090018	0.25	11.4	143.631119	98.592959	294.8315611
COPPER	7/14	0.28 J	1.4 J	S12MW007	S12MW0070026	0.5	2.9	0.662857	0.615	0.401372645
IRON	80/105	30 J	130000	S12MW013	S12MW0013028	6.27	169	58528.8075	44597.3021	41989.7074
LEAD	14/49	0.074 J	7.5	S12MW008	S12MW0080024	0.2	3	3.553142	1.810285	1.869943136
MAGNESIUM	14/14	523	216000	S12MW009	S12MW0090018			40132.85714	40132.85714	61516.08191
MANGANESE	105/105	15.1	17000	S12MW009	S12MW0090028			3202.541428	3202.541428	4254.202072
NICKEL	8/14	0.23 J	880	S12MW009	S12MW0090018	0.2	3.3	164.28625	94.148571	245.8375175
POTASSIUM	14/14	315 J	14100 J	S12MW013	S12MW0130018			6203.357142	6203.357142	4543.134137
SELENIUM	12/14	0.23 J	31.1 J	S12MW011	S12MW0110018-D	4.7	4.7	8.931666	7.991428	10.40836635

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TABLE 5-3
Site 12 Frequency of Detections
September 2007 - August 2012
Site 12 - Town Gut Landfill
Naval Support Facility-Indian Head
Indian Head, Maryland
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Parameter	Frequency of Detection	Min Res	Max Res	Location of Max Detect	Sample of Max Detect	Min ND	Max ND	Average of Positive Results	Overall Average	Standard Deviation
SODIUM	14/14	26900	585000	S12MW009	S12MW0090018			116878.5714	116878.5714	176361.7084
VANADIUM	6/14	0.64 J	2.7 K	S12MW011	S12MW0110018	0.56	3.4	1.503333	1.127142	0.748972923
ZINC	11/14	1.5 L	936	S12MW009	S12MW0090018	0.79	0.79	127.931818	100.6025	256.6787484
Semivolatle Organics (ug/L)										
2-METHYLNAPHTHALENE	1/14	3 J	3.1 J	S12MW010	S12MW0100026-D	2	5.6	3.05	1.95	0.864914402
ACENAPHTHENE	5/14	1.5 J	4.1 J	S12MW011	S12MW0110026	2	5.3	2.84	2.210714	1.048107924
ANTHRACENE	1/14	1.7 J	1.7 J	S12MW011	S12MW0110026	2	5.6	1.7	1.853571	0.806097982
BIS(2-ETHYLHEXYL)PHTHALATE	1/14	1.5 J	1.5 J	S12MW012	S12MW0120018	2	5.6	1.5	1.732142	0.815854234
CARBAZOLE	1/14	1.8 J	1.8 J	S12MW010	S12MW0100026	2	5.6	1.8	1.860714	0.805074906
DIBENZOFURAN	2/14	1.4 J	1.9 J	S12MW010	S12MW0100026-D	2	5.6	1.625	1.892857	0.778523539
FLUORANTHENE	1/14	1.5 J	1.5 J	S12MW011	S12MW0110026	2	5.6	1.5	1.839285	0.810787502
FLUORENE	5/14	0.98 J	2.9 J	S12MW010	S12MW0100026-D	2	5.6	1.986	1.905714	0.800285663
NAPHTHALENE	1/14	15	16	S12MW010	S12MW0100026	2	5.6	15.5	2.839285	3.731836966
PHENANTHRENE	2/14	1 J	3.1 J	S12MW010	S12MW0100026-D	2	5.6	1.975	1.942857	0.855492917
PYRENE	1/14	1.5 J	1.5 J	S12MW011	S12MW0110026	2	5.6	1.5	1.839285	0.810787502
Volatile Organics (ug/L)										
BENZENE	1/14	2.5 J	2.5 J	S12MW008	S12MW0080026	0.5	5	2.5	1.535714	1.15549333
CHLOROETHANE	1/14	4.8 J	4.8 J	S12MW008	S12MW0080026	0.5	5	4.8	1.7	1.433258794
CIS-1,2-DICHLOROETHENE	2/42	0.039 J	0.059 J	S12MW008	S12MW0080024	0.5	5	0.0505	1.7405	1.087881747
NAPHTHALENE	1/2	0.9 J	1 J	S12MW010	S12MW10-041411-D	0.5	0.5	0.95	0.6	0.494974747
Pesticides/PCBs (ug/L)										
4,4'-DDD	1/7	0.027 J	0.027 J	S12MW011	S12MW0110018	0.1	0.11	0.027	0.050285	0.010435744
ALPHA-CHLORDANE	1/7	0.017 J	0.017 J	S12MW011	S12MW0110018-D	0.05	0.056	0.017	0.025357	0.003793792
DELTA-BHC	1/7	0.0088 J	0.011 J	S12MW011	S12MW0110018	0.05	0.056	0.0099	0.024342	0.006432174
GAMMA-CHLORDANE	1/7	0.012 J	0.012 J	S12MW011	S12MW0110018	0.05	0.056	0.012	0.024642	0.005647376

Notes:

J - Analyte present, reported value is estimated

K - Analyte present, reported value may be biased high

L - Analyte present, reported value may be biased low

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TABLE 5-4
Short-Term Trend Test Summary July 2009 Through April 2010
Indian Head Site 12 - Town Gut Landfill
Naval Support Facility - Indian Head,
Indian Head, Maryland

CHEMICAL	S12MW008			S12MW009			S12MW010			S12MW011			S12MW013		
	S TEST STATISTIC	P-VALUE	CONCLUSION												
VOLATILES															
CIS-1,2-DICHLOROETHENE	NA ⁽¹⁾														
DISSOLVED METALS															
ARSENIC	0	0.625	No Trend	-4	0.167	No Trend	-4	0.167	No Trend	-2	0.375	No Trend	0	0.625	No Trend
COBALT	1	0.625	No Trend	-6	0.042	Downward Trend	-3	0.375	No Trend	4	0.167	No Trend	6	0.042	Upward Trend
IRON	-4	0.167	No Trend	-2	0.375	No Trend	2	0.375	No Trend	-4	0.167	No Trend	-4	0.167	No Trend
LEAD	NA ⁽¹⁾														
MANGANESE	1	0.625	No Trend	-5	0.167	No Trend	-2	0.375	No Trend	-4	0.167	No Trend	-4	0.167	No Trend

Notes:

NA = Not Applicable

(1) There are not at least four rounds of data.

(2) All the rounds of data are non-detect.

* 5 Percent Significance Level was used to determine if a trend is present.

TABLE 5-5
 Long-Term Trend Test Summary July 2006 Through April 2010
 Indian Head Site 12 - Town Gut Landfill
 Naval Support Facility - Indian Head,
 Indian Head, Maryland

CHEMICAL	S12MW008			S12MW009			S12MW010			S12MW011			S12MW013		
	KENDALL SCORE	P-VALUE	CONCLUSION	KENDALL SCORE	P-VALUE	CONCLUSION	KENDALL SCORE	P-VALUE	CONCLUSION	KENDALL SCORE	P-VALUE	CONCLUSION	KENDALL SCORE	P-VALUE	CONCLUSION
VOLATILES															
CIS-1,2-DICHLOROETHENE	-5	0.511	NO TREND	-5	0.511	NO TREND	-5	0.511	NO TREND	-5	0.511	NO TREND	-5	0.511	NO TREND
DISSOLVED METALS															
ARSENIC	29	0.206	NO TREND	20	0.391	NO TREND	63	0.00508	UPWARD TREND	75	0.000766	UPWARD TREND	49	0.026	UPWARD TREND
COBALT	15	0.273	NO TREND	-7	0.64	NO TREND	-6	0.696	NO TREND	6	0.696	NO TREND	20	0.138	NO TREND
IRON	52	0.0217	UPWARD TREND	-10	0.685	NO TREND	70	0.00189	UPWARD TREND	10	0.685	NO TREND	28	0.224	NO TREND
LEAD	27	0.0376	UPWARD TREND	18	0.181	NO TREND	4	0.813	NO TREND	25	0.0549	NO TREND	22	0.0983	NO TREND
MANGANESE	33	0.149	NO TREND	2	0.964	NO TREND	-14	0.558	NO TREND	-48	0.034	DOWNWARD TREND	-22	0.344	NO TREND

Notes:

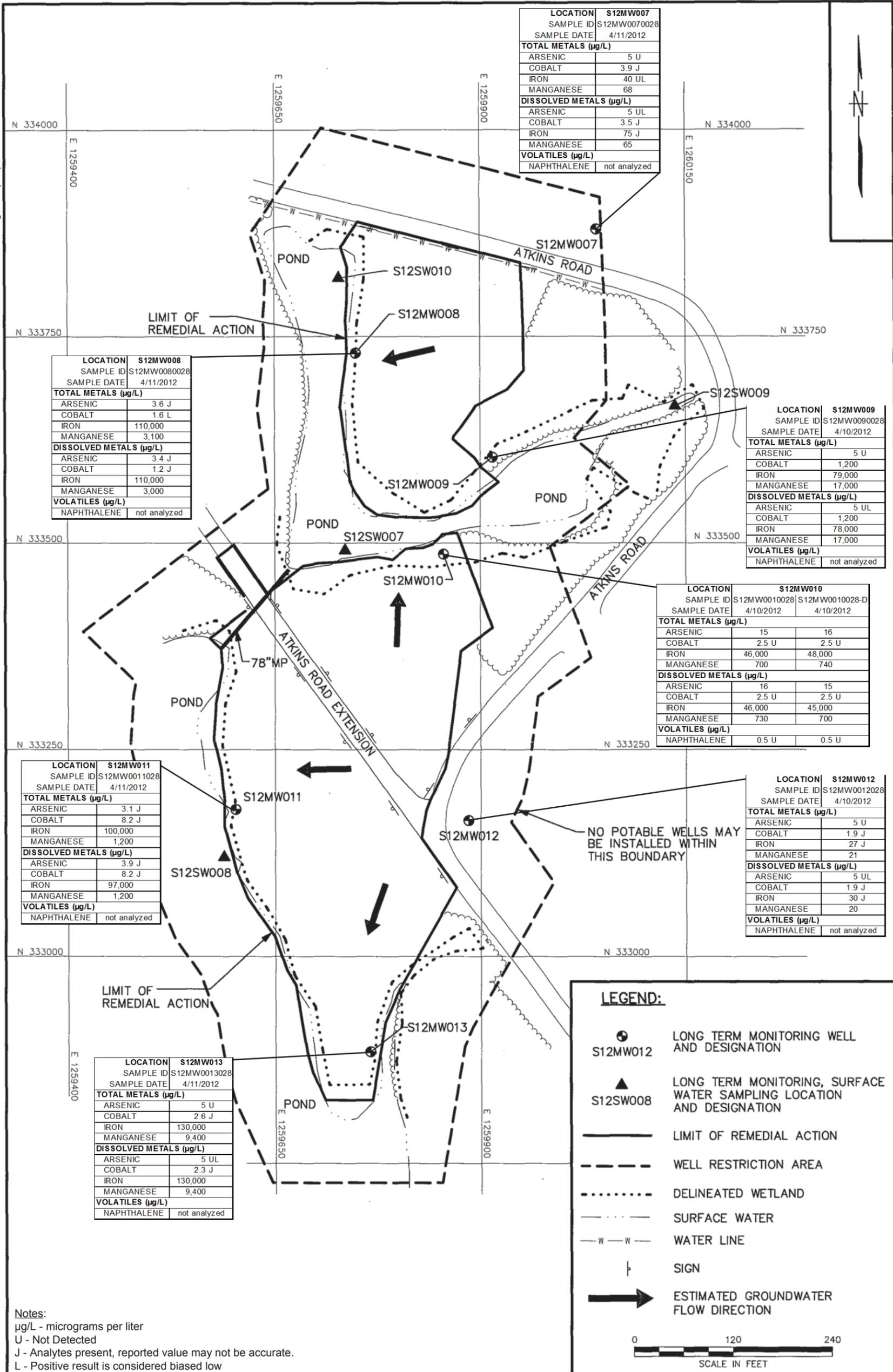
NA = Not Applicable

(1) There are not at least four rounds of data.

(2) All the rounds of data are non-detect.

* 5 Percent Significance Level was used to determine if a trend is present.

ACAD: 0525CM67.dwg 06/05/02 HJB PIT



LOCATION	S12MW007
SAMPLE ID	S12MW0070028
SAMPLE DATE	4/11/2012
TOTAL METALS (µg/L)	
ARSENIC	5 U
COBALT	3.9 J
IRON	40 UL
MANGANESE	68
DISSOLVED METALS (µg/L)	
ARSENIC	5 UL
COBALT	3.5 J
IRON	75 J
MANGANESE	65
VOLATILES (µg/L)	
NAPHTHALENE	not analyzed

LOCATION	S12MW008
SAMPLE ID	S12MW0080028
SAMPLE DATE	4/11/2012
TOTAL METALS (µg/L)	
ARSENIC	3.6 J
COBALT	1.6 L
IRON	110,000
MANGANESE	3,100
DISSOLVED METALS (µg/L)	
ARSENIC	3.4 J
COBALT	1.2 J
IRON	110,000
MANGANESE	3,000
VOLATILES (µg/L)	
NAPHTHALENE	not analyzed

LOCATION	S12MW009
SAMPLE ID	S12MW0090028
SAMPLE DATE	4/10/2012
TOTAL METALS (µg/L)	
ARSENIC	5 U
COBALT	1,200
IRON	79,000
MANGANESE	17,000
DISSOLVED METALS (µg/L)	
ARSENIC	5 UL
COBALT	1,200
IRON	78,000
MANGANESE	17,000
VOLATILES (µg/L)	
NAPHTHALENE	not analyzed

LOCATION	S12MW010	
SAMPLE ID	S12MW0010028	S12MW0010028-D
SAMPLE DATE	4/10/2012	4/10/2012
TOTAL METALS (µg/L)		
ARSENIC	15	16
COBALT	2.5 U	2.5 U
IRON	46,000	48,000
MANGANESE	700	740
DISSOLVED METALS (µg/L)		
ARSENIC	16	15
COBALT	2.5 U	2.5 U
IRON	46,000	45,000
MANGANESE	730	700
VOLATILES (µg/L)		
NAPHTHALENE	0.5 U	0.5 U

LOCATION	S12MW011
SAMPLE ID	S12MW0011028
SAMPLE DATE	4/11/2012
TOTAL METALS (µg/L)	
ARSENIC	3.1 J
COBALT	8.2 J
IRON	100,000
MANGANESE	1,200
DISSOLVED METALS (µg/L)	
ARSENIC	3.9 J
COBALT	8.2 J
IRON	97,000
MANGANESE	1,200
VOLATILES (µg/L)	
NAPHTHALENE	not analyzed

LOCATION	S12MW012
SAMPLE ID	S12MW0012028
SAMPLE DATE	4/10/2012
TOTAL METALS (µg/L)	
ARSENIC	5 U
COBALT	1.9 J
IRON	27 J
MANGANESE	21
DISSOLVED METALS (µg/L)	
ARSENIC	5 UL
COBALT	1.9 J
IRON	30 J
MANGANESE	20
VOLATILES (µg/L)	
NAPHTHALENE	not analyzed

LOCATION	S12MW013
SAMPLE ID	S12MW0013028
SAMPLE DATE	4/11/2012
TOTAL METALS (µg/L)	
ARSENIC	5 U
COBALT	2.6 J
IRON	130,000
MANGANESE	9,400
DISSOLVED METALS (µg/L)	
ARSENIC	5 UL
COBALT	2.3 J
IRON	130,000
MANGANESE	9,400
VOLATILES (µg/L)	
NAPHTHALENE	not analyzed

LEGEND:

- LONG TERM MONITORING WELL AND DESIGNATION
- LONG TERM MONITORING, SURFACE WATER SAMPLING LOCATION AND DESIGNATION
- LIMIT OF REMEDIAL ACTION
- WELL RESTRICTION AREA
- DELINEATED WETLAND
- SURFACE WATER
- WATER LINE
- SIGN
- ESTIMATED GROUNDWATER FLOW DIRECTION

0 120 240
SCALE IN FEET

Notes:
 µg/L - micrograms per liter
 U - Not Detected
 J - Analytes present, reported value may not be accurate.
 L - Positive result is considered biased low

DRAWN BY HJB	DATE 2/18/02	SITE PLAN SITE 12 - TOWN GUT LANDFILL NAVAL SUPPORT FACILITY-INDIAN HEAD	CONTRACT NO. 7129	OWNER NO. 0295
CHECKED BY <i>[Signature]</i>	DATE 7/30/02		APPROVED BY <i>[Signature]</i>	DATE 7/30/02
SCALE AS NOTED			DRAWING NO. FIGURE 5-1	REV. 0

6.0 SITES 14, 15, 16, 49, 50, 53, 54, AND 55 – LAB AREA

6.1 SITE CHRONOLOGY

As a result of similar historic usage, proximity, the sharing of sewer utilities, and overlapping field investigations, it was decided by the U.S. Navy, MDE, and the USEPA in May 2000 to refer to the area encompassing Sites 14, 15, 16, 49, 50, 53, 54, and 55 as the “Lab Area.” The Lab Area is located in the northeastern area of NSF-IH (Figure 1-2). The approximate boundary of the Lab Area and the various sites it contains are shown in Figure 6-1. A chronology of events for the Lab Area is presented in Table 6-1 and a photograph of the site is presented as Figure 6-2.



Figure 6-2. Photograph of Lab Area facing south from Site 15.

6.1.1 Site 14 – Waste Acid Disposal Pit

Site 14, the Old Waste Acid Pit (OWAP), was not initially included as part of the Lab Area RI. However, the OWAP was thought to be in close proximity to the Lab Area, specifically, in close proximity to the Chemical Disposal Pit (Site 49). The OWAP was removed and filled in with concrete in 1975, however, the location of the OWAP was not documented (NEESA, 1983 and 1992). An interview with a retired Lab Area worker of 40 years (Baroody, 2001), revealed that after digging out the OWAP and filling it with concrete in the early 1970s, the Chemical Disposal Pit was installed on top of the abandoned OWAP.

6.1.2 Site 15 – Mercury Deposits in Manhole, Fluorine Lab

Site 15 is the location of the Surveillance/ Sample Control Building (Building 103) and the Fluorine Laboratory (Building 502), which were constructed in 1902 and 1942, respectively. Building 103 contained facilities to analyze raw materials and manufactured propellants for surveillance tests. Laboratory equipment containing mercury was reportedly used at different times throughout the history of Building 103. The equipment included nitrometers, pycnometers, talianis, and thermometers. Liquid wastes from this facility consisted of water, acetone, and alcohol used to wash laboratory glassware.

Building 502 housed a laboratory to develop, provide, and analyze bench-scale quantities of experimental chemicals and fuels. The extensive variety of products and processes developed in Building 502 required a large amount of equipment, such as water aspirators and condensers of different size and capacities, as well as jacketed reactors and vessels with up to 50 gallons in capacity.

The wastewater from Buildings 103 and 502 discharged into Mattawoman Creek between 1942 and the late 1980s. Contaminants known to be in the wastewater included mercury, lead, total suspended solids, and oil/grease.

6.1.3 Site 16 – Laboratory Chemical Disposal, Building 600

Site 16 consists of the sewers draining the Research and Development Building (Building 600). Building 600 housed the chemical research laboratories and division offices. Reportedly, waste chemicals were disposed of into the plumbing system, where they combined with sanitary sewage and flowed to the sewage treatment plant. Approximately 80 chemical compounds, which included acids, amines, cyanide compounds, metals, and both chlorinated and non-chlorinated solvents, were generated or procured by this facility on an annual basis.

6.1.4 Site 49 – Chemical Disposal Pit

The Chemical Disposal Pit is designated as Site 49. The site consists of a circular concrete pit, approximately 2.5 feet in diameter and 3 feet deep, northwest of Building 444. The pit was designed to dispose of laboratory containers without exposing personnel to the contents. To dispose of laboratory waste in laboratory containers, the containers were placed on a steel grate in the pit. A metal plate was dropped on the containers. The fragments of shattered glass were caught in a wire basket below the steel grate, and the contents of the containers collected in the bottom of the pit and drained from the pit via a drain line to the sanitary sewer system. Reportedly, the pit received limited use until the early 1970s, when the container crushing hardware was removed. The concrete pit was still structurally sound with no visible fractures before its removal in May 2001. The Chemical Disposal Pit (Site 49) is separate from the

Site 14 - OWAP (NEESA, 1983; NEESA, 1992). The OWAP was approximately 15 feet to 20 feet deep with rocks placed on the bottom, and was reportedly filled with concrete in 1975 (NEESA, 1992).

6.1.5 Site 50 – Building 103 Crawl Space

Site 50 is the crawl space beneath Building 103, which is a small one-story building with a concrete block foundation, built in approximately 1902. Laboratory equipment containing mercury (nitrometers, pycnometers, talianis, and thermometers) was reportedly used in Building 103 at different times. Spent mercury handling procedures at Building 103 and other buildings in the laboratory area that used mercury consisted of pouring spent mercury into “slop jars” and running tap water into the jar over a sink to remove sulfuric acid from the mercury. Spills often occurred while transferring the spent mercury from nitrometers, and slop jars often broke. In addition, mercury was inadvertently washed out of the jars.

In 1988, while replacing two sinks in Building 103, workers discovered that the sinks were connected to a single drain line, which discharged directly to the soil beneath the building rather than to the storm or sanitary sewer system. After the discovery, a pipe was installed from the sink drain line to Manhole A, which is west of Building 102. The quantity of solvents and mercury discharged to the soil from 1902 to 1985 is unknown.

6.1.6 Site 53 – Mercury Contamination in the Sewage System

Site 53 consists of the sewer lines serving the laboratory research buildings in the Lab Area. The sewage system contains both the storm sewer lines and the sanitary sewer lines from several buildings. Between the early 1900s and the late 1960s, all sewage generated in the buildings was piped directly to Mattawoman Creek. Since the late 1960s, separate sanitary and storm sewer systems have served the Lab Area. The sanitary sewage from the Lab Area was sent to the Sewage Treatment Plant No. 2 beginning in the early 1970s, when it was constructed, until the early to mid 1980s. From the mid 1980s to the early 1990s, the sanitary sewage was rerouted to the upgraded Sewage Treatment Plant No. 1 and Sewage Treatment Plant No. 2 was closed. In the early 1990s, Buildings 103 and 502 were connected to the Industrial Wastewater Treatment Phase I System, which is designed to collect operations wastewater for analysis before discharge to Sewage Treatment Plant No. 1.

Laboratory workers reported that approximately a liter of mercury per month was lost down the sinks from Building 102. Over the 77-year period (1909-1986) that the Building 102 laboratory operated without mercury traps on the sinks, up to 28,000 pounds of mercury could have been discharged to the drain lines (NEESA, 1992). Additional quantities of mercury may have been disposed down the drain lines as the result of similar mercury handling and disposal practices at the other laboratory buildings within the Lab Area.

6.1.7 Site 54 – Building 101 Mercury Contamination

Building 101 is a two-story brick building where mercury compounds were used in research and development. In the mid-1980s a NSF-IH employee in Building 101 detected mercury droplets and an organic solvent odor in the basement office when solvents were discharged through the pipe system, suggesting a potential leaky drainage pipe. In January 1990, several droplets of mercury were discovered on the insulation of a steam pipe in the southeast corner room of the first floor in Building 101. When Base Safety Office personnel began removing the drop ceiling tiles, mercury vapors were detected in the breathing zone, but no visible signs of mercury on the ceiling tile tracks were observed. A 1918 blueprint showed four nitrometers in the room above where the mercury droplets were discovered. It was reported that the nitrometer bulbs would sometimes explode under pressure during sensitivity testing.

6.1.8 Site 55 – Building 102

Building 102 is located in the center of the Lab Area and was constructed in 1909. It was used as a laboratory for testing nitrocellulose by the nitrometer method. Other mercury-containing equipment, including pycnometers, talianis, vacuum stability testers, and thermometers, was used to determine the densities and sensitivity of propellants throughout the 80 years of laboratory operations in Building 102. On October 6, 1987, metallic mercury was discovered dripping from the ceiling onto the sink table top of the coffee mess, in the northern end of the basement of Building 102. The source of the mercury was believed to be the equipment located on the first floor (NEESA, 1992).

Building 102 was abandoned in February 1989, and the water supply to Building 102 was terminated to help alleviate the high mercury levels found in the sanitary sewage sludge (NEESA, 1992). According to employee interviews, a major spill occurred upstairs in Building 102 in the early 1960s.

6.2 BACKGROUND

6.2.1 Land and Resource Use

The Lab Area is located in the restricted area of NSF-IH. The buildings within the Lab Area are currently unoccupied or are used as offices and laboratories. Because of its location, the future use of the site will remain industrial.

6.2.2 Basis for Remedial Action

The need for remedial action at the Lab Area was based on the history of site activities, nature and extent of the contamination, a risk assessment to determine the effects of contamination on human and ecological receptors, and the comparison of COC levels to calculated, or established SRGs.

6.2.3 Summary of Contamination

Surface soil, subsurface soil, surface water, sewer sediment, and sediment were sampled during previous investigations. COCs have been identified in surface soil, subsurface soil and sediment. These COCs have been identified based on the risk drivers from the HHRA, ERA, and exceedances of regulatory criteria. Mercury and lead were identified as COCs in surface soil and arsenic was identified as a COC in sediment. In addition, mercury was identified as a COC for subsurface soil in the proximity of underground sewer lines. Table 6-2 provides a summary of Lab Area SRGs.

6.3 REMEDIAL ACTIONS

6.3.1 Remedial Action Objectives

Based on the evaluation of site conditions, an understanding of the contaminants, the physical properties in media of concern, the results of risk assessments, and an analysis of ARARs, the following RAOs were developed:

- Reduce risks to human receptors from exposure to mercury and lead in the surface soil in the Upland Area to acceptable levels under industrial land use scenario.
- Reduce risks to human receptors from exposure to mercury potentially present in and around sewer pipes in the Upland Area to acceptable levels under industrial land use scenario.
- Reduce risks to ecological receptors from exposure to mercury in the sediment in the Wetland Area to acceptable levels.

6.3.2 Selected Remedy

The selected remedy for the Lab Area consists of the following:

- Excavating the surface soil and wetland sediment areas of attainment (AAs) to a depth of 1 foot.
- Conducting lateral post-excavation confirmatory sampling; vertical confirmation is not necessary because the depth of excavation is to 1 foot, which is beyond the affected ecological zone from 0 to 6 inches.
- Restoring the surface soil excavation area by backfilling the area with a 6-inch layer of clean fill and a 6-inch layer of topsoil, followed by compaction and reseeding the area.
- Restoring the wetland excavation area into a wetland; an approved combination of native wetland species will be planted, and the newly restored wetland will be inspected quarterly for the first

year or longer until the plants are established, then twice a year for the second year, and once a year for the third through the fifth years.

- Improving and maintaining best practices in surface water runoff management, such as reseeding bare spots to minimize uncontrolled runoff sources and maintaining the condition of the surface water runoff ditches or lines.
- Transporting and disposing of the excavated material to an offsite permitted facility.
- Implementing ICs on the surface soil and on the subsurface soil prohibiting residential development (including housing, elementary and secondary schools, childcare facilities, and playgrounds) which would include a mechanism that will inform future construction workers that there may be underground sewer pipes that may contain mercury, and that appropriate health and safety precautions need to be taken. These ICs will apply to the entire site boundary and will be placed in the Base GIS.
- The requirements of the ICs will be integrated into the Comprehensive Work Approval Plan (CWAP) system and made into one of the criteria in the CWAP approval for any future work at the site. The ICs will remain in effect as long as contaminants remain at the site at levels that do not allow for unlimited use and unrestricted exposure.
- Conducting 5-year reviews.

Soil excavation and site restoration were completed in February 2012. Wetland plantings were completed in May 2012. The details of the remedy implementation will be documented in a future construction completion report.

6.4 PROGRESS SINCE THE LAST REVIEW

This is the first Five-Year Review report for the Lab Area.

6.5 FIVE-YEAR REVIEW PROCESS

6.5.1 Document Review

Part of the Five-Year Review consisted of a review of relevant documents. Historical documents are referenced in Table 6-1 and Section 12.0.

6.5.2 Data Review

Post-excavation confirmatory sampling confirmed the removal of the risk associated with mercury contaminated surface soils and wetland sediment in the Lab Area (CH2M HILL, 2004).

6.5.3 Site Inspection

An inspection of the site was conducted on May 21, 2012 by representatives of Tetra Tech. The purpose of the inspection was to assess the protectiveness of the remedy. Appendix A contains the site inspection checklist. Photographs taken during the site inspection are included in Appendix B.

No issues were identified during the site inspection. The selected remedy appears to be protective of human health and the environment, and control exposure pathways that could result in unacceptable risk. Vegetation in the Lab Area and adjacent wetland is currently being established.

6.5.4 Interviews

Interviews have been conducted with MDE and NAVFAC and are included in Appendix C.

6.6 TECHNICAL ASSESSMENT

6.6.1 Question A: Is The Remedy Functioning As Intended By The Decision Documents?

The review of documents, ARARs, and the site inspection indicates that the final remedy is functioning as intended by the ROD. The excavation and restoration of soil and sediment areas and implementation of ICs has achieved the RAOs.

NAVFAC manages and maintains a base-wide GIS. All IR Sites are identified on the GIS. All work that is performed on the Activity must be approved by the Navy.

No signs of intrusion or invasive development of the site were observed. No activities were observed that would have violated the institutional controls. In summary, the remedy is in place to successfully prevent exposure to the site-related contaminants.

6.6.2 Question B: Are The Exposure Assumptions, Toxicity Data, Clean-Up Levels, And RAOs Used At The Time Of The Remedy Selection Still Valid?

There have been no changes in exposure assumption, toxicity, or contaminant characteristics that have negatively impacted the remedial action or monitoring activities. The RAOs are still valid, and applicable

State and Federal standards have not changed since the ROD was signed in September 2011. LUCs have been implemented to restrict the site for industrial use.

The excavation limits of the upland soils were confirmed using risk-based cleanup goals for mercury (19 milligrams per kilogram [mg/kg]; construction worker scenario with hazard quotient at unity) and lead (400 mg/kg; future child resident acceptable conservative lead level). The current human health exposure methodology for inhalation was incorporated into the calculation for the upland soils mercury cleanup goal. The mercury cleanup goal for wetland sediments (1.06 mg/kg) is an ecological cleanup value. This value is still current as a consensus-based probable effect concentration for freshwater sediments, and is protective of both the benthic community and semi-aquatic mammals (e.g., raccoons) that may forage in the wetland (CH2M HILL, 2009).

6.6.3 Question C: Has Any Other Information Come To Light That Calls Into Question The Protectiveness Of The Remedy?

No other information has been made available that calls into question the protectiveness of the remedy.

6.6.4 Technical Assessment Summary

According to the site inspection, the final remedy is functioning as intended by the ROD. There have been no changes in the physical conditions of the Lab Area that would affect the protectiveness of the final remedy. All ARARs cited in the ROD have been met by construction of the remedial action. There is no other information that calls into question the protectiveness of the final remedy.

6.7 ISSUES

No issues with the remedy were identified during this review.

6.8 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Based on the results of this Five-Year Review, no recommendations or follow-up actions are required at this time.

6.9 PROTECTIVENESS STATEMENT

The remedy for the Lab Area is protective of human health and the environment and is functioning as intended by the ROD. The exposure pathways that could result in unacceptable risks are being controlled and all of the RAOs are being satisfied. The exposure assumptions, toxicity data, clean up levels, and

RAOs used at the time of the final remedy selection are still valid. No other information that could call into question the protectiveness of the final remedy has been identified in this review.

6.10 NEXT REVIEW

The next Five-Year Review for the Lab Area is required by 2017, five years from the date of this review.

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TABLE 6-1
 Chronology of Lab Area Site Events
 Sites 14, 15, 16, 49, 50, 53, 54, And 55 – Lab Area
 Naval Support Facility - Indian Head,
 Indian Head, Maryland

Event	Date
Site 14 Waste Acid Disposal Pit Operation	Until 1975
Site 15 Mercury Deposits in Manhole, Fluorine Lab Operation	1942-1981
Site 16 Laboratory Chemical Disposal Operation	1944-present
Site 49 Chemical Disposal Pit Operation	Up to early 1970s
Site 50 Building 103 Crawl Space Operation	1902-1985
Site 53 Mercury Contamination of the Sewage System Operation	1909-1986
Site 54 Building 101 Operation	1909-mid 1980s
Site 55 Building 102 Operation	1909-1963
Ten pounds of mercury recovered in Site 53 storm sewer manhole	1969
Site 53 television inspection	1988
One pound of mercury recovered in Site 53 storm sewer manhole	1989
Preliminary Assessment (PA) completed (NEESA, 1992)	1992
Site 53, 54, and 55 Site Inspection (SI) (E/A & H, 1994)	1994
RI Completed (CH2M HILL, 2004)	January 2004
Wetlands Delineation Completed (CH2M HILL, 2006)	April 2006
BERA Completed (CH2M HILL, 2006)	May 2006
Focused Feasibility Study (FFS) Completed (CH2M HILL, 2009)	December 2009
Proposed Plan Completed	April 2010
ROD Completed (CH2M HILL, 2011)	September 2011
Soil Removal and Site Restoration Completed	February 2012
Wetlands Planting Completed	May 2012

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TABLE 6-2
 Summary of Lab Area SRGs
 Sites 14, 15, 16, 49, 50, 53, 54, and 55 - Lab Area
 Naval Support Facility-Indian Head
 Indian Head, Maryland

COC	Medium	Facility-wide Background Concentration (mg/kg) ^{1,2}	Human Health Risk-Based PRGs (mg/kg)		Eco Risk- Based PRG (mg/kg)
			Residential	Industrial	
Mercury	Surface Soil	0.06	11 ³	19	NR
	Wetland Sediment	0.2	NR	NR	1.06
Arsenic	Wetland Sediment	10.6	34	NR	NR
Lead	Surface Soil	21.7	400	1,092	NR

Notes:

COC - constituent of concern

SRG - Site Remediation Goal

PRG - Prelimination Remediation Goal

mg/kg - milligram(s) per kilogram

NR - No Risk

Bold font indicates the proposed SRG

From Sites 14, 15, 16, 49, 50, 53, 54, and 55 ROD (CH2M HILL, 2011)

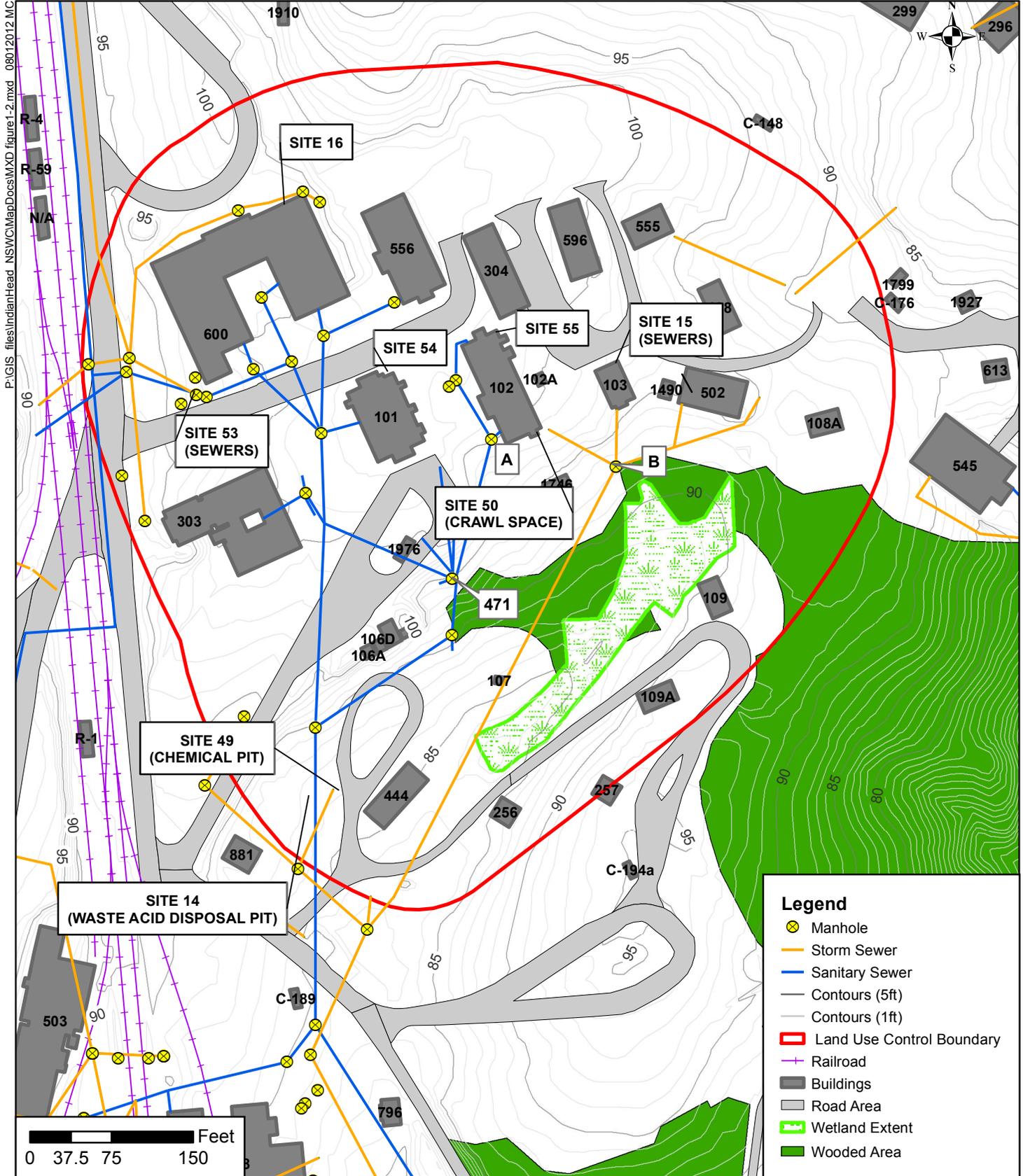
* - Subsurface soil present at the surface to be exposed to future receptors

1 - The surface soil facility background concentrations were obtained from the *Background Investigation Report for Indian Head and Stump Neck Annex, Naval Surface Warfare Center, Indian Head, Maryland* prepared by Tetra Tech in February, 2002.

2 - The wetland sediment facility background concentration was obtained from the *Background Investigation Report from Indian head and Stump Neck Annex, Naval Surface Warfare Center, Indian Head, Maryland* prepared by Brown and Root Environmental in December, 1997.

3 - Representing the lowest value among the adult and child residents and the adult and child recreators.

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Legend

- Manhole
- Storm Sewer
- Sanitary Sewer
- Contours (5ft)
- Contours (1ft)
- Land Use Control Boundary
- Railroad
- Buildings
- Road Area
- Wetland Extent
- Wooded Area

DRAWN BY	DATE
MC	8/1/12
CHECKED BY	DATE
REVISIED BY	DATE
SCALE	AS NOTED

**LAB AREA SITE LAYOUT
NAVAL SUPPORT FACILITY - INDIAN HEAD
INDIAN HEAD, MARYLAND**

CONTRACT NUMBER	112G03107
APPROVED BY	DATE
APPROVED BY	DATE
FIGURE NO.	REV
6-1	

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7.0 SITE 17 – METAL PARTS ALONG SHORELINE

7.1 SITE CHRONOLOGY

Site 17 is a 1,000-ft stretch of shoreline along the Mattawoman Creek where metal parts were discarded from the 1960s until the early 1980s. The discarded materials included rocket motor casings, shipping containers, empty drums, and various metal parts (Figure 7-1). The majority of the metal parts, which were placed along the shoreline for erosion control, were removed in the early 1990s. In 1997, the area of the site was expanded to include the forested area 100 feet from the shoreline, where dozens of rusted drums were identified. The horizontal extent of the site is approximately 3.5 acres.

A chronology of events for Site 17 is presented in Table 7-1 and a photograph of the site is presented as Figure 7-2.



Figure 7-2. Photograph of Site 17 facing southeast towards Mattawoman Creek

7.2 BACKGROUND

7.2.1 Land and Resource Use

Site 17 is a vegetated area along the Mattawoman Creek, east of the Caffee Road Landfill. The site extends inland approximately 100 feet from the shoreline into a wooded area near Building 1569. No future land use changes are projected for Site 17, and no other land use for this site is planned by the Navy. Shallow groundwater beneath the site is not used for any purpose. The Navy has no plans to

develop the groundwater resource in the future. Residential use of Site 17 is restricted by the ROD. However, hypothetical future residential use of the site was evaluated in the risk assessment to determine if land use restrictions would be necessary at the site.

7.2.2 Basis for Remedial Action

The need for remedial action at Site 17 was based on the history of site activities, nature and extent of the contamination, a risk assessment to determine the effects of contamination on human and ecological receptors, and the comparison of COC levels to calculated, or established SRGs.

7.2.3 Summary of Contamination

Surface soil, subsurface soil, groundwater, surface water, and sediment were sampled during previous investigations. COCs have been identified in groundwater. These COCs have been identified based on the risk drivers from the HHRA. The COCs identified for groundwater include cis-1,2-DCE and VC. TCE is also included as a COC because the results of a follow-up sampling post HHRA showed that TCE concentrations are indicative of DNAPL and TCE is likely the source of cis-1,2-DCE and VC. Table 7-2 provides a summary of Site 17 SRGs.

7.3 REMEDIAL ACTIONS

7.3.1 Remedial Action Objectives

Based on the evaluation of site conditions, an understanding of the contaminants, the physical properties in media of concern, the results of risk assessments, and an analysis of ARARs, the following RAOs were developed:

- Prevent unacceptable risks to human receptors from exposure to contaminants in the shallow groundwater.
- Prevent migration or discharge of groundwater with COCs above SRGs to Mattawoman Creek.
- Return the shallow groundwater to its beneficial use to the extent practicable.

These RAOs were developed following guidance provided in Land Use in the CERCLA Remedy Selection Process (USEPA, 1995). According to this guidance, RAOs should reflect the reasonably anticipated future land use or uses.

7.3.2 Selected Remedy

The selected remedy for Site 17 is source zone treatment using *in situ* chemical reduction (ISCR), monitored natural attenuation (MNA), and ICs. The components of this alternative include the following:

- Clearing and removal of munitions and explosives of concern (MEC) and non-MEC metallic objects before soil mixing.
- Applying granular zero valent iron (ZVI) via soil mixing in the area where the TCE concentration exceeds or equals 1,000 µg/L.
- Conducting short-term performance sampling events at baseline (before soil mixing), 6, 9, and 12 months after soil mixing.
- Conducting LTM for an assumed duration of 29 years after completing the short-term performance sampling.
- Conducting 5-year reviews.
- Designating Site 17 as “restricted use” area in the base GIS database, which would prohibit intrusive activities, such as excavation, residential development, or use of groundwater. This designation would remain in place until groundwater monitoring indicates that the SRGs have been met. The IC area encompasses the AA.

At the time of this report, the remedy is currently being planned at Site 17.

7.4 PROGRESS SINCE THE LAST REVIEW

This is the first Five-Year Review report for Site 17.

7.5 FIVE-YEAR REVIEW PROCESS

7.5.1 Document Review

Part of the Five-Year Review consisted of a review of relevant documents. Historical documents are referenced in Table 7-1 and Section 12.0.

7.5.2 Data Review

Long-term monitoring of groundwater shall be implemented to determine if the remedy is functioning as intended and is achieving the RAOs.

7.5.3 Site Inspection

An inspection of the site was conducted on May 21, 2012 by representatives of Tetra Tech. Appendix A contains the site inspection checklist. Photographs taken during the site inspection are included in Appendix B.

No issues were identified during the site inspection.

7.5.4 Interviews

Interviews have been conducted with MDE and NAVFAC and are included in Appendix C.

7.6 TECHNICAL ASSESSMENT

7.6.1 Question A: Is The Remedy Functioning As Intended By The Decision Documents?

At the time of this report, the remedy is currently being planned at Site 17. Implementation of the remedy will achieve the RAOs for the site.

Long-term monitoring of shallow groundwater will be implemented to determine if the remedy is functioning as intended and is achieving the RAOs.

The institutional controls include restrictions on breaching the soil cover and any other activities or actions that might interfere with the implemented final remedy. NAVFAC manages and maintains a base-wide GIS. All IR Sites are identified on the GIS. All work that is performed on the Activity must be approved by the Navy.

During the site inspection, no signs of intrusion or invasive development of the site were observed. No activities were observed that would have violated the institutional controls.

7.6.2 Question B: Are The Exposure Assumptions, Toxicity Data, Clean-Up Levels, And RAOs Used At The Time Of The Remedy Selection Still Valid?

The site usage has not changed since the ROD was prepared, therefore, the receptors and exposure pathways identified above have not changed. The RAOs are still valid, and the remedy is expected to be completed and maintained in compliance with ARARs.

The cleanup levels for TCE, cis-1,2-DCE, and vinyl chloride in groundwater are the MCLs, which have not changed since the ROD was signed in January 2010.

7.6.3 Question C: Has Any Other Information Come To Light That Calls Into Question The Protectiveness Of The Remedy?

No other information has been made available that calls into question the protectiveness of the remedial action.

7.6.4 Technical Assessment Summary

The remedy is currently being planned at Site 17. The removal of MEC and non-MEC metallic objects and application of ZVI will actively treat the COC mass in the source area and minimize the migration or discharge of unacceptable COC concentrations into the creek. In addition, the enforcement of institutional controls in the form of land and groundwater use restrictions will limit the risk of human exposure to the shallow groundwater. Long-term monitoring will be implemented to determine if the remedy is functioning as intended and is achieving the RAOs.

7.7 ISSUES

No issues with the remedy were identified during this review.

7.8 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Based on the results of this Five-Year Review, no recommendations or follow-up actions are required at this time.

7.9 PROTECTIVENESS STATEMENT

The remedy for Site 17 will be protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled by land use restrictions. The final remedy is currently being planned however the LTMP has yet to be finalized. The exposure assumptions, toxicity data, clean up levels, and RAOs used at the time of the final remedy selection are still valid. No other information that could call into question the protectiveness of the final remedy has been identified in this review.

7.10 NEXT REVIEW

The next Five-Year Review for Site 17 is required by 2017, five years from the date of this review.

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TABLE 7-1
 Chronology of Site 17 Events
 Site 17 – Disposed Metal Parts Along Shoreline
 Naval Support Facility - Indian Head,
 Indian Head, Maryland

Event	Date
Metal parts disposed along shoreline	1960s - early 1980s
IAS Completed (Hart, 1983)	1983
The majority of metal parts were removed	Late 1980s - early 1990s
Phase II Resource Conservation Recovery Act Facility Assessment (RFA) Completed (A.T. Kearney/K.W. Brown, 1988)	1988
RI Completed (CH2M HILL, 2004)	April 2004
FFS Completed (CH2M HILL, 2004)	2004
EE/CA Completed (CH2M HILL, 2004)	August 2004
Upgradient Investigation Completed	2004-2005
BERA Completed (CH2M HILL, 2005)	February 2005
Non-time Critical Removal Action (NTCRA) Completed	December 2005
Bench Scale Studies Completed	2006
FS Completed (CH2M HILL, 2008)	October 2008
Proposed Plan Completed	2008
ROD Completed (NSWC Indian Head, 2010)	January 2010

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TABLE 7-2
 Summary of Site 17 SRGs
 Site 11 - Caffee Road Landfill
 Naval Support Facility-Indian Head
 Indian Head, Maryland

COCs	SRGs (µg/L)	Comment
Trichloroethene (TCE)	5	Technically not a COC because maximum TCE concentration was not used in HHRA. TCE is presumed to present unacceptable risks to human health and is the presumed source for cis-1,2-DCE and VC
cis-1,2-Dichloroethene (DCE)	150	Risk-driving COC
Vinyl Chloride (VC)	2	Risk-driving COC

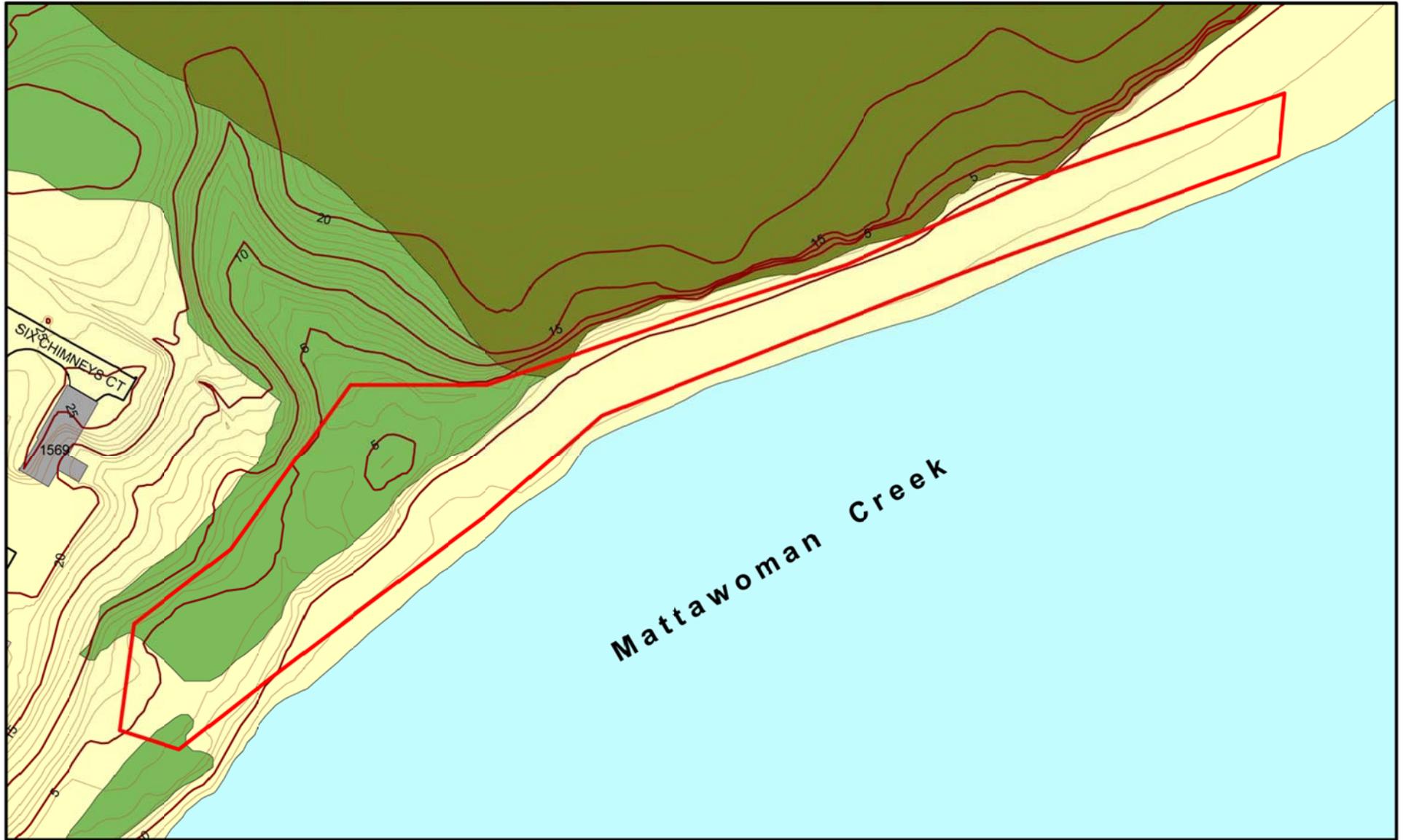
Notes:

SRG - Site Remediation Goal

µg/L-micrograms per liter

From Site 17 ROD (NSWC Indian Head, 2010)

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LEGEND

IR Sites	Topographic Contours (1 foot Intervals)
Buildings	Topographic Index Contours (5 foot Intervals)
Railroads	Dense Wooded Area
Road	Wooded Area

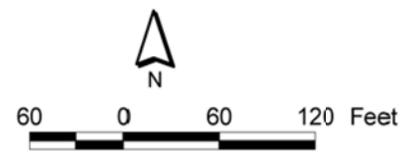


FIGURE 7-1
SITE 17 SITE LAYOUT
NAVAL SUPPORT FACILITY - INDIAN HEAD
INDIAN HEAD, MARYLAND

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8.0 SITE 21 – BRONSON ROAD LANDFILL

8.1 SITE CHRONOLOGY

Site 21, also known as the Bronson Road Landfill, is located between Bronson Road and Building 602. The site was originally the location of a 2-acre gravel-mining pit (Figure 8-1). Circa 1975, the Public Works Department began filling the pit with solid waste generated in the explosives manufacturing area. The landfill was filled by trench excavation and is estimated to contain approximately 1,500 tons of solid waste and unknown quantities of paint sludge, asbestos, and barium sulfate. This practice ended in November 1981 when a 40-cubic-yard dumpster was placed at the north end of the site to act as a transfer station. The dumpster was removed in 1996, and the area was regraded. The site also accepted sludge from paint spray booths and bagged asbestos until June 1982.

A site reconnaissance in 1982 indicated the landfilled material was partially covered with 6 inches to 1 foot of soil. Uncovered bags of asbestos were observed, as well as several small, dark-brown-colored pools of water that may have been leachate. By 1989, the inactive landfill had been completely covered with a soil cap. The excavation of a sediment pond near the north end of the site in 1996 resulted in the uncovering of plastic, glass, and metal waste. In the past, 20-ft cliffs surrounded three sides of the site; however, placement of fill from other sites on NSF-IH has brought the ground surface nearly up to the elevation of the cliff tops. Currently, additional soil is no longer being placed on the landfill.

A chronology of events for Site 21 is presented in Table 8-1 and a photograph of the site is presented as Figure 8-2.

An anonymous call was made to MDE on June 25, 2008 stating that Agent Orange drums were buried at the site. As documented in the Technical Memorandum: Site 21 (Bronson Road Landfill) Agent Orange Investigation Summary (CH2M HILL, 2009), an investigation determined that no Agent Orange-related constituents were detected in the groundwater samples. The Navy and the USEPA, in consultation with MDE, recommended no further action for Agent Orange at Site 21.



Figure 8-2. Photograph of Site 21 facing northeast up the slope of the landfill.

8.2 BACKGROUND

8.2.1 Land and Resource Use

Site 21 is currently maintained as open space vegetated with grass. No future land use changes are projected for Site 21, and no other land use for this site is planned by the Navy. Shallow groundwater beneath the site is not used for any purpose and the Navy has no plans to develop the groundwater resource in the future. The nearest potable water well is Well 18, which lies 450 feet north (upgradient) of the site. Residential development of Site 21 is restricted by the ROD. However, hypothetical future residential use of the site, including the groundwater resource, was evaluated in the risk assessment to assess whether restrictions would be necessary at the site.

8.2.2 Basis for Remedial Action

The need for remedial action at Site 21 was based on the history of site activities, nature and extent of the contamination, a risk assessment to determine the effects of contamination on human and ecological receptors, and the comparison of COC levels to be calculated, or established SRGs.

8.2.3 Summary of Contamination

Surface soil and groundwater were sampled during previous investigations. COCs have been identified for soil and groundwater. These COCs have been identified based on the risk drivers from the HHRA. Arsenic was identified as a COC for soil. The COCs identified for groundwater include manganese and thallium. Tables 8-2 and 8-3 provide a summary of the Site 21 SRGs.

8.3 REMEDIAL ACTIONS

8.3.1 Remedial Action Objectives

Based on the evaluation of site conditions, an understanding of the contaminants, the physical properties in media of concern, the results of risk assessments, and an analysis of ARARs, the following RAOs were developed:

- Prevent or minimize direct contact of human and ecological receptors with landfill contents
- Prevent surface water from running onto the site and control surface water runoff and erosion
- Prevent unacceptable risks to human receptors from exposure to contaminants in the shallow groundwater
- Return the groundwater to beneficial use to the extent practicable

8.3.2 Selected Remedy

The selected remedy for Site 21 consists of the following:

- Verify or grade/fill to achieve a minimum 2-foot cover over waste material. Construct additional 2 feet of soil cover (18 inches of clean fill and 6 inches of topsoil) with a 4 percent slope and a stabilized vegetative cover in accordance with COMAR regulation 26.04.07.26. The seed mixture for the cover vegetation will be designed so that it will serve as a bio-barrier to burrowing animals.
- Grade for surface water control and storm water management.
- Implement ICs, which consist of land-use and groundwater-use restrictions. These include prohibiting: (1) digging into or disturbing the existing cover or contents of the landfill; (2) residential uses, including housing, elementary and secondary school, child care facilities, and playgrounds on the site; (3) use of the shallow groundwater beneath the site until concentrations of contaminants are at levels that allow for unlimited use and unrestricted exposure; and (4) use of shallow groundwater within 100 feet from identifiable sources of contamination and designated subsurface disposal areas (landfill and groundwater plume) (COMAR 26.04.04.05).
- Perform long-term groundwater quality monitoring; a detailed description of the monitoring program is included in the LTMP, which was prepared after the ROD was signed.
- Conduct 5-year reviews.

The remedy implementation is scheduled to begin in the summer of 2012.

8.4 PROGRESS SINCE THE LAST REVIEW

This is the first Five-Year Review Report for Site 21.

8.5 FIVE YEAR REVIEW PROCESS

8.5.1 Document Review

Part of the Five-Year Review consisted of a review of relevant documents. Historical documents are referenced in Table 8-1 and Section 12.0.

8.5.2 Data Review

Long-term monitoring of groundwater shall be implemented to determine if the remedy is functioning as intended and is achieving the RAOs.

8.5.3 Site Inspection

An inspection of the site was conducted on May 21, 2012 by representatives of Tetra Tech. Appendix A contains the site inspection checklist. Photographs taken during the site inspection are included in Appendix B.

No issues were identified during the site inspection. There was evidence of a slump in the south-central portion of the site (Appendix B, Site 21, Photo 3). However, the landfill cover is not yet in place. The existing cover will be reworked with an additional 2 feet of soil. Once completed, the selected remedy will be protective of human health and the environment, and control exposure pathways that could result in unacceptable risk.

8.5.4 Interviews

Interviews have been conducted with MDE and NAVFAC and are included in Appendix C.

8.6 TECHNICAL ASSESSMENT

8.6.1 Question A: Is The Remedy Functioning As Intended By The Decision Documents?

The remedy is scheduled to be implemented in the summer of 2012. Implementation of the remedy will achieve the RAOs for the site.

Long-term monitoring of shallow groundwater will be implemented to confirm that groundwater contaminant migration is not occurring at unacceptable levels and that the remedy is functioning as intended.

The institutional controls include restrictions on land and groundwater use, breaching the soil cover, and any other activities or actions that might interfere with the implemented final remedy. NAVFAC manages and maintains a base-wide GIS. All IR Sites are identified on the GIS. All work that is performed on the Activity must be approved by the Navy.

During the site inspection, no signs of intrusion or invasive development of the site were observed. No activities were observed that would have violated the institutional controls.

8.6.2 Question B: Are The Exposure Assumptions, Toxicity Data, Clean-Up Levels, And RAOs Used At The Time Of The Remedy Selection Still Valid?

The exposure assumptions, toxicity data, cleanup levels, and RAOs are still valid based on confirmation that the applicable State and Federal standards for the COCs have not changed significantly. The remedy is expected to be completed and maintained in compliance with ARARs. The landfill cover (exposure barrier) will remain in place with no residential development. The groundwater at the site will be subject to monitoring under Maryland's post-closure rules. Because wastes remain in place, Site 21 will continue to be subject to the requirement for five-year reviews and for the Maryland post-closure groundwater monitoring requirements.

8.6.3 Question C: Has Any Other Information Come To Light That Calls Into Question The Protectiveness Of The Remedy?

At the time of this Five-Year Review, the remedy had not yet been implemented.

8.6.4 Technical Assessment Summary

At the time of this Five-Year Review, the remedy had not yet been implemented. There have been no changes in the physical conditions of Site 21 that would affect the protectiveness of the final remedy. There is no other information that calls into question the protectiveness of the final remedy.

8.7 ISSUES

No issues were identified during this review.

8.8 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Based on the results of this Five-Year Review, no recommendations or follow-up actions are required at this time.

8.9 PROTECTIVENESS STATEMENT

Once completed, the remedy for Site 21 will be protective of human health and will function as intended by the ROD. The environment and exposure pathways that could result in unacceptable risks will be controlled and all of the RAOs will be satisfied. The exposure assumptions, toxicity data, clean up levels, and RAOs used at the time of the final remedy selection are still valid. No other information that could call into question the protectiveness of the final remedy has been identified in this review.

8.10 NEXT REVIEW

The next Five-Year Review for Site 21 is required by 2017, five years from the date of this review.

TABLE 8-1
 Chronology of Site 21 Events
 Site 21 – Bronson Road Landfill
 Naval Support Facility - Indian Head,
 Indian Head, Maryland

Event	Date
Landfill Operations	1975-1982
IAS Completed (Hart, 1983)	May 1983
Soil Cap completed	1989
Initial RI fieldwork completed	2000
Pre-FS field investigation (CH2M HILL, 2002)	2002
Installation and sampling of monitoring wells	January 2003
RI completed (CH2M HILL, 2004)	April 2004
Final FS report (CH2M HILL, 2006)	September 2005
Manganese Technical Memorandum (CH2M HILL, 2009)	March 2009
Agent Orange Technical Memorandum	July 2009
Draft Proposed Plan submitted	March 2010
Final ROD completed (NAVFAC, 2011)	September 2011
Redlined Final LTMP completed (CH2M HILL, 2012)	May 2012
Redlined LUC RD completed (CH2M HILL, 2012)	May 2012

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TABLE 8-2
 Site 21 Soil SRG
 Site 21 - Bronson Road Landfill
 Naval Support Facility - Indian Head,
 Indian Head, Maryland

COC	Facility Background 95% UCL (mg/kg)	Applicable Residential Soil PRG (mg/kg)	Maximum Detected Concentration (mg/kg)	Basis for PRG
Arsenic	290	22	51.8	Target hazard = 1, Child resident

Notes:

95% UCL - 95 percent UCL

mg/kg - milligram per kilogram

Bolded value represents SRG

From the Site 21 FS (CH2M HILL, 2006)

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TABLE 8-3

Summary of Site 21 Shallow Groundwater SRGs
 Site 21 - Bronson Road Landfill
 Naval Support Facility-Indian Head
 Indian Head, Maryland

COC	Facility Background (µg/L)	Construction and Residential PRG (µg/L)	Maximum Detected Concentration (µg/L)	MCL (µg/L)	Basis for PRG
Manganese	824	290	24,700 (filtered)	NA	Target hazard = 1, Child resident
	824	11,000	23100 (unfiltered)	NA	Target hazard = 1, Construction worker
Thallium	NA	0.55	6.2	2	Target hazard = 1, Child resident

Notes: NA - Not available

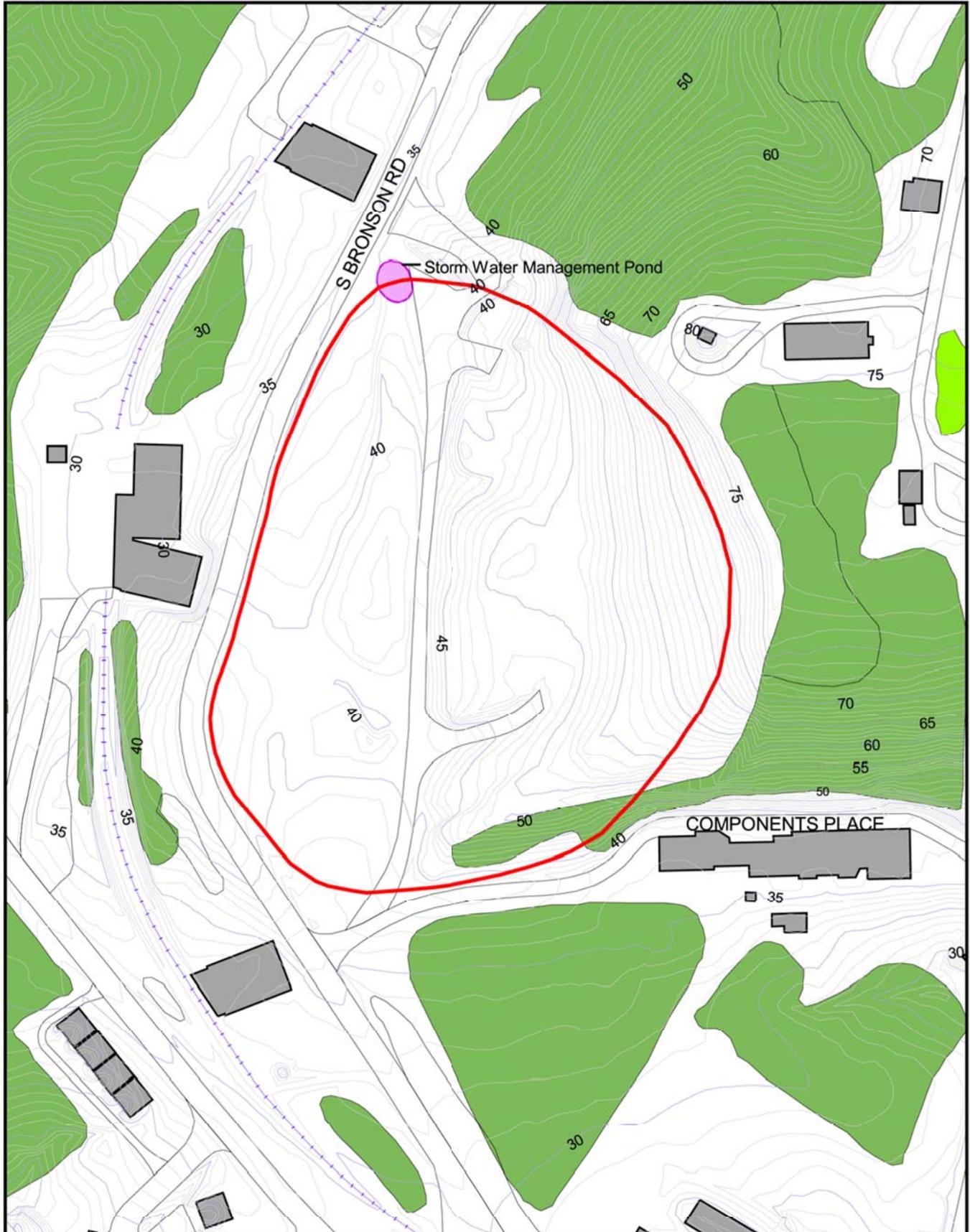
µg/L - micrograms per liter

Bolded value represents SRG

Construction worker risk-based PRG was not used in the PRG selection because it was less conservative than child resident scenario.

From the Site 21 FS (CH2M HILL, 2006)

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LEGEND

-  IR Site
-  Buildings
-  Railroads
-  Road
-  Wooded Area
-  Topographic Contours (1 foot Intervals)
-  Topographic Index Contours (5 foot Intervals)



NAVAL SUPPORT FACILITY -INDIAN HEAD
INDIAN HEAD, MARYLAND

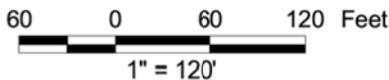


FIGURE 8-1
SITE 21 LAYOUT
INDIAN HEAD, MARYLAND

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9.0 SITE 36 – CLOSED LANDFILL

9.1 SITE CHRONOLOGY

Site 36 – Closed Landfill is located in the western portion of Stump Neck Annex along Roach Road adjacent to Chickamuxen Creek (Figure 9-1). The landfill was used from 1972 to 1974 and has been inactive since that time. The filled area was most likely part of Chickamuxen Creek and/or a wetland or marsh adjacent to the creek, and the fill was believed to contain metal casings from mines, bombs, and torpedoes. The contents were reportedly certified inert and did not contain any explosives or chemicals when buried. Wood fragments were also buried in the landfill. Subsequent anecdotal information from personnel who formerly worked in Building 2010, which is located northeast of the landfill, indicated that disassembled metal parts were disposed in the creek across (west of) Roach Road from Building 2010.

A chronology of events for Site 36 is presented in Table 9-1 and a photograph of the site is presented as Figure 9-2.



Figure 9-2. Photograph of Site 36 facing north.

9.2 BACKGROUND

9.2.1 Land and Resource Use

Site 36 is maintained as an open vegetated area. No future land use changes are projected for Site 36, and no other land use for this site is planned by the Navy. The unconfined shallow groundwater beneath

the site is not used for any purpose. There is no shallow groundwater downgradient (west) of the landfill boundary, beyond which is the shoreline of Chickamuxen Creek which borders the site to the north, west, and south. Contaminated groundwater was only detected beneath the site and does not extend beyond the site boundaries 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. Residential development of Site 36 is restricted by the ROD.

9.2.2 Basis for Remedial Action

The need for remedial action at Site 36 was based on the history of site activities, nature and extent of the contamination and, a risk assessment to determine the effects of contamination on human and ecological receptors.

9.2.3 Summary of Contamination

Surface soil, groundwater, surface water, sediment, and sediment pore water were sampled during previous investigations. COCs have been identified in groundwater and sediment pore water. These COCs have been identified based on the risk drivers from the HHRA. The COCs identified for groundwater include arsenic, iron, and manganese. The COCs identified for sediment pore water include iron and manganese.

9.3 REMEDIAL ACTIONS

9.3.1 Remedial Action Objectives

Based on an evaluation of site conditions, an understanding of the contaminants, the physical properties in media of concern, the results of risk assessments, and an analysis of ARARs, the following RAOs were developed:

- Close the landfill in a manner that protects human health and the environment from direct exposure to contaminated sources at the landfill and from exposure to contaminants migrating from the landfill via surface water runoff and erosion, infiltration to groundwater and groundwater migration, or wind erosion and dust migration in accordance with State of Maryland solid waste management regulations.
- Prevent exposure to contaminants in site groundwater through the application of LUCs prohibiting the use of groundwater as a potable source.

These RAOs were developed following guidance provided in Land Use in the CERCLA Remedy Selection Process (USEPA, 1995). According to this guidance, RAOs should reflect the reasonably anticipated future land use or uses. The need for RAOs for groundwater was evaluated following Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites (USEPA, 1988). According to this guidance, clean-up levels should be achieved throughout the area of attainment. The area of attainment does not include the area where waste is to be managed or contained on site. Therefore, RAOs were not developed for groundwater outside the area of attainment.

9.3.2 Selected Remedy

The major components of the selected remedy for Site 36 include the following:

- LUCs to prevent unauthorized excavation, residential development, and use of shallow groundwater at the site until contaminants at the site are at levels that allow for unlimited use and unrestricted exposure.
- Maintenance of the existing soil and vegetative cover to prevent direct exposure to landfill contents and to minimize erosion by surface water and wind.
- LTM of shallow groundwater and sediment pore water to confirm that groundwater contaminant migration is not occurring at unacceptable levels.
- Removal and recycling of large pieces of metal debris along the shoreline.
- Five-year reviews.

This remedy does not comply with state closure standards for sanitary landfills that require an impermeable cap; however, a variance to the design was accepted by MDE because the existing soil cover protects public health, protects and conserves natural resources and the environment, and controls air, water, and land pollution to the same extent as would be obtained by an engineered cover.

The removal of metal debris along the shoreline is scheduled for late 2012 or early 2013. LUCs have been implemented to prevent unauthorized excavations, residential development, and use of shallow groundwater. The existing soil and vegetative cover prevents direct exposure to landfill contents and minimizes erosion by surface and wind. Long-term monitoring will be initiated in 2012.

9.4 PROGRESS SINCE THE LAST REVIEW

This is the first Five-Year Review report for Site 36.

9.5 FIVE-YEAR REVIEW PROCESS

9.5.1 Document Review

Part of the Five-Year Review consisted of a review of relevant documents. Historical documents are referenced in Table 9-1 and Section 12.0.

9.5.2 Data Review

Long-term monitoring of groundwater and sediment pore water shall be implemented to determine if the remedy is functioning as intended and is achieving the RAOs.

9.5.3 Site Inspection

An inspection of the site was conducted on May 21, 2012 by representatives of Tetra Tech. The purpose of the inspection was to assess the protectiveness of the remedy, including the integrity of the existing soil cover. Appendix A contains the site inspection checklist. Photographs taken during the site inspection are included in Appendix B.

No issues were identified during the site inspection. Once completed, the selected remedy will be protective of human health and the environment, and control exposure pathways that could result in unacceptable risk. Signs will be installed in the near future.

9.5.4 Interviews

Interviews have been conducted with MDE and NAVFAC and are included in Appendix C.

9.6 TECHNICAL ASSESSMENT

9.6.1 Question A: Is The Remedy Functioning As Intended By The Decision Documents?

The review of documents, ARARs, and the site inspection indicates that the LUCs and current soil cover is functioning as intended by the ROD. The soil cover maintenance is expected to achieve the RAOs both to minimize the human risk, and to reduce or eliminate erosion, thus reducing migration of contaminants to groundwater, surface water and sediment. The effective implementation of institutional controls has also helped achieve the RAOs that minimize human receptor contact.

Long-term monitoring of shallow groundwater and sediment pore water will be implemented to confirm that groundwater contaminant migration is not occurring at unacceptable levels and that the remedy is functioning as intended.

The institutional controls include restrictions on breaching the soil cover and any other activities or actions that might interfere with the implemented final remedy. NAVFAC manages and maintains a base-wide GIS. All IR Sites are identified on the GIS. All work that is performed on the Activity must be approved by the Navy.

No signs of intrusion or invasive development of the site were observed. No activities were observed that would have violated the institutional controls. In summary, the institutional controls are successful in preventing exposure to the site-related contaminants.

9.6.2 Question B: Are The Exposure Assumptions, Toxicity Data, Clean-Up Levels, And RAOs Used At The Time Of The Remedy Selection Still Valid?

The exposure assumptions and RAOs are still valid based on confirmation that the applicable State and Federal standards have not changed significantly. The remedy is expected to be completed and maintained in compliance with ARARs. The landfill cover (exposure barrier) will remain in place with no residential development. There are no specific COCs or cleanup levels documented in the ROD for Site 36, however, the groundwater and sediment pore water at the site will be subject to monitoring under Maryland's post-closure rules. Because wastes remain in place, Site 36 will continue to be subject to the requirement for five-year reviews and for the Maryland post-closure groundwater monitoring requirements.

9.6.3 Question C: Has Any Other Information Come To Light That Calls Into Question The Protectiveness Of The Remedy?

No other information has been made available that calls into question the protectiveness of the remedial action.

9.6.4 Technical Assessment Summary

According to the site inspection, the soil cover is functioning as intended by the ROD. There have been no changes in the physical conditions of Site 36 that would affect the protectiveness of the final remedy. All ARARs cited in the ROD will be met by construction of the remedial action. There is no other information that calls into question the protectiveness of the final remedy.

9.7 ISSUES

No issues with the remedy were identified during this review.

9.8 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Based on the results of this Five-Year Review, no recommendations or follow-up actions are required.

9.9 PROTECTIVENESS STATEMENT

Once completed, the remedy for Site 36 will be protective of human health and the environment, and will function as intended by the ROD. The exposure pathways that could result in unacceptable risks will be controlled and all of the RAOs will be satisfied. The exposure assumptions, toxicity data, clean up levels, and RAOs used at the time of the final remedy selection are still valid. No other information that could call into question the protectiveness of the final remedy has been identified in this review. To evaluate site constituent trends in the future, LTM of groundwater and sediment pore water will be implemented.

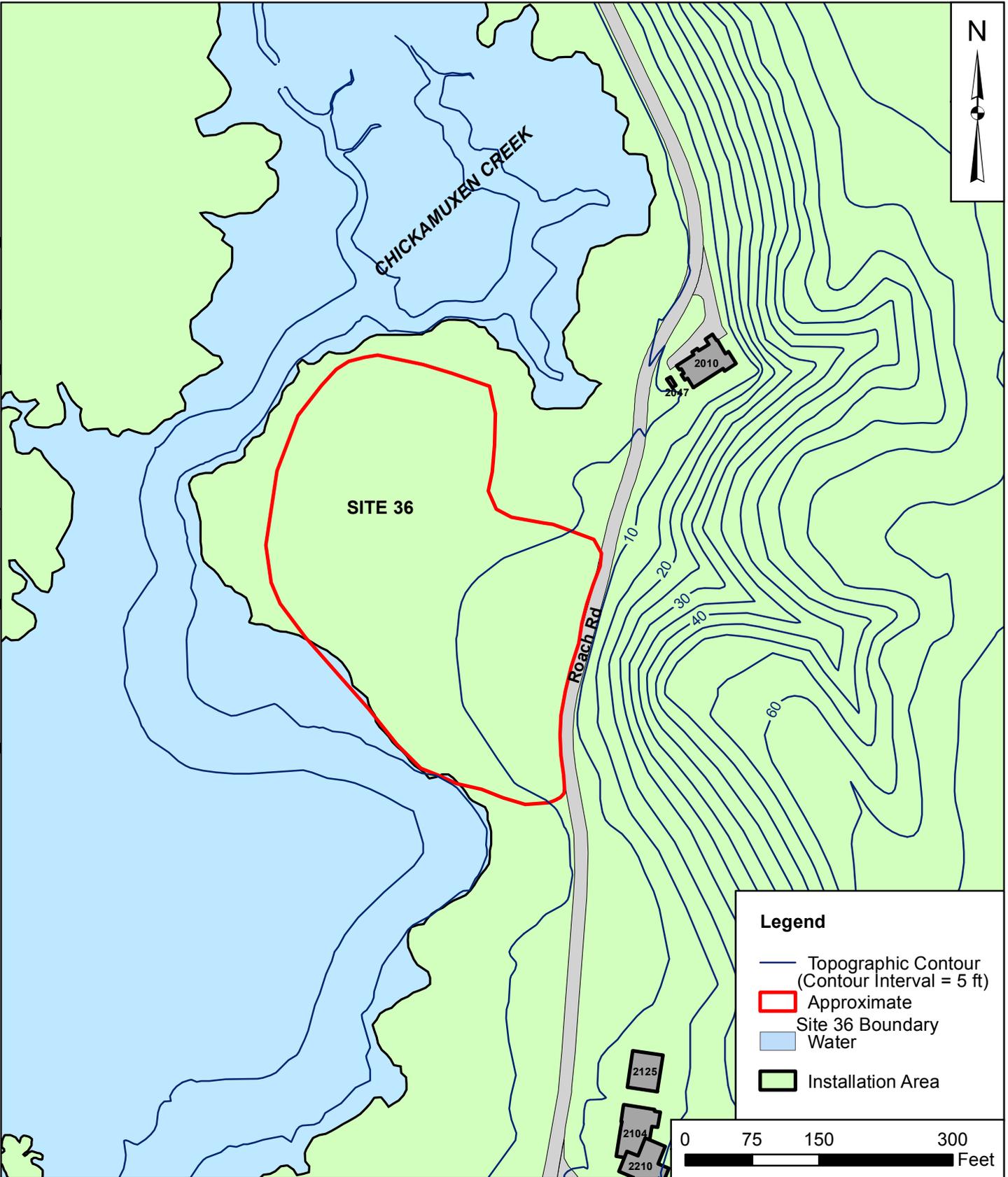
9.10 NEXT REVIEW

The next Five-Year Review for Site 36 is required by 2017, five years from the date of this review.

TABLE 9-1
 Chronology of Site 36 Events
 Site 36 – Closed Landfill
 Naval Support Facility - Indian Head,
 Indian Head, Maryland

Event	Date
Landfill Operations	1972-1974
IAS Completed (Hart, 1983)	1983
Site Screening Assessment (SSP) Completed (Tetra Tech, 2003)	2002
Benthic Invertebrate Study Completed (Tetra Tech, 2008)	November 2007
Final FS Completed (Tetra Tech, 2010)	March 2010
Final Proposed Plan Completed (Tetra Tech, 2010)	April 2010
Final ROD Completed (NAVFAC, 2011)	September 2011
Final LTMP Completed (Tetra Tech, 2012)	May 2012
LUC RD Completed (Tetra Tech, 2012)	May 2012

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CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	

SITE 36 LAYOUT
NAVAL SUPPORT FACILITY - INDIAN HEAD
INDIAN HEAD, MARYLAND

CONTRACT NUMBER 112G00771	
APPROVED BY	DATE
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10.0 SITE 42 – OLSEN ROAD LANDFILL

10.1 SITE CHRONOLOGY

Site 42 - Olsen Road Landfill comprises approximately 1.43 acres in the southwestern portion of NSF-IH. The landfill area includes a portion of the paved area south of building 1866 and the undeveloped land west, southwest, and south of Building 1866 (Figure 10-1). Between 1982 and 1987 and in 1992, during construction of Building 1866, the area was used as an unauthorized disposal site for solid wastes. Waste subsequently encountered in test pits included construction and demolition debris, cut wood logs, charred wood, metal debris, and demolished steel drums. The unauthorized disposal area was not lined, and there were no historical records of hazardous waste disposal within the limits of the Landfill.

A chronology of events for Site 42 is presented in Table 10-1 and a photograph of the site is presented as Figure 10-2.



Figure 10-2: Photograph of Site 42 facing west along drainage channel.

10.2 BACKGROUND

10.2.1 Land and Resource Use

Site 42 is maintained as an open vegetated and paved space. No future land use changes are projected for the area of the landfill cap. Current and potential future land use plans for the area surrounding the

landfill cap include vacant land, assembly building activities, minor construction and limited development. Shallow groundwater beneath the site is not used for any purpose and the Navy has no plans to develop the groundwater resource in the future. Groundwater use is restricted to non-potable use only as specified in the LUCs. Residential development of Site 42 is restricted by the ROD.

10.2.2 Basis for Remedial Action

The need for remedial action at Site 42 was based on the history of site activities, nature and extent of the contamination, and a risk assessment to determine the effects of contamination on human and ecological receptors.

10.2.3 Summary of Contamination

Surface soil, subsurface soil, groundwater, surface water, and sediment were sampled during previous investigations. COCs have been identified in groundwater beneath and downgradient of Site 42 as well as Site 42 soil. These COCs have been identified based on the risk drivers from the baseline human health and ecological risk assessments, and exceedances of regulatory criteria. The COCs identified for groundwater include cis-1,2-DCE, TCE, VC, arsenic, chromium, iron, lead, and vanadium. The COCs for soil include iron. A summary of the COCs are shown on Table 10-2.

10.3 REMEDIAL ACTIONS

10.3.1 Remedial Action Objectives

Based on the evaluation of site conditions, an understanding of the contaminants, the physical properties in media of concern, the results of risk assessments, and an analysis of ARARs, the following RAOs were developed:

- Prevent future residential exposure to soil and groundwater contaminants.
- Close the landfill in a manner that protects human health and the environment and controls air, water, and land pollution in accordance with State Solid Waste Management Regulations COMAR 26.04.07.
- Remove potential hazardous waste (hot spots) that may be a source of groundwater contamination.
- Conduct monitoring to confirm that migration of contaminants from the site has not occurred and to evaluate the need for future actions.

These RAOs were developed following guidance provided in Land Use in the CERCLA Remedy Selection Process (USEPA, 1995). According to this guidance, RAOs should reflect the reasonably anticipated future land use or uses.

10.3.2 Selected Remedy

The selected remedy for Site 42 identified in the ROD included:

- Construction of an engineered cap system.
- Removal of soil and sediment hot spots that may represent source areas.
- LUCs, which prohibit the use of shallow groundwater as a potable water source, prohibit residential use, and prevent land disturbance activities that could compromise the integrity of the engineered cap.
- LTM of groundwater and surface water. The LTMP titled Post-Closure Long-Term Monitoring and Inspection Plan for Site 42 - Olsen Road Landfill (Tetra Tech, 2005) provides for the periodic collection and analysis of groundwater and surface water samples.
- Review of remedial action performance every five years.

The selected remedy does not include direct remediation of the groundwater. The selected remedy includes removal of an area of potential hazardous waste (hot spot) that is a potential source of groundwater contamination and provides for the installation of an engineered cap that includes a synthetic geomembrane to reduce infiltration and subsequent migration of contaminants to groundwater. Land use controls were implemented to prohibit residential development, elementary and secondary schools, child care facilities, playgrounds, and use of contaminated shallow groundwater.

In addition, the USEPA defines the area of attainment for which clean-up levels will be achieved in the groundwater. It encompasses the area outside the boundary of any waste remaining in place and up to the boundary of the contaminant plume. If waste is managed or contained on site, the groundwater beneath the waste management area is not in the area of attainment. Consequently, ARAR-based cleanup levels would not apply within the boundary of waste remaining in place. The previous investigations indicated that shallow groundwater beyond the landfill boundary is not contaminated and the discharge of on-site shallow groundwater is not adversely affecting surface water quality. Monitoring is conducted to determine whether shallow groundwater contaminants are migrating beyond the site boundary or to surface water at unacceptable levels (e.g., concentrations greater than MCLs or State water quality criteria).

The installation of the cap system was completed in August 2006. Long-term monitoring was initiated in July 2006.

10.4 PROGRESS SINCE THE LAST REVIEW

The first Five-Year Review of Site 42 was completed in August 2007 (JMWA, 2007). The report concluded that the remedy at Site 42 was protective of human health and the environment. The following issue was identified during the review:

- Heavy rainfall prior to the site inspection on June 2, 2006 has resulted in erosion channels on the north side of the vegetated landfill adjacent to the asphalt cap. This erosion resulted from sheet flow across the asphalt parking lot.

The previous site inspection (2006) concluded that the erosion was related to sheet flow from the asphalt parking lot and that the cover vegetation was not yet fully established. The 2012 site inspection, conducted as part of the Five-Year Review, indicated that the cover showed no evidence of erosion and that the cover vegetation was well established.

The IHIRT reviewed the surface water sampling at Site 42. Based on the results of the ecological risk evaluation and a data review performed subsequent to the July 2007 sampling event, the groundwater concentrations in the monitoring wells near the surface water sampling locations are similar to or below the site-specific background monitoring locations. Because the groundwater concentrations adjacent to the surface water were similar to the background concentrations, the site constituents are not expected to cause site-related adverse effects to aquatic biota at Site 42 (Tetra Tech, 2007). Therefore, it was determined by the IHIRT that additional surface water sampling at Site 42 was not required for any monitoring event after October 2007.

In addition, the IHIRT reviewed optimization measures for the groundwater monitoring. Groundwater monitoring at Site 42 has historically been conducted on a quarterly basis in accordance with the decision logic presented in the LTMP (Tetra Tech, July 2005). A total of six years of monitoring for selected analytes, including multiple full HSL sampling events, has been completed and provides a comprehensive history of the concentrations of the site constituents. Overall, the statistical trend analyses from the 2011 Site 42 End-of-Sequence Report (Sovereign, 2012) indicated that the site constituents have become relatively stable with no apparent trends or decreasing trends. The human health risk evaluation from the Site 42 October 2011 Event Report (Sovereign, 2012) indicated that there are some risks associated with exposure to arsenic, iron, manganese, and TCE.

During the partnering meeting on February 9, 2012, the IHIRT agreed to continue monitoring arsenic, iron, manganese, and TCE due to continued risks associated with these site constituents. In addition, cis-1,2 DCE and VC will continue to be analyzed to evaluate the breakdown of TCE at the site. However, the IHIRT agreed to reduce the frequency of monitoring for these constituents to once every 9 months because the trend analysis (Sovereign, 2011) indicated the concentrations of the majority of the site constituents have become relatively stable.

10.5 FIVE-YEAR REVIEW PROCESS

10.5.1 Document Review

Part of the Five-Year Review consisted of a review of relevant documents. Historical documents are referenced in Table 10-1 and Section 12.0.

10.5.2 Data Review

Monitoring data has been collected since the implementation of the remedial action. A LTMP (Tetra Tech, 2005) was developed to comply with the groundwater and surface water monitoring requirements of the CERCLA Program. As previously discussed in Section 10.4, the surface water monitoring was discontinued after October 2007.

Groundwater monitoring data (frequency of detections) for the period of this review (September 2007 – August 2012) is summarized in Table 10-3. A review of the analytical data shows that TCE was the only VOC detected at concentrations exceeding the screening criteria. In addition, naphthalene was the only SVOC to exceed the screening criteria during the October 2011 sampling event. The concentrations of metals exceeded the screening criteria at all of the monitoring wells. In addition, the analytical results from the January 2012 sampling event are shown on Figure 10-1. The current groundwater monitoring program at Site 42 consists of the analysis of selected metals and VOCs (arsenic, iron, manganese, TCE, cis-1,2, DCE, and VC) at a frequency of every 9 months.

As part of the monitoring, a human health risk evaluation was conducted utilizing the HSL data collected during the October 2011 sampling event (Sovereign, 2012). The risk evaluation showed that the majority of the site constituents that exceeded the screening criteria did not contribute to site risks. However, there are some risks associated with exposure to arsenic, iron, manganese, and TCE in site groundwater. In addition, the cobalt concentration contributed to the risk at downgradient well MW-9, however, the concentration was less than the detected concentration in background well MW-11. Because this concentration is below the site background, cobalt was not added to the list of COCs that are consistently monitored for the site.

Trend analyses were performed on the monitoring data to evaluate the concentrations of site constituents over time (Sovereign, 2012). The results from the short-term trend tests (using data from four monitoring events) indicate that the analytes demonstrated no trends (Table 10-4). The long-term statistical analysis (Table 10-5) indicated decreasing trends were observed for cis-1,2-DCE (MW-9), TCE (MW-3, MW-8, and MW-9), and VC (MW-8). However, increasing trends for the dissolved concentrations of iron and manganese, as well as TCE, were observed at well MW-10. VOC samples from MW-3, located downgradient of MW-10, have shown no exceedances of the screening criteria for site constituents. Therefore, there is no indication of a new release of VOCs occurring at the site.

There are exceedances of the screening criteria for metals and VOCs. The majority of the site constituent concentrations either demonstrated no trend or a decreasing trend. However, increasing trends were observed for some of the site constituents at monitoring well MW-10.

10.5.3 Site Inspection

An inspection of the site was conducted on April 26, 2012 by representatives of Tetra Tech. The purpose of the inspection was to assess the protectiveness of the remedy, including the integrity of the engineered cap. Appendix A contains the site inspection checklist. Photographs taken during the site inspection are included in Appendix B.

The selected remedy appears to be protective of human health and the environment, and control exposure pathways that could result in unacceptable risk. There is no evidence of damage to the cap and inspection of the drainage channels and road indicate that these are in good working condition. However, some saplings and tall vegetation were observed growing in the drainage channels. These issues may obstruct surface water flow on the landfill cap. Erosion was also observed in the unlined portion of the central drainage ditch. However, these issues do not impact the protectiveness of the remedy.

10.5.4 Interviews

Interviews have been conducted with MDE and NAVFAC and are included in Appendix C.

10.6 TECHNICAL ASSESSMENT

10.6.1 Question A: Is The Remedy Functioning As Intended By The Decision Documents?

The review of documents, ARARs, and the site inspection indicate that the final remedy is functioning as intended by the ROD. The site inspection did not identify any problems with the engineered cap system. The institutional controls include restrictions on intrusive activities at the site and any other activities or actions that might interfere with the implemented final remedy. NAVFAC manages and maintains a base-

wide GIS. All IR Sites are identified on the GIS. All work performed on the activity must be approved by the Navy.

The groundwater monitoring indicated that the concentrations of the majority of the site constituents in groundwater were relatively stable based on a lack of trends for the majority of the site constituents over time. Some site constituents exceeded their respective screening criteria, however, the LUCs prevent use of groundwater at Site 42. Increasing trends of some site constituents were observed at downgradient well MW-10, indicating that there may be the potential for offsite migration of site-impacted groundwater.

No evidence of any activities of an intrusive, residential, or disturbing nature were observed during the site inspection that would have violated any of the land use controls. In summary, the LUCs, O&M inspections, and engineered cap are in place to successfully prevent human exposure to the site-related contaminants at Site 42.

10.6.2 Question B: Are The Exposure Assumptions, Toxicity Data, Clean-Up Levels, And RAOs Used At The Time Of The Remedy Selection Still Valid?

The site usage has not changed since the ROD was prepared. Based on the remedy evaluation for data in existing documents and confirmation that the applicable State and Federal standards for the COCs have not changed significantly, the exposure assumptions, toxicity data, cleanup levels, and RAOs are still valid, especially considering the intact engineered cap (exposure barrier). The remedy is in compliance with the ARARs. Vapor intrusion was not considered as an exposure pathway in the HHRA. In addition, vapor monitoring was not conducted during the previous investigations. However, Building 1866 is located outside of the waste material and the selected remedy stipulated removal of the potential hazardous waste hot spot at Site 42.

The HHRA presumed unacceptable risks for hypothetical future residential exposure to soils and landfill materials, as well as groundwater. There have been no changes to the RAOs and exposure assumptions used for the selection of an engineered cap remedy. There are no toxicity value changes that warrant discussion as related to revising cleanup levels. The remedy is functioning as intended and the cap will be maintained with no residential development as long as wastes remain in place. Because wastes remain in place, Site 42 will continue to be subject to the requirement for five-year reviews and for the Maryland post-closure groundwater monitoring requirements.

10.6.3 Question C: Has Any Other Information Come To Light That Calls Into Question The Protectiveness Of The Remedy?

No other information has been made available that calls into question the protectiveness of the remedial action.

10.6.4 Technical Assessment Summary

The final remedy consisting of an engineered cap system, removal of potential source areas, institutional controls, which include land use controls, and O&M inspections are successful in achieving the RAOs in the ROD by restricting exposure to site-related contaminants. Analytical data from LTM of groundwater indicates that there is no significant increase in the organic or metals concentrations. The LUCs, through the permitting process and the GIS, are the primary reason that the RAOs have been met. There is no other information that calls into question the protectiveness of the final remedy.

10.7 ISSUES

The results of the LTM indicate that some of the site constituents at downgradient well MW-10 have demonstrated increasing trends. This issue should be evaluated to ensure contaminated groundwater is not migrating offsite. In addition, during the site inspection, saplings and tall vegetation were observed growing in the drainage channels. This issue does not represent an immediate impact to the protectiveness of the remedy. However, the issue should be addressed to ensure that surface water can drain from the site.

10.8 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Based on the results of this Five-Year Review, it is recommended that the Navy develop a work plan to investigate downgradient groundwater concentrations at the site to ensure that contaminated groundwater is not migrating offsite. In addition, it is recommended that vegetation be trimmed and saplings be removed from the drainage channels.

10.9 PROTECTIVENESS STATEMENT

The remedy for Site 42 is protective of human health and the environment and is functioning as intended by the ROD. The exposure pathways that could result in unacceptable risks have been controlled and all of the RAOs have been satisfied. The exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the final remedy are still valid. No other information that could call into question the protectiveness of the remedy has been identified in this review.

10.10 NEXT REVIEW

The next Five-Year Review for Site 42 is required by 2017, five years from the date of this review.

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TABLE 10-1
 Chronology of Site 42 Events
 Site 42– Olsen Road Landfill
 Naval Support Facility – Indian Head
 Indian Head, Maryland

Event	Date
Unauthorized dumping at Olsen Road Landfill	1982-1987 and 1992
IAS Report published (NEESA, 1983)	1983
Supplemental PA Report published (NEESA, 1992)	1992
Phase I SI Report published (E/A&H, 1992)	1992
Phase II SI Report published (E.A&H, 1994)	1994
NSF-IH added to the NPL	1995
RI completed (Tetra Tech, 1999)	1999
Additional field investigations published	2003
FS Report published (Tetra Tech, 2003)	2003
Pre-design field investigation performed	2002-2003
ROD signed (USEPA, et. al, 2005)	2005
Remedial Action Design published (Tetra Tech, 2005)	2005
Remedial Action completed (FSSI/Shaw, 2006)	2006
LTM initiated	2006

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TABLE 10-2
 Summary of Site 42 COCs
 Site 42 - Olsen Road Landfill
 Naval Support Facility-Indian Head
 Indian Head, Maryland

Exposure Point	Chemical of Concern
Soil – ingestion, dermal contact, inhalation	Iron
Groundwater – ingestion, dermal contact, inhalation	cis-1,2-Dichloroethene
	Trichloroethene
	Vinyl chloride
	Arsenic
	Chromium
	Iron
	Lead
	Vanadium

Notes:
 From the Site 42 RI (Tetra Tech, 1999)

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TABLE 10-3
 Site 42 Frequency of Detections
 September 2007 - August 2012
 Site 42 - Olsen Road Landfill
 Naval Support Facility-Indian Head
 Indian Head, Maryland
 Page 1 of 2

Parameter	Frequency of Detection	Min Res	Max Res	Location of Max Detect	Sample of Max Detect	Min ND	Max ND	Average of Positive Results	Overall Average	Standard Deviation
Inorganics (ug/L)										
ALUMINUM	7/18	94.8 J	9370	S42MW13	S42MW00130022	16.1	300	2055.257142	823.898611	2222.219203
ARSENIC	46/108	2.1 J	44.4	S42MW09	S42MW0090017	1.86	10	8.002173	4.475	6.64057515
BARIUM	18/18	70	182	S42MW10	S42MW0100014-D			117.433333	117.433333	30.44879984
BERYLLIUM	3/18	0.56 J	0.7	S42MW11	S42MW0110014	0.037	5	0.613333	0.733111	0.991850803
CADMIUM	2/18	0.41	0.68	S42MW12	S42MW0120015	0.1	0.5	0.5225	0.208888	0.139342527
CALCIUM	18/18	2530	14000	S42MW08	S42MW0080015			7095.555555	7095.555555	3231.414682
CHROMIUM	7/24	0.76	23.8	S42MW13	S42MW00130022	0.5	2.1	6.994285	2.39427	5.163419909
COBALT	30/36	0.43 J	19.9	S42MW11	S42MW0110014	0.28	8.7	10.584833	9.147777	6.13290463
COPPER	9/18	0.68 J	9.2 J	S42MW13	S42MW00130022	1.5	4.7	3.418888	2.44	2.427540513
IRON	108/108	1080	71800	S42MW10	S42MW0100017-D			18103.10185	18103.10185	18727.93297
LEAD	4/24	1.5 J	6.7	S42MW13	S42MW00130022	1.8	5	3	1.5625	1.215859867
MAGNESIUM	18/18	2330	7190	S42MW08	S42MW0080014			3973.055555	3973.055555	1489.915255
MANGANESE	102/102	117	7390	S42MW08	S42MW0801112			1109.563725	1109.563725	1396.451359
NICKEL	17/18	1.1	34.4	S42MW12	S42MW0120014	0.96	0.96	14.732352	13.940555	12.76428679
POTASSIUM	18/18	279 L	1960	S42MW13	S42MW00130022			683.75	683.75	353.3590596
SILVER	4/18	0.46 J	1.5 J	S42MW10	S42MW00100022-D	0.96	15	0.8975	1.592777	2.179179029
SODIUM	18/18	11300	49100	S42MW13	S42MW0130014			23725	23725	10009.23471
VANADIUM	6/24	0.4 J	19.4 J	S42MW13	S42MW00130022	0.34	25	5.316666	3.1375	5.391987816
ZINC	10/18	1.8 J	42.6 K	S42MW13	S42MW00130022	3.4	55.9	19.09	16.823611	13.0344805
Filtered Inorganics (ug/L)										
ALUMINUM	2/18	21.2 J	144 J	S42MW13	S42MW00130022	12.1	300	82.6	51.847222	62.00624132
ARSENIC	33/108	1.7 J	11.8	S42MW09	S42MW09_20090724	1.86	10	5.020909	2.826435	2.143444042
BARIUM	18/18	55.6	185	S42MW10	S42MW0100014			109.894444	109.894444	35.77204745
BERYLLIUM	2/18	0.49 J	0.7	S42MW11	S42MW0110014	0.037	5	0.595	0.560916	0.908619497
CADMIUM	2/18	0.78	1	S42MW12	S42MW0120015	0.08	0.5	0.8775	0.244444	0.244220783
CALCIUM	18/18	2710	17800	S42MW08	S42MW0080015			7296.944444	7296.944444	3852.771783
CHROMIUM	2/24	0.61	2.2	S42MW10	S42MW0100014	0.5	1.2	0.9175	0.498958	0.198931817
COBALT	31/36	0.69 J	20	S42MW11	S42MW0110014	0.28	8.6	10.522419	9.250277	6.071316043
COPPER	6/18	0.72 J	5.8	S42MW13	S42MW0130014	1.5	25	2.150833	2.878055	3.745196586
IRON	107/108	208	74800	S42MW10	S42MW0100017	160	160	15233.15421	15092.84722	18215.82994
MAGNESIUM	18/18	2480	9030	S42MW08	S42MW0080015			4125	4125	1829.241244

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TABLE 10-3
 Site 42 Frequency of Detections
 September 2007 - August 2012
 Site 42 - Olsen Road Landfill
 Naval Support Facility-Indian Head
 Indian Head, Maryland
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Parameter	Frequency of Detection	Min Res	Max Res	Location of Max Detect	Sample of Max Detect	Min ND	Max ND	Average of Positive Results	Overall Average	Standard Deviation
MANGANESE	102/102	113	7690	S42MW08	S42MW0801110			1125.083333	1125.083333	1470.008635
NICKEL	18/18	0.95 J	34.7	S42MW12	S42MW0120014			13.694444	13.694444	12.36102614
POTASSIUM	17/18	259	875 J	S42MW12	S42MW00120022	347	347	569.617647	547.611111	207.5578981
SELENIUM	6/18	2.6 J	11.2 J	S42MW13	S42MW0130015	3.6	10	5.675	5.047222	1.84458446
SILVER	3/18	0.34 J	1.3 J	S42MW10	S42MW00100022-D	0.96	15	0.676666	1.922777	2.590670605
SODIUM	18/18	11300	47600	S42MW13	S42MW0130014			24666.66667	24666.66667	10560.92966
VANADIUM	3/24	0.33 J	0.79 J	S42MW13	S42MW00130022	0.34	25	0.626666	2.415833	4.609845717
ZINC	13/18	1.2 L	46.1	S42MW12	S42MW0120014	17.2	56.3	16.603846	16.341666	13.55874202
Semivolatile Organics (ug/L)										
NAPHTHALENE	2/12	2.8 J	5 J	S42MW10	S42MW00100022-D	9	10	3.525	4.629166	0.595612112
Volatile Organics (ug/L)										
1,1-DICHLOROETHENE	3/19	0.23 J	0.5 J	S42MW12	S42MW00120022	0.5	5	0.36	1.043684	1.021753452
ACETONE	1/12	4 J	4 J	S42MW11	S42MW00110022	1.7	5	4	1.93125	0.978700727
BENZENE	2/19	0.4 J	0.46 J	S42MW10	S42MW0100015	0.5	5	0.43	1.045263	1.020285191
CIS-1,2-DICHLOROETHENE	42/121	0.046 J	12	S42MW10	S42MW00100019	0.2	5	2.62419	1.885462	1.986085912
TETRACHLOROETHENE	1/19	0.4 J	0.4 J	S42MW11	S42MW00110022	0.5	5	0.4	1.03421	1.028085144
TRICHLOROETHENE	43/121	0.3 J	520	S42MW12	S42MW0120018	0.3	5	92.109302	33.600826	87.30155807
VINYL CHLORIDE	6/121	0.096 J	1 J	S42MW10	S42MW00100020	0.2	25	0.421333	1.54333	1.18390254

Notes

J - Analyte present, reported value is estimated

K - Analyte present, reported value may be biased high

L - Analyte present, reported value may be biased low

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TABLE 10-4
SHORT-TERM TREND TEST SUMMARY JULY 2010 THROUGH APRIL 2011
INDIAN HEAD SITE 42 - OLSEN ROAD LANDFILL
NAVAL SUPPORT FACILITY, INDIAN HEAD, MARYLAND
PAGE 1 OF 1

CHEMICAL	S42MW03				S42MW08				S42MW09				S42MW10			
	S TEST STATISTIC	P-VALUE	CONCLUSION	CV	S TEST STATISTIC	P-VALUE	CONCLUSION	CV	S TEST STATISTIC	P-VALUE	CONCLUSION	CV	S TEST STATISTIC	P-VALUE	CONCLUSION	CV
DISSOLVED METALS																
ARSENIC	NA ⁽¹⁾	NA ⁽¹⁾	NA ⁽¹⁾	NA ⁽¹⁾	2	0.375	NO TREND	0.54	-4	0.167	NO TREND	0.72	-1	0.625	NO TREND	0.38
IRON	NA ⁽¹⁾	NA ⁽¹⁾	NA ⁽¹⁾	NA ⁽¹⁾	-4	0.167	NO TREND	0.99	0	0.625	NO TREND	0.35	-2	0.375	NO TREND	0.18
MANGANESE	NA ⁽¹⁾	NA ⁽¹⁾	NA ⁽¹⁾	NA ⁽¹⁾	2	0.375	NO TREND	0.72	2	0.375	NO TREND	0.2	-4	0.167	NO TREND	0.089
VOLATILES																
CIS-1,2-DICHLOROETHENE	0	0.625	NO TREND	0.74	0	0.625	NO TREND	0.56	NA ⁽²⁾	NA ⁽²⁾	NA ⁽²⁾	NA ⁽²⁾	2	0.375	NO TREND	1.1
TRICHLOROETHENE	NA ⁽²⁾	NA ⁽²⁾	NA ⁽²⁾	NA ⁽²⁾	0	0.625	NO TREND	0.62	-2	0.375	NO TREND	0.49	4	0.167	NO TREND	0.72
VINYL CHLORIDE	NA ⁽²⁾	0	0.625	NO TREND	0.5											

Notes:

CV = COEFFICIENT OF VARIATION

NA = NOT APPLICABLE

(1) There are not at least four rounds of data.

(2) All the rounds are non-detect.

5 Percent Significance Level was used to determine if a trend is present.

TABLE 10-5
LONG-TERM TREND TEST SUMMARY APRIL 1993 THROUGH APRIL 2011
INDIAN HEAD SITE 42 - OLSEN ROAD LANDFILL
NAVAL SUPPORT FACILITY, INDIAN HEAD, MARYLAND
PAGE 1 OF 1

CHEMICAL	S42MW03				S42MW08				S42MW09				S42MW10			
	S TEST STATISTIC	P-VALUE	CONCLUSION	CV	S TEST STATISTIC	P-VALUE	CONCLUSION	CV	S TEST STATISTIC	P-VALUE	CONCLUSION	CV	S TEST STATISTIC	P-VALUE	CONCLUSION	CV
DISSOLVED METALS																
ARSENIC	-2	0.375	NO TREND	0.61	3	0.951	NO TREND	1.6	30	0.381	NO TREND	0.5	49	0.1467	NO TREND	0.56
IRON	-2	0.375	NO TREND	0.68	-23	0.506	NO TREND	0.68	34	0.319	NO TREND	0.27	111	0.00089	UPWARD TREND	0.25
MANGANESE	-2	0.375	NO TREND	0.15	-40	0.079	NO TREND	0.83	17	0.471	NO TREND	0.25	68	0.00256	UPWARD TREND	0.14
VOLATILES																
CIS-1,2-DICHLOROETHENE	-12	0.536	NO TREND	0.97	-48	0.0858	NO TREND	0.76	-53	0.04	DOWNWARD TREND	0.7	19	0.5206	NO TREND	1
TRICHLOROETHENE	-54	0.013	DOWNWARD TREND	1.1	-64	0.0333	DOWNWARD TREND	0.65	-70	0.016	DOWNWARD TREND	0.64	109	0.00101	UPWARD TREND	0.96
VINYL CHLORIDE	NA ⁽²⁾	NA ⁽²⁾	NA ⁽²⁾	NA ⁽²⁾	-60	0.0401	DOWNWARD TREND	0.6	NA ⁽²⁾	NA ⁽²⁾	NA ⁽²⁾	NA ⁽²⁾	-39	0.1451	NO TREND	0.51

Notes:

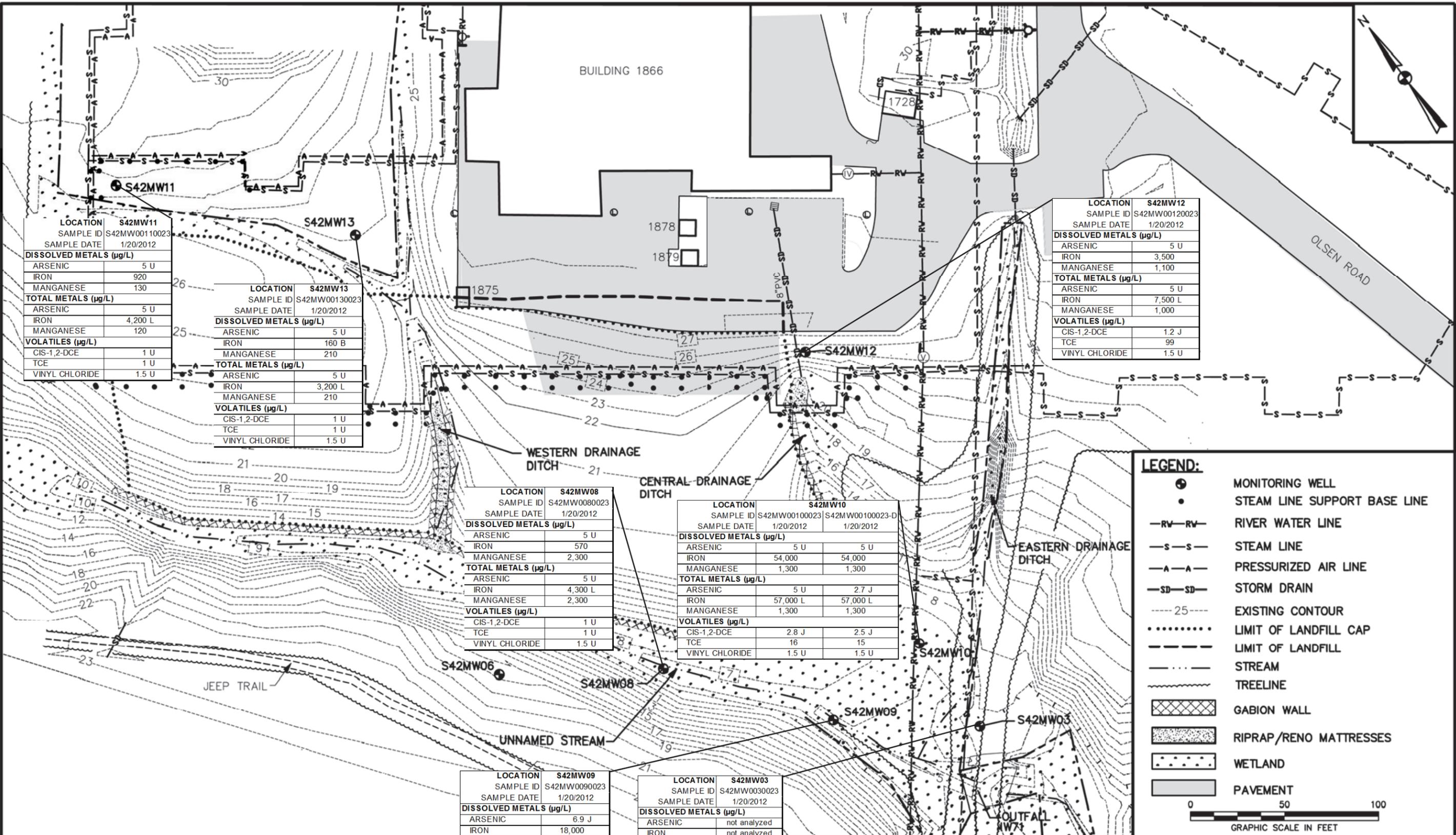
CV = COEFFICIENT OF VARIATION

NA = NOT APPLICABLE

(1) There are not at least four rounds of data.

(2) All the rounds are non-detect.

5 Percent Significance Level was used to determine if a trend is present.



LOCATION	S42MW11
SAMPLE ID	S42MW00110023
SAMPLE DATE	1/20/2012
DISSOLVED METALS (µg/L)	
ARSENIC	5 U
IRON	920
MANGANESE	130
TOTAL METALS (µg/L)	
ARSENIC	5 U
IRON	4,200 L
MANGANESE	120
VOLATILES (µg/L)	
CIS-1,2-DCE	1 U
TCE	1 U
VINYL CHLORIDE	1.5 U

LOCATION	S42MW13
SAMPLE ID	S42MW00130023
SAMPLE DATE	1/20/2012
DISSOLVED METALS (µg/L)	
ARSENIC	5 U
IRON	160 B
MANGANESE	210
TOTAL METALS (µg/L)	
ARSENIC	5 U
IRON	3,200 L
MANGANESE	210
VOLATILES (µg/L)	
CIS-1,2-DCE	1 U
TCE	1 U
VINYL CHLORIDE	1.5 U

LOCATION	S42MW12
SAMPLE ID	S42MW00120023
SAMPLE DATE	1/20/2012
DISSOLVED METALS (µg/L)	
ARSENIC	5 U
IRON	3,500
MANGANESE	1,100
TOTAL METALS (µg/L)	
ARSENIC	5 U
IRON	7,500 L
MANGANESE	1,000
VOLATILES (µg/L)	
CIS-1,2-DCE	1.2 J
TCE	99
VINYL CHLORIDE	1.5 U

LOCATION	S42MW08
SAMPLE ID	S42MW0080023
SAMPLE DATE	1/20/2012
DISSOLVED METALS (µg/L)	
ARSENIC	5 U
IRON	570
MANGANESE	2,300
TOTAL METALS (µg/L)	
ARSENIC	5 U
IRON	4,300 L
MANGANESE	2,300
VOLATILES (µg/L)	
CIS-1,2-DCE	1 U
TCE	1 U
VINYL CHLORIDE	1.5 U

LOCATION	S42MW10
SAMPLE ID	S42MW00100023
SAMPLE DATE	1/20/2012
DISSOLVED METALS (µg/L)	
ARSENIC	5 U
IRON	54,000
MANGANESE	1,300
TOTAL METALS (µg/L)	
ARSENIC	5 U
IRON	57,000 L
MANGANESE	1,300
VOLATILES (µg/L)	
CIS-1,2-DCE	2.8 J
TCE	16
VINYL CHLORIDE	1.5 U

LOCATION	S42MW09
SAMPLE ID	S42MW0090023
SAMPLE DATE	1/20/2012
DISSOLVED METALS (µg/L)	
ARSENIC	6.9 J
IRON	18,000
MANGANESE	920
TOTAL METALS (µg/L)	
ARSENIC	39
IRON	30,000 L
MANGANESE	970
VOLATILES (µg/L)	
CIS-1,2-DCE	1 U
TCE	1 U
VINYL CHLORIDE	1.5 U

LOCATION	S42MW03
SAMPLE ID	S42MW0030023
SAMPLE DATE	1/20/2012
DISSOLVED METALS (µg/L)	
ARSENIC	not analyzed
IRON	not analyzed
MANGANESE	not analyzed
TOTAL METALS (µg/L)	
ARSENIC	not analyzed
IRON	not analyzed
MANGANESE	not analyzed
VOLATILES (µg/L)	
CIS-1,2-DCE	1 U
TCE	1 U
VINYL CHLORIDE	1.5 U

DRAWN BY	MF	DATE	11/8/05
CHECKED BY	NJB	DATE	11/8/05
REVISED BY		DATE	
SCALE AS NOTED			

LEGEND:

- MONITORING WELL
- STEAM LINE SUPPORT BASE LINE
- RV— RIVER WATER LINE
- S—S— STEAM LINE
- A—A— PRESSURIZED AIR LINE
- SD—SD— STORM DRAIN
- 25--- EXISTING CONTOUR
- LIMIT OF LANDFILL CAP
- --- LIMIT OF LANDFILL
- --- STREAM
- --- TREELINE
- [X] GABION WALL
- [.] RIPRAP/RENO MATTRESSES
- [.] WETLAND
- [] PAVEMENT

0 50 100
GRAPHIC SCALE IN FEET

Notes:
 µg/L - micrograms per liter
 U - Not Detected
 J - Analytes present, reported value may not be accurate
 L - Positive result is considered biased low

SITE 42 LAYOUT
NAVAL SUPPORT FACILITY-INDIAN HEAD
INDIAN HEAD, MARYLAND

CONTRACT NO.	2194		
OWNER NO.	007		
APPROVED BY	GJL	DATE	11/8/05
DRAWING NO.	FIGURE 10-1	REV.	0

11.0 SITE 57 – BUILDING 292 TCE CONTAMINATION

11.1 SITE CHRONOLOGY

Site 57, Building 292 TCE Contamination, encompasses the area located south of Building 292 at the Main Area of NSF-IH (Figure 11-1). Previous operations from the mid-1960s until 1989 involved the use of TCE for vapor degreasing and general cleaning. During the 1970s and 1980s, spent TCE was transferred from a tank inside Building 292 into drums via a pipe that passed through the wall near the southern corner of the building. The drums were reportedly stored on a grass-covered area near manhole MH-1 south of the southern corner of Building 292. It is believed that these operations have resulted in the contamination of soil and groundwater. Building 292 is still active; however, TCE has not been used since 1989. Site 57 also included Buildings 165 and 496, located approximately 150 feet southwest of Building 292, which were used to store ethyl ether.

A chronology of events for Site 57 is presented in Table 11-1 and a photograph of the site is presented as Figure 11-2.



Figure 11-2. Photograph of Site 57 facing southeast towards Building 160.

11.2 BACKGROUND

11.2.1 Land and Resource Use

Building 292 is currently in active industrial use, however, TCE has not been used at the building since 1989. Potential future land uses include industrial and maintenance activities within and around the building, minor construction, and limited development. Residential development of Site 57 is restricted by the ROD. Shallow groundwater is not used for any purpose, 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 source of water for domestic use at NSF-IH.

11.2.2 Basis for Remedial Action

The need for remedial action at Site 57 was based on the history of site activities, nature and extent of the contamination, a risk assessment to determine the effects of contamination on human and ecological receptors, and the comparison of COC levels to calculated, or established project remediation goals (PRGs).

11.2.3 Summary of Contamination

Surface soil, subsurface soil, groundwater, surface water, and sediment were sampled during previous investigations. COCs were identified for surface soil and groundwater based on the risk drivers from the HHRA and exceedances of regulatory criteria. However, all contaminated soil was addressed under the non-time critical removal action (NTCRA) completed in 2006, therefore, there are no longer any COCs for soil. The COCs identified for groundwater include cis-1,2-DCE, 1,1-DCE, diethyl ether, trans-1,2-DCE, TCE, and VC. Table 11-2 provides a summary of Site 57 PRGs.

11.3 REMEDIAL ACTIONS

11.3.1 Remedial Action Objectives

Based on the evaluation of site conditions, an understanding of the contaminants, the physical properties in media of concern, the results of risk assessments, and an analysis of ARARs, the following RAOs were developed:

- Prevent exposure to groundwater contaminated at concentrations greater than PRGs.
- Prevent or minimize further migration of the groundwater contaminant plume (plume containment).
- Restore groundwater to its expected beneficial use (aquifer restoration).

These RAOs were developed following guidance provided in Land Use in the CERCLA Remedy Selection Process (USEPA, 1995). According to this guidance, RAOs should reflect the reasonably anticipated future land use or uses.

11.3.2 Selected Remedy

The initial selected remedy for Site 57 was *in-situ* biodegradation with injection of emulsified vegetable oil (EVO), LUCs, and LTM. However, during initiation of EVO injection activities at Site 57 on November 16, 2011, EVO was observed in one of three storm sewer pipes present at the site. EVO injection activities were stopped while the integrity of the storm sewer pipes was evaluated. Results of the investigation indicated that gravity injection of the EVO substrate could infiltrate into the two storm sewer pipes. Therefore, the EVO injection specified in the Final Remedial Design (RD) Submittal (Tetra Tech, 2009) could not be implemented.

The remedial approach was modified to deploy EHC[®] via an A-SOX delivery system in 12 injection wells and 2 monitoring wells (AGVIQ/CH2M HILL, 2012). The components of the modified remedy include:

- *In-situ* bioremediation through use of EHC[®] to stimulate anaerobic biodegradation of groundwater contaminants in the source area and mid-plume area to promote reductive dechlorination of TCE and its degradation products, cis-1,2-DCE and VC. EHC[®] will be deployed in the injection and monitoring wells via the A-SOX delivery system. An oxygen release compound (ORC) (electron acceptor) will be injected into the surficial aquifer in the downgradient plume area near Mattawoman Creek to create an aerobic treatment zone suitable for oxidative biodegradation of cis-1,2-DCE and VC.
- LUCs will consist of (1) maintaining records of the restrictions in the NSF-IH GIS, and (2) restriction of shallow groundwater as a source of potable water until PRGs are achieved.
- Monitoring will consist of sampling existing monitoring wells on a regular basis for Target Compound List (TCL) VOCs, diethyl ether, and natural attenuation indicator parameters [ferrous iron, total organic carbon (TOC), alkalinity, nitrate, nitrite, sulfate, sulfide, carbon dioxide, methane, ethane, and ethene].
- Five Year Reviews will be conducted to evaluate the site status and determine effectiveness of the selected remedy.

The implementation of the modified remedy is scheduled for summer 2012. Long-term monitoring will be initiated in late 2012.

11.4 PROGRESS SINCE THE LAST REVIEW

This is the first Five-Year Review report for Site 57.

11.5 FIVE-YEAR REVIEW PROCESS

11.5.1 Document Review

Part of the Five-Year Review consisted of a review of relevant documents. Historical documents are referenced in Table 11-1 and Section 12.0.

11.5.2 Data Review

Long-term monitoring of groundwater will be initiated in late 2012 to determine if the modified remedy is functioning as intended and is achieving the RAOs.

11.5.3 Site Inspection

An inspection of the site was conducted on May 21, 2012 by representatives of Tetra Tech. Appendix A contains the site inspection checklist. Photographs taken during the site inspection are included in Appendix B.

No issues were identified during the site inspection. Once completed, the modified remedy will be protective of human health and the environment, and control exposure pathways that could result in unacceptable risk.

11.5.4 Interviews

Interviews have been conducted with MDE and NAVFAC and are included in Appendix C.

11.6 TECHNICAL ASSESSMENT

11.6.1 Question A: Is The Remedy Functioning As Intended By The Decision Documents?

The modified remedy implementation is scheduled for summer 2012.

Long-term monitoring of shallow groundwater will be implemented to confirm that groundwater contaminant migration is not occurring at unacceptable levels and that the modified remedy is functioning as intended.

The institutional controls include NAVFAC managing and maintaining a base-wide GIS. All IR Sites are identified on the GIS. LUCs will prevent shallow groundwater being used as a potable water supply. All other uses of groundwater shall require Navy approval. Acceptability of use will be evaluated based on the chemical concentrations present in the groundwater at the time of such use. LUCs will be maintained until the concentrations of hazardous substances in shallow groundwater are at such levels to allow for unlimited use and unrestricted exposure.

No signs of intrusion or invasive development of the site were observed. No activities were observed that would have violated the institutional controls. In summary, the institutional controls are successful in preventing exposure to the site-related contaminants.

11.6.2 Question B: Are The Exposure Assumptions, Toxicity Data, Clean-Up Levels, And RAOs Used At The Time Of The Remedy Selection Still Valid?

There have been no changes in exposure assumption, toxicity, or contaminant characteristics that have negatively impacted the modified remedial action or monitoring activities. Since the site usage has not changed since the ROD was prepared, the receptors and exposure pathways identified above have not changed. The cleanup levels for the COCs in groundwater are MCLs (with the exception of diethyl ether). The MCLs have not been changed since the ROD was signed in September 2007. The risk-based cleanup level for diethyl ether is not affected significantly by any exposure route or toxicity value changes, because its derivation is based on a calculation utilizing the MCLs of the other COCs (Tetra Tech, 2006). State and Federal ARARs have not changed significantly as they relate to the groundwater injection remedy. The RAOs are still valid, and the remedy is expected to be maintained in compliance with ARARs.

11.6.3 Question C: Has Any Other Information Come To Light That Calls Into Question The Protectiveness Of The Remedy?

No other information has been made available that calls into question the protectiveness of the modified remedial action.

11.6.4 Technical Assessment Summary

There have been no changes in the physical conditions of Site 57 that would affect the protectiveness of the modified final remedy. The ARARs for soil contamination cited in the ROD will be addressed by implementation of the modified remedial action. There is no other information that calls into question the protectiveness of modified the final remedy.

11.7 ISSUES

No issues with the modified remedy were identified during this review.

11.8 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Based on the results of this Five-Year Review, no recommendations or follow-up actions are required at this time.

11.9 PROTECTIVENESS STATEMENT

Once completed, the modified remedy for Site 57 will be protective of human health and the environment, and will function as intended by the ROD. The exposure pathways that could result in unacceptable risks will be controlled and all of the RAOs will be satisfied. The exposure assumptions, toxicity data, clean up levels, and RAOs used at the time of the modified final remedy selection are still valid. No other information that could call into question the protectiveness of the modified final remedy has been identified in this review.

11.10 NEXT REVIEW

The next Five-Year Review for Site 57 is required by 2017, five years from the date of this review.

TABLE 11-1
 Chronology of Site 57 Events
 Site 57 – Building 252 TCE Contamination
 Naval Support Facility - Indian Head
 Indian Head, Maryland

Event	Date
Use of TCE at Building 292	1964 to 1989
Limited subsurface investigation	March 1996
EE/CA completed (B&R Environmental, 1998)	June 1998
Soil removal action	1998
RI (Tetra Tech, 2000)	July 2000
Field investigation in preparation for FS	August 2001
Hydro Release Compound (HRC) injection pilot study	May 2003
FS completed (Tetra Tech, 2006)	July 2006
NCTRA for soil completed (Shaw, 2006)	July 2006
Final ROD completed (NAVFAC, 2007)	September 2007
Final RD submitted	October 2009
LTMP submitted (Tetra Tech, 2010)	March 2010
Remedial Action initiated	November 2011
Design Modification Technical Memorandum (AGVIQ/CH2M HILL, 2012)	February 2012

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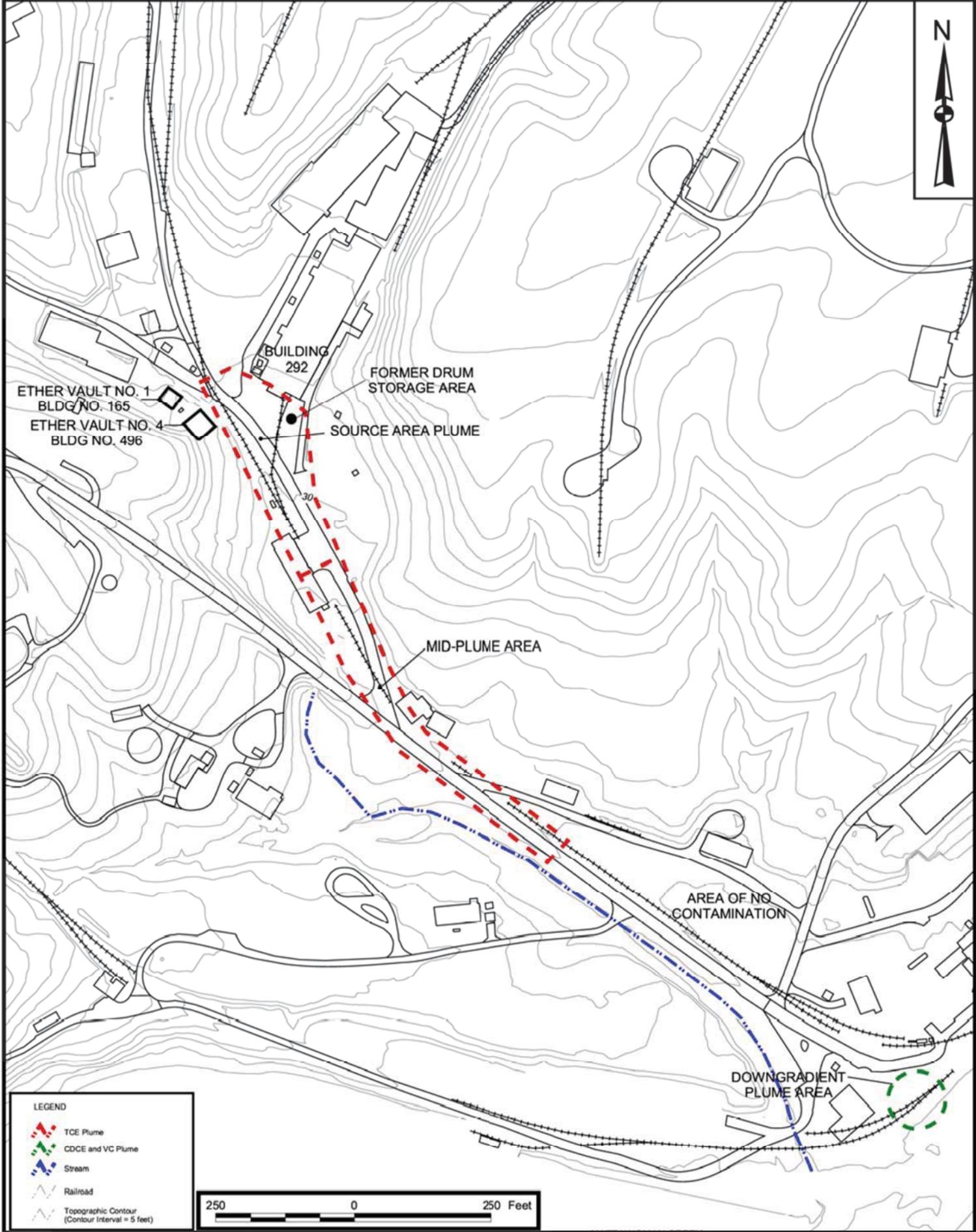
TABLE 11-2
Summary of Site 57 PRGs
Site 57 - Building 292 TCE Contamination
Naval Support Facility - Indian Head
Indian Head, Maryland

COCs	PRGs (µg/L)
cis-1,2-Dichloroethene	70
1,1-Dichloroethene	7
Diethyl ether	1,246
Trans-1,2-Dichloroethene	100
Trichloroethene	5
Vinyl Chloride	2

Notes:

From Site 57 ROD (NAVFAC, 2007)

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LEGEND	
	TCE Plume
	CDCE and VC Plume
	Stream
	Railroad
	Topographic Contour (Contour Interval = 5 feet)



DRAWN BY K. PEILA	DATE 2/28/06
CHECKED BY K. TURNBULL	DATE 9/06/06
COST/SCHEDULE-AREA	
SCALE AS NOTED	

**SITE 57 LAYOUT
NAVAL SUPPORT FACILITY - INDIAN HEAD
INDIAN HEAD, MARYLAND**

CONTRACT NUMBER 2194	OWNER NUMBER 007
APPROVED BY K. TURNBULL	DATE 7/20/06
APPROVED BY	DATE
DRAWING NO. FIGURE 11-1	REV 0

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APPENDIX A

SITE INSPECTION CHECKLIST

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III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1.	O&M Documents O&M manual As-built drawings Maintenance logs Remarks: <u>Documentation forthcoming. Remedy not yet fully implemented, since grass and wetlands not yet fully established.</u>	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
2.	Site-Specific Health and Safety Plan Contingency plan/emergency response plan Remarks:	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
3.	O&M and OSHA Training Records Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
4.	Permits and Service Agreements <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits: Remarks:	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
5.	Gas Generation Records Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
6.	Settlement Monument Records Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
7.	Groundwater Monitoring Records Remarks: <u>Groundwater monitoring has not yet been implemented.</u>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
8.	Leachate Extraction Records Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
9.	Discharge Compliance Records <input type="checkbox"/> Air <input type="checkbox"/> Water (effluent) Remarks:	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
10.	Daily Access/Security Logs Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A

IV. O&M COSTS

1. **O&M Organization**
- | | |
|---|--|
| <input type="checkbox"/> State in-house | <input type="checkbox"/> Contractor for State |
| <input type="checkbox"/> PRP in-house | <input type="checkbox"/> Contractor for PRP |
| <input checked="" type="checkbox"/> Federal Facility in-house | <input type="checkbox"/> Contractor for Federal Facility |
| <input type="checkbox"/> Other: | |

2. **O&M Cost Records NOT AVAILABLE**
- | | | |
|--|---|---|
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> Funding mechanism/agreement in place |
| Original O&M cost estimate <u>NA</u> | <input type="checkbox"/> Breakdown attached | |

Total annual cost by year for review period if available

From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**

None

V. ACCESS AND INSTITUTIONAL CONTROLS Applicable N/A

A. Fencing

1. **Fencing damaged** Location shown on site map Gates secured N/A
 Remarks: Located within NSF-IH which is a secure gated facility. There is no site fence.

B. Other Access Restrictions

1. **Signs and other security measures** Location shown on site map N/A
 Remarks: Signs have not yet been installed.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs are properly implemented Yes No N/A
Site conditions imply ICs are being fully enforced Yes No N/A

Note: Signs still need to be installed and vegetation needs to be established.

Type of monitoring (e.g., self-reporting, drive by): Self-reporting

Frequency: Annual

Responsible party/agency: EPA/NAVY

Contact: Nick Carros NSF-IH IRPM
Name Title

Reporting is up-to-date Yes No N/A
Reports are verified by the lead agency Yes No N/A
Specific requirements in deed or decision documents have been met Yes No N/A
Violations have been reported Yes No N/A
Other problems or suggestions: Report attached

2. **Adequacy** ICs are adequate ICs are inadequate N/A

Remarks: Signs still need to be installed.

D. General

1. **Vandalism/trespassing** Location shown on site map No vandalism evident
Remarks:

2. **Land use changes on site** N/A

Remarks: None

3. **Land use changes off site** N/A

Remarks: None

VI. GENERAL SITE CONDITIONS

A. Roads Applicable N/A

1. **Roads damaged** Location shown on site map Roads adequate N/A

Remarks: Gravel roads in good condition, but can be soft in spots.

B. Other Site Conditions

Remarks: The trees planted along the banks of the river are not strong enough to support themselves and are leaning heavily due to them not being properly supported.

VII. LANDFILL COVERS

Applicable N/A

A. Landfill Surface

1. **Settlement** (Low spots) Location shown on site map Settlement not evident
 Areal extent: _____
 Depth: _____
 Remarks:

2. **Cracks** Location shown on site map Cracking not evident
 Lengths _____ Widths _____ Depths _____
 Remarks:

3. **Erosion** Location shown on site map Erosion not evident
 Areal extent _____ Depth _____
 Remarks:

4. **Holes** Location shown on site map Holes not evident
 Areal extent _____ Depth _____
 Remarks:

5. **Vegetative Cover** Grass Cover properly established No signs of stress
 Trees/Shrubs (indicate size and locations on a diagram)
 Remarks: Grass not established on the flat areas, and the wetlands have little or no vegetation.

6. **Alternative Cover (armored rock, concrete, etc.)** N/A
 Remarks:

7. **Bulges** Location shown on site map Bulges not evident
 Areal extent _____ Height _____
 Remarks:

8. **Wet Areas/Water Damage** Wet areas/water damage not evident
 Wet areas Location shown on site map Areal extent _____
 Ponding Location shown on site map Areal extent _____
 Seeps Location shown on site map Areal extent _____
 Soft subgrade Location shown on site map Areal extent _____
 Remarks: Grass not established. Geese foraging on vegetation.

9. **Slope Instability**
 Slides Location shown on site map No evidence of slope instability
 Areal extent _____
 Remarks:

B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	Flows Bypass Bench Remarks:	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
2.	Bench Breached Remarks:	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
3.	Bench Overtopped Remarks:	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
C. Letdown Channels <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	Settlement Areal extent _____ Depth _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of settlement
2.	Material Degradation Material type _____ Areal extent _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of degradation
3.	Erosion Areal extent _____ Depth _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of erosion
4.	Undercutting Areal extent _____ Depth _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of undercutting
5.	Obstructions Type _____ <input type="checkbox"/> Location shown on site map Areal extent _____ Size _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> No obstructions
6.	Excessive Vegetative Growth <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map Remarks: <u>Not applicable.</u>	Type _____ Areal extent _____

D. Cover Penetrations		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Gas Vents	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Good condition
	<input checked="" type="checkbox"/> N/A		
	Remarks:		
2.	Gas Monitoring Probes	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Routinely sampled
	Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Good condition	<input checked="" type="checkbox"/> N/A
3.	Monitoring Wells (within surface area of landfill)	<input checked="" type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Routinely sampled
	Remarks: <u>Locked with protective bollards bounding the wells. The concrete apron is intact and the protective stickups show no signs of rust.</u>	<input checked="" type="checkbox"/> Good condition	<input checked="" type="checkbox"/> N/A
4.	Leachate Extraction Wells	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Routinely sampled
	Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Good condition	<input checked="" type="checkbox"/> N/A
5.	Settlement Monuments	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed
	Remarks: <u>Not applicable.</u>		<input checked="" type="checkbox"/> N/A
E. Gas Collection and Treatment		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Gas Treatment Facilities	<input type="checkbox"/> Flaring	<input type="checkbox"/> Thermal destruction
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Collection for reuse
	Remarks: <u>Not applicable</u>		
2.	Gas Collection Wells, Manifolds and Piping	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance
	Remarks: <u>Not applicable</u>		
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings)	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance
	Remarks:	<input checked="" type="checkbox"/> N/A	
F. Cover Drainage Layer		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Outlet Pipes Inspected	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
	Remarks:		

2.	Outlet Rock Inspected	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
G. Detention/Sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Siltation	Areal extent _____	Depth _____ <input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Siltation not evident			
Remarks:			
2.	Erosion	Areal extent _____	Depth _____
<input type="checkbox"/> Erosion not evident			
Remarks: <u>Not applicable</u>			
3.	Outlet Works	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
4.	Dam	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Deformations	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
Horizontal displacement _____			
Vertical displacement _____			
Rotational displacement _____			
Remarks: <u>Not applicable.</u>			
2.	Degradation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
Remarks: <u>Not applicable.</u>			
I. Perimeter Ditches/Off-Site Discharge <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	Siltation	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Siltation not evident
Areal extent _____			
Depth _____			
Remarks:			
2.	Vegetative Growth	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
<input checked="" type="checkbox"/> Vegetation does not impede flow			
Areal extent _____			
Type _____			
Remarks: <u>Vegetation present in ditches but it does not restrict flow.</u>			
3.	Erosion	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Erosion not evident
Areal extent _____			
Depth _____			
Remarks:			
4.	Discharge Structure	<input checked="" type="checkbox"/> Functioning	<input type="checkbox"/> N/A
Remarks: <u>Concrete outfall in western portion of the site and rip rap at terminus of drainage channel in good condition.</u>			

VIII. VERTICAL BARRIER WALLS		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Settlement	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
	Areal extent _____	Depth _____	
	Remarks: <u>Not applicable</u>		
2.	Performance Monitoring	Type of monitoring _____	
	<input type="checkbox"/> Performance not monitored		
	Frequency _____	<input type="checkbox"/> Evidence of breaching	
	Head differential _____		
	Remarks: <u>Not applicable</u>		
IX. GROUNDWATER/SURFACE WATER REMEDIES		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
A. Groundwater Extraction Wells, Pumps, and Pipeline		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Pumps, Wellhead Plumbing, and Electrical	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> All required wells properly operating
	Remarks:	<input type="checkbox"/> Need Maintenance	
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Good condition
	Remarks:	<input type="checkbox"/> Needs Maintenance	
3.	Spare Parts and Equipment	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Good Condition
	Remarks: <u>Not applicable</u>	<input type="checkbox"/> Requires Upgrade	<input type="checkbox"/> Needs to be Provided
B. Surface Water Collection Structures, Pumps, and Pipelines		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Collection Structures, Pumps and Electrical	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Good Condition
	Remarks:	<input type="checkbox"/> Need Maintenance	
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Appurtenances	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Good condition
	Remarks:	<input type="checkbox"/> Needs Maintenance	
3.	Spare Parts and Equipment	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Good Condition
	Remarks: <u>Not applicable</u>	<input type="checkbox"/> Requires Upgrade	<input type="checkbox"/> Needs to be Provided

C. Treatment System		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Treatment Train (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks: <u>Not applicable</u>		
2.	Electrical Enclosures and Panels (properly rated and functional) <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:		
3.	Tanks, Vaults, Storage Vessels <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks:		
4.	Discharge Structure and Appurtenances <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:		
5.	Treatment Building(s) <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks:		
6.	Monitoring Wells (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A Remarks:		
D. Monitoring Data			
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality Remarks: <u>Remedy not yet fully implemented.</u>		
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining Remarks: <u>Remedy not yet fully implemented.</u>		

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
 Properly secured/locked Functioning Routinely sampled Good condition
 All required wells located Needs Maintenance N/A
Remarks: Monitoring wells need to be locked and labeled.

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The purpose of the remedy at Site 11 is to prevent human or ecological exposure to site contaminants and to monitor groundwater. It is performing well, but vegetation is not yet fully established. Once established the remedy will be effective in prevent exposure.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Not yet fully implemented.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

Not yet fully implemented but vegetation needs to be established to prevent erosion and burrowing.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

None.

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Site Inspection Checklist

I. SITE INFORMATION													
Site name: Site 12 – Town Gut Landfill Naval Support Facility Indian Head	Date of inspection: April 26, 2012												
Location and Region: EPA Region 3	EPA ID: MD7170024684												
Agency, office, or company leading the five-year review: EPA/Navy	Weather/temperature: Mid 60°F Cloudy with rain earlier in the morning												
Remedy Includes: (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td><input checked="" type="checkbox"/> Landfill cover/containment</td> <td><input type="checkbox"/> Monitored natural attenuation</td> </tr> <tr> <td><input checked="" type="checkbox"/> Access controls</td> <td><input type="checkbox"/> Groundwater containment</td> </tr> <tr> <td><input checked="" type="checkbox"/> Institutional controls</td> <td><input type="checkbox"/> Vertical barrier walls</td> </tr> <tr> <td><input type="checkbox"/> Groundwater pump and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Surface water collection and treatment</td> <td></td> </tr> <tr> <td colspan="2"><input type="checkbox"/> Other: <u>Groundwater sampling (once every fifteen months)</u></td> </tr> </table>		<input checked="" type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation	<input checked="" type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment	<input checked="" type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls	<input type="checkbox"/> Groundwater pump and treatment		<input type="checkbox"/> Surface water collection and treatment		<input type="checkbox"/> Other: <u>Groundwater sampling (once every fifteen months)</u>	
<input checked="" type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation												
<input checked="" type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment												
<input checked="" type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls												
<input type="checkbox"/> Groundwater pump and treatment													
<input type="checkbox"/> Surface water collection and treatment													
<input type="checkbox"/> Other: <u>Groundwater sampling (once every fifteen months)</u>													
Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached													

II. INTERVIEWS (Check all that apply)			
1. O&M site manager	<u>Nick Carros</u> Name	<u>NSF-IH IRPM</u> Title	<u>April 26, 2012</u> Date
Interviewed <input type="checkbox"/> at site <input checked="" type="checkbox"/> at office <input type="checkbox"/> by phone Phone No. 301-744-2263 Problems, suggestions; <input type="checkbox"/> Report attached: <u>There was a recent excavation to repair a water line adjacent to the site (outside covered area).</u> <u>The cover was not affected.</u>			
2. O&M staff	<u>NA</u> Name	Title	Date
Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone No. _____ Problems, suggestions; <input type="checkbox"/> Report attached:			
3. Local regulatory authorities and response agencies (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.			
Agency: MDE			
Contact:	<u>Curtis DeTore</u> Name	<u>RPM</u> Title	<u>June 19, 2012</u> Date
			<u>401-537-3791</u> Phone no.
Problems; suggestions; <input type="checkbox"/> Report attached			
Agency:			
Contact:			
	Name	Title	Date
			Phone no.
Problems; suggestions; <input type="checkbox"/> Report attached			
4. Other interviews (optional) <input type="checkbox"/> Report attached.			

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1.	<p>O&M Documents</p> <p>O&M manual <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A As-built drawings <input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> N/A Maintenance logs <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A</p> <p>Remarks: <u>Inspection checklists are included in LTM reports.</u></p>
2.	<p>Site-Specific Health and Safety Plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Contingency plan/emergency response plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A</p> <p>Remarks:</p>
3.	<p>O&M and OSHA Training Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A</p> <p>Remarks:</p>
4.	<p>Permits and Service Agreements</p> <p><input type="checkbox"/> Air discharge permit <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Other permits: <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A</p> <p>Remarks:</p>
5.	<p>Gas Generation Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A</p> <p>Remarks:</p>
6.	<p>Settlement Monument Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A</p> <p>Remarks:</p>
7.	<p>Groundwater Monitoring Records <input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> N/A</p> <p>Remarks: <u>See LTM reports for details.</u></p>
8.	<p>Leachate Extraction Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A</p> <p>Remarks:</p>
9.	<p>Discharge Compliance Records</p> <p><input type="checkbox"/> Air <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Water (effluent) <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A</p> <p>Remarks:</p>
10.	<p>Daily Access/Security Logs <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A</p> <p>Remarks: <u>Landfill is located within NSF-Indian Head, which is a secure gated facility.</u></p>

IV. O&M COSTS

1. O&M Organization

- | | |
|---|--|
| <input type="checkbox"/> State in-house | <input type="checkbox"/> Contractor for State |
| <input type="checkbox"/> PRP in-house | <input type="checkbox"/> Contractor for PRP |
| <input checked="" type="checkbox"/> Federal Facility in-house | <input type="checkbox"/> Contractor for Federal Facility |
| <input type="checkbox"/> Other: | |

2. O&M Cost Records NOT AVAILABLE

- | | | |
|--|---|---|
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> Funding mechanism/agreement in place |
| Original O&M cost estimate <u>NA</u> | <input type="checkbox"/> Breakdown attached | |

Total annual cost by year for review period if available

From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	

3. Unanticipated or Unusually High O&M Costs During Review Period

None

V. ACCESS AND INSTITUTIONAL CONTROLS Applicable N/A

A. Fencing

- 1. Fencing damaged** Location shown on site map Gates secured N/A
 Remarks: Located within NSF-IH which is a secure gated facility. There is no site fence.

B. Other Access Restrictions

- 1. Signs and other security measures** Location shown on site map N/A
 Remarks: The signs are in good condition and in clear view. They clearly display information along Atkins Road and are adequately spaced.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs are properly implemented Yes No N/A
Site conditions imply ICs are being fully enforced Yes No N/A

Type of monitoring (e.g., self-reporting, drive by): Self-reporting
Frequency: Ground water sampling every 15 months, and site inspections at 6 month intervals
Responsible party/agency: EPA/NAVY
Contact: Nick Carros NSF-IH IRPM
Name Title

Reporting is up-to-date Yes No N/A
Reports are verified by the lead agency Yes No N/A
Specific requirements in deed or decision documents have been met Yes No N/A
Violations have been reported Yes No N/A
Other problems or suggestions: Report attached
During previous mowing event, the grass was cut below 6 inches. The height of the grass during the inspection exceeds 6 inches, in accordance with site requirements.

2. **Adequacy** ICs are adequate ICs are inadequate N/A
Remarks:

D. General

1. **Vandalism/trespassing** Location shown on site map No vandalism evident
Remarks:

2. **Land use changes on site** N/A
Remarks: None

3. **Land use changes off site** N/A
Remarks: None

VI. GENERAL SITE CONDITIONS

A. Roads Applicable N/A

1. **Roads damaged** Location shown on site map Roads adequate N/A
Remarks: Well maintained with a gravel shoulder.

B. Other Site Conditions

Remarks: None

VII. LANDFILL COVERS Applicable N/A

A. Landfill Surface	
1.	Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident Areal extent: _____ Depth: _____ Remarks: _____
2.	Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident Lengths _____ Widths _____ Depths _____ Remarks: _____
3.	Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks: _____
4.	Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident Areal extent _____ Depth _____ Remarks: _____
5.	Vegetative Cover <input checked="" type="checkbox"/> Grass <input checked="" type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram) Remarks: _____
6.	Alternative Cover (armored rock, concrete, etc.) <input type="checkbox"/> N/A Remarks: _____
7.	Bulges <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Bulges not evident Areal extent _____ Height _____ Remarks: _____
8.	Wet Areas/Water Damage <input checked="" type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Wet areas <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Ponding <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Seeps <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Soft subgrade <input type="checkbox"/> Location shown on site map Areal extent _____ Remarks: _____
9.	Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of slope instability Areal extent _____ Remarks: _____
B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)	

1.	Flows Bypass Bench Remarks:	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
2.	Bench Breached Remarks:	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
3.	Bench Overtopped Remarks:	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
C. Letdown Channels <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	Settlement Areal extent _____ Depth _____ Remarks:	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement
2.	Material Degradation Material type _____ Areal extent _____ Remarks:	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation
3.	Erosion Areal extent _____ Depth _____ Remarks:	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion
4.	Undercutting Areal extent _____ Depth _____ Remarks:	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
5.	Obstructions Type _____ <input type="checkbox"/> Location shown on site map Areal extent _____ Size _____ Remarks:	<input type="checkbox"/> No obstructions	
6.	Excessive Vegetative Growth <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map Remarks:	Type _____	Areal extent _____

D. Cover Penetrations		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Gas Vents	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> Good condition
	<input checked="" type="checkbox"/> N/A		
	Remarks:		
2.	Gas Monitoring Probes	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
		<input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> N/A
	Remarks:		
3.	Monitoring Wells (within surface area of landfill)	<input checked="" type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input checked="" type="checkbox"/> Routinely sampled	<input checked="" type="checkbox"/> Good condition
		<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
	Remarks: Locked with protective bollards bounding the wells. The concrete apron is intact and the protective stickups show no signs of rust.		
4.	Leachate Extraction Wells	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
		<input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> N/A
	Remarks:		
5.	Settlement Monuments	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed
	Remarks:		<input checked="" type="checkbox"/> N/A
E. Gas Collection and Treatment		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Gas Treatment Facilities	<input type="checkbox"/> Flaring	<input type="checkbox"/> Thermal destruction
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Collection for reuse	<input type="checkbox"/> Needs Maintenance
	Remarks: <u>Not applicable</u>		
2.	Gas Collection Wells, Manifolds and Piping	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance
	Remarks: <u>Not applicable</u>		
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings)	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance
	Remarks:		<input checked="" type="checkbox"/> N/A
F. Cover Drainage Layer		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Outlet Pipes Inspected	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
	Remarks:		

2.	Outlet Rock Inspected	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
G. Detention/Sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Siltation	Areal extent _____	Depth _____ <input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Siltation not evident			
Remarks:			
2.	Erosion	Areal extent _____	Depth _____
<input type="checkbox"/> Erosion not evident			
Remarks: <u>Not applicable</u>			
3.	Outlet Works	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
4.	Dam	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Deformations	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
Horizontal displacement _____			
Vertical displacement _____			
Rotational displacement _____			
Remarks: <u>Not applicable.</u>			
2.	Degradation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
Remarks: <u>Not applicable.</u>			
I. Perimeter Ditches/Off-Site Discharge <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	Siltation	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Siltation not evident
Areal extent _____			
Depth _____			
Remarks:			
2.	Vegetative Growth	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
<input checked="" type="checkbox"/> Vegetation does not impede flow			
Areal extent _____			
Type _____			
Remarks: <u>Saplings are present within the drainage channels as well as a fallen tree.</u>			
3.	Erosion	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Erosion not evident
Areal extent _____			
Depth _____			
Remarks:			
4.	Discharge Structure	<input checked="" type="checkbox"/> Functioning	<input type="checkbox"/> N/A
Remarks: <u>All culverts in good working order.</u>			

VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks: <u>Not applicable</u>
2.	Performance Monitoring Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks: <u>Not applicable</u>
IX. GROUNDWATER/SURFACE WATER REMEDIES <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
A. Groundwater Extraction Wells, Pumps, and Pipeline <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Pumps, Wellhead Plumbing, and Electrical <input checked="" type="checkbox"/> N/A <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Need Maintenance Remarks:
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:
3.	Spare Parts and Equipment <input type="checkbox"/> Readily Available <input type="checkbox"/> Good Condition <input type="checkbox"/> Requires Upgrade <input type="checkbox"/> Needs to be Provided Remarks: <u>Not applicable</u>
B. Surface Water Collection Structures, Pumps, and Pipelines <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Collection Structures, Pumps and Electrical <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good Condition <input type="checkbox"/> Need Maintenance Remarks:
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Appurtenances <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:
3.	Spare Parts and Equipment <input type="checkbox"/> Readily Available <input type="checkbox"/> Good Condition <input type="checkbox"/> Requires Upgrade <input type="checkbox"/> Needs to be Provided Remarks: <u>Not applicable</u>

C. Treatment System		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Treatment Train (Check components that apply) <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 30%;"> <input type="checkbox"/> Metals removal <input type="checkbox"/> Air stripping <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ </div> <div style="width: 30%;"> <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Carbon adsorbers </div> <div style="width: 30%; text-align: right;"> <input type="checkbox"/> Bioremediation </div> </div> <div style="margin-top: 5px;"> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ </div> Remarks: <u>Not applicable</u>		
2.	Electrical Enclosures and Panels (properly rated and functional) <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:		
3.	Tanks, Vaults, Storage Vessels <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks:		
4.	Discharge Structure and Appurtenances <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:		
5.	Treatment Building(s) <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks:		
6.	Monitoring Wells (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A Remarks:		
D. Monitoring Data			
1.	Monitoring Data <input checked="" type="checkbox"/> Is routinely submitted on time <input checked="" type="checkbox"/> Is of acceptable quality		
2.	Monitoring data suggests: <input checked="" type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining		

E. Monitored Natural Attenuation	
1. Monitoring Wells (natural attenuation remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A
Remarks:	
X. OTHER REMEDIES	
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.	
XI. OVERALL OBSERVATIONS	
A. Implementation of the Remedy	
<p>Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).</p> <p><u>The purpose of the remedy at Site 12 is to consolidate and cover over the construction materials, landscaping debris, and potential chemical waste dumped at the site. The cover will eliminate direct exposure to site contaminants. Based on visual inspection during the site visit and review of the long-term monitoring data, the remedy appears effective and functioning as designed.</u></p>	
B. Adequacy of O&M	
<p>Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <p><u>No issues were noted relating to the implementation of the O&M requirements set forth in the O&M Plan.</u></p>	
C. Early Indicators of Potential Remedy Problems	
<p>Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.</p> <p><u>Within the ditches there are saplings and a fallen tree which may in the future prevent the drainage channels from properly draining.</u></p>	
D. Opportunities for Optimization	
<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <p><u>None.</u></p>	

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III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1.	<p>O&M Documents</p> <p>O&M manual <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A As-built drawings <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Maintenance logs <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks: <u>NA.</u></p>
2.	<p>Site-Specific Health and Safety Plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Contingency plan/emergency response plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks:</p>
3.	<p>O&M and OSHA Training Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks:</p>
4.	<p>Permits and Service Agreements</p> <p><input type="checkbox"/> Air discharge permit <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Other permits: <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks:</p>
5.	<p>Gas Generation Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks:</p>
6.	<p>Settlement Monument Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks:</p>
7.	<p>Groundwater Monitoring Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks:</p>
8.	<p>Leachate Extraction Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks:</p>
9.	<p>Discharge Compliance Records</p> <p><input type="checkbox"/> Air <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Water (effluent) <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks:</p>
10.	<p>Daily Access/Security Logs <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks:</p>

IV. O&M COSTS

1. **O&M Organization**
- | | |
|---|--|
| <input type="checkbox"/> State in-house | <input type="checkbox"/> Contractor for State |
| <input type="checkbox"/> PRP in-house | <input type="checkbox"/> Contractor for PRP |
| <input checked="" type="checkbox"/> Federal Facility in-house | <input type="checkbox"/> Contractor for Federal Facility |
| <input type="checkbox"/> Other: | |

2. **O&M Cost Records NOT AVAILABLE**
- | | | |
|--|---|---|
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> Funding mechanism/agreement in place |
| Original O&M cost estimate <u>NA</u> | <input type="checkbox"/> Breakdown attached | |

Total annual cost by year for review period if available

From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**
- None

V. ACCESS AND INSTITUTIONAL CONTROLS Applicable N/A

A. Fencing

1. **Fencing damaged** Location shown on site map Gates secured N/A
 Remarks: Located within NSF-IH which is a secure gated facility. There is no site fence.

B. Other Access Restrictions

1. **Signs and other security measures** Location shown on site map N/A
 Remarks:

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs are properly implemented Yes No N/A
Site conditions imply ICs are being fully enforced Yes No N/A

Type of monitoring (e.g., self-reporting, drive by): Self-Reporting
Frequency: Biannual
Responsible party/agency: EPA/NAVY
Contact: Nick Carros NSF-IH IRPM
Name Title

Reporting is up-to-date Yes No N/A
Reports are verified by the lead agency Yes No N/A
Specific requirements in deed or decision documents have been met Yes No N/A
Violations have been reported Yes No N/A
Other problems or suggestions: Report attached

2. **Adequacy** ICs are adequate ICs are inadequate N/A
Remarks:

D. General

1. **Vandalism/trespassing** Location shown on site map No vandalism evident
Remarks:

2. **Land use changes on site** N/A
Remarks: None

3. **Land use changes off site** N/A
Remarks: None

VI. GENERAL SITE CONDITIONS

A. Roads Applicable N/A

1. **Roads damaged** Location shown on site map Roads adequate N/A
Remarks: Gravel roads in good condition, and have been graded recently.

B. Other Site Conditions

Remarks: Vegetation still needs to be fully established. Visible ponding seen in a few small areas. Site is currently being watered with sprinklers.

VII. LANDFILL COVERS

Applicable N/A

A. Landfill Surface

1. **Settlement** (Low spots) Location shown on site map Settlement not evident
 Areal extent: _____ Depth: _____
 Remarks: Not applicable.

2. **Cracks** Location shown on site map Cracking not evident
 Lengths _____ Widths _____ Depths _____
 Remarks: Not applicable.

3. **Erosion** Location shown on site map Erosion not evident
 Areal extent _____ Depth _____
 Remarks: Not applicable.

4. **Holes** Location shown on site map Holes not evident
 Areal extent _____ Depth _____
 Remarks: Not applicable.

5. **Vegetative Cover** Grass Cover properly established No signs of stress
 Trees/Shrubs (indicate size and locations on a diagram)
 Remarks: Not applicable.

6. **Alternative Cover (armored rock, concrete, etc.)** N/A
 Remarks: Not applicable.

7. **Bulges** Location shown on site map Bulges not evident
 Areal extent _____ Height _____
 Remarks: Not applicable.

8. **Wet Areas/Water Damage** Wet areas/water damage not evident
 Wet areas Location shown on site map Areal extent _____
 Ponding Location shown on site map Areal extent _____
 Seeps Location shown on site map Areal extent _____
 Soft subgrade Location shown on site map Areal extent _____
 Remarks: Not applicable.

9. **Slope Instability**
 Slides Location shown on site map No evidence of slope instability
 Areal extent _____
 Remarks: Not applicable.

B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	Flows Bypass Bench Remarks:	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
2.	Bench Breached Remarks:	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
3.	Bench Overtopped Remarks:	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
C. Letdown Channels <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	Settlement Areal extent _____ Depth _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of settlement
2.	Material Degradation Material type _____ Areal extent _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of degradation
3.	Erosion Areal extent _____ Depth _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of erosion
4.	Undercutting Areal extent _____ Depth _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of undercutting
5.	Obstructions Type _____ <input type="checkbox"/> No obstructions <input type="checkbox"/> Location shown on site map Areal extent _____ Size _____ Remarks: <u>Not applicable.</u>	
6.	Excessive Vegetative Growth <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map Remarks: <u>Not applicable.</u>	Type _____ Areal extent _____

D. Cover Penetrations		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Gas Vents	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Good condition
	<input checked="" type="checkbox"/> N/A		
	Remarks:		
2.	Gas Monitoring Probes	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> N/A	
	Remarks: <u>Not applicable.</u>		
3.	Monitoring Wells (within surface area of landfill)	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> N/A	
	Remarks: Locked with protective bollards bounding the wells. The concrete apron is intact and the protective stickups show no signs of rust.		
4.	Leachate Extraction Wells	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> N/A	
	Remarks: <u>Not applicable.</u>		
5.	Settlement Monuments	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed
	Remarks: <u>Not applicable.</u>	<input checked="" type="checkbox"/> N/A	
E. Gas Collection and Treatment		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Gas Treatment Facilities	<input type="checkbox"/> Flaring	<input type="checkbox"/> Thermal destruction
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Collection for reuse
	Remarks: <u>Not applicable</u>		
2.	Gas Collection Wells, Manifolds and Piping	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance
	Remarks: <u>Not applicable</u>		
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings)	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance
	Remarks:	<input checked="" type="checkbox"/> N/A	
F. Cover Drainage Layer		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Outlet Pipes Inspected	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
	Remarks:		

2.	Outlet Rock Inspected	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
G. Detention/Sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Siltation	Areal extent _____	Depth _____ <input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Siltation not evident			
Remarks:			
2.	Erosion	Areal extent _____	Depth _____
<input type="checkbox"/> Erosion not evident			
Remarks: <u>Not applicable</u>			
3.	Outlet Works	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
4.	Dam	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Deformations	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
Horizontal displacement _____			
Vertical displacement _____			
Rotational displacement _____			
Remarks: <u>Not applicable.</u>			
2.	Degradation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
Remarks: <u>Not applicable.</u>			
I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Siltation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
Areal extent _____			
Depth _____			
Remarks:			
2.	Vegetative Growth	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Vegetation does not impede flow			
Areal extent _____			
Type _____			
Remarks:			
3.	Erosion	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
Areal extent _____			
Depth _____			
Remarks: <u>Not applicable.</u>			
4.	Discharge Structure	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			

VIII. VERTICAL BARRIER WALLS		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Settlement	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
	Areal extent _____	Depth _____	
	Remarks: <u>Not applicable</u>		
2.	Performance Monitoring	Type of monitoring _____	
	<input type="checkbox"/> Performance not monitored		
	Frequency _____	<input type="checkbox"/> Evidence of breaching	
	Head differential _____		
	Remarks: <u>Not applicable</u>		
IX. GROUNDWATER/SURFACE WATER REMEDIES		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
A. Groundwater Extraction Wells, Pumps, and Pipeline		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Pumps, Wellhead Plumbing, and Electrical		
	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> All required wells properly operating	<input type="checkbox"/> Need Maintenance
	Remarks:		
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances		
	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance
	Remarks:		
3.	Spare Parts and Equipment		
	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Good Condition	<input type="checkbox"/> Requires Upgrade
	<input type="checkbox"/> Needs to be Provided		
	Remarks: <u>Not applicable</u>		
B. Surface Water Collection Structures, Pumps, and Pipelines		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Collection Structures, Pumps and Electrical		
	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Good Condition	<input type="checkbox"/> Need Maintenance
	Remarks:		
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Appurtenances		
	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance
	Remarks:		
3.	Spare Parts and Equipment		
	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Good Condition	<input type="checkbox"/> Requires Upgrade
	<input type="checkbox"/> Needs to be Provided		
	Remarks: <u>Not applicable</u>		

C. Treatment System		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Treatment Train (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks: <u>Not applicable</u>		
2.	Electrical Enclosures and Panels (properly rated and functional) <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:		
3.	Tanks, Vaults, Storage Vessels <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks:		
4.	Discharge Structure and Appurtenances <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:		
5.	Treatment Building(s) <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks:		
6.	Monitoring Wells (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A Remarks:		
D. Monitoring Data			
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality Remarks: <u>Not applicable</u>		
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining Remarks: <u>Not applicable</u>		

E. Monitored Natural Attenuation	
1. Monitoring Wells (natural attenuation remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A
Remarks:	
X. OTHER REMEDIES	
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.	
XI. OVERALL OBSERVATIONS	
A. Implementation of the Remedy	
<p>Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).</p> <p><u>The purpose of the remedy at the Lab Area is to prevent exposure to mercury and lead contaminated soil. The excavation and backfilling are complete, however, the grass and wetlands have not yet become fully established. Once established the remedy will be effective in preventing exposure.</u></p>	
B. Adequacy of O&M	
<p>Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <p><u>Not yet fully implemented.</u></p>	
C. Early Indicators of Potential Remedy Problems	
<p>Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.</p> <p><u>Not yet fully implemented.</u></p>	
D. Opportunities for Optimization	
<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <p><u>None.</u></p>	

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III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1.	O&M Documents O&M manual As-built drawings Maintenance logs Remarks:	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
2.	Site-Specific Health and Safety Plan Contingency plan/emergency response plan Remarks:	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
3.	O&M and OSHA Training Records Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
4.	Permits and Service Agreements <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits: Remarks:	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
5.	Gas Generation Records Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
6.	Settlement Monument Records Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
7.	Groundwater Monitoring Records Remarks: <u>Groundwater monitoring has not yet been implemented.</u>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
8.	Leachate Extraction Records Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
9.	Discharge Compliance Records <input type="checkbox"/> Air <input type="checkbox"/> Water (effluent) Remarks:	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
10.	Daily Access/Security Logs Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A

IV. O&M COSTS

1. **O&M Organization**
- | | |
|---|--|
| <input type="checkbox"/> State in-house | <input type="checkbox"/> Contractor for State |
| <input type="checkbox"/> PRP in-house | <input type="checkbox"/> Contractor for PRP |
| <input checked="" type="checkbox"/> Federal Facility in-house | <input type="checkbox"/> Contractor for Federal Facility |
| <input type="checkbox"/> Other: | |

2. **O&M Cost Records NOT AVAILABLE**
- | | | |
|--|---|---|
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> Funding mechanism/agreement in place |
| Original O&M cost estimate <u>NA</u> | <input type="checkbox"/> Breakdown attached | |

Total annual cost by year for review period if available

From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**

None

V. ACCESS AND INSTITUTIONAL CONTROLS Applicable N/A

A. Fencing

1. **Fencing damaged** Location shown on site map Gates secured N/A
 Remarks: Located within NSF-IH which is a secure gated facility. There is no site fence.

B. Other Access Restrictions

1. **Signs and other security measures** Location shown on site map N/A
 Remarks:

C. Institutional Controls (ICs)

1.	Implementation and enforcement	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs are properly implemented	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs are being fully enforced	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
Note: Remedy not yet in place but moving towards completion.				
Type of monitoring (e.g., self-reporting, drive by): <u>Drive by</u>				
Frequency: <u>Monthly drive by inspections</u>				
Responsible party/agency: <u>EPA/NAVY</u>				
Contact: <u>Nick Carros</u> <u>NSF-IH IRPM</u>				
Name Title				
	Reporting is up-to-date	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
	Reports are verified by the lead agency	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
	Specific requirements in deed or decision documents have been met	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
	Violations have been reported	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
	Other problems or suggestions: <input type="checkbox"/> Report attached			
2.	Adequacy	<input checked="" type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
Remarks: <u>Remedy is being implemented at the time of this inspection.</u>				
D. General				
1.	Vandalism/trespassing	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident	
Remarks:				
2.	Land use changes on site	<input type="checkbox"/> N/A		
Remarks: <u>None</u>				
3.	Land use changes off site	<input type="checkbox"/> N/A		
Remarks: <u>None</u>				
VI. GENERAL SITE CONDITIONS				
A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A				
1.	Roads damaged	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate	<input checked="" type="checkbox"/> N/A
Remarks: <u>No roads at the site.</u>				
B. Other Site Conditions				
Remarks: <u>Dense vegetation. High tide prevented metal in along shoreline from being observed. Drainage ditch is heavily vegetated but draining well. S. lespedeza dominating vegetation.</u>				
VII. LANDFILL COVERS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A				

A. Landfill Surface	
1. Settlement (Low spots) Areal extent: _____ Remarks: <u>Not applicable</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Depth: _____
2. Cracks Lengths _____ Widths _____ Depths _____ Remarks: <u>Not applicable</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident
3. Erosion Areal extent _____ Remarks: <u>Not applicable</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident Depth _____
4. Holes Areal extent _____ Remarks: <u>Not applicable</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident Depth _____
5. Vegetative Cover <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram) Remarks: <u>Not applicable</u>	
6. Alternative Cover (armored rock, concrete, etc.) Remarks:	<input checked="" type="checkbox"/> N/A
7. Bulges Areal extent _____ Remarks: <u>Not applicable</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident Height _____
8. Wet Areas/Water Damage <input type="checkbox"/> Wet areas <input type="checkbox"/> Ponding <input type="checkbox"/> Seeps <input type="checkbox"/> Soft subgrade Remarks: <u>Not applicable</u>	<input type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Location shown on site map Areal extent _____
9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability Areal extent _____ Remarks: <u>Not applicable</u>	
B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)	

1.	Flows Bypass Bench Remarks:	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
2.	Bench Breached Remarks:	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
3.	Bench Overtopped Remarks:	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
C. Letdown Channels <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	Settlement Areal extent _____ Depth _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement
2.	Material Degradation Material type _____ Areal extent _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation
3.	Erosion Areal extent _____ Depth _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion
4.	Undercutting Areal extent _____ Depth _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
5.	Obstructions Type _____ <input type="checkbox"/> Location shown on site map Areal extent _____ Size _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> No obstructions	
6.	Excessive Vegetative Growth <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map Remarks: <u>Not applicable.</u>	Type _____	Areal extent _____

D. Cover Penetrations		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Gas Vents	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Good condition
	<input checked="" type="checkbox"/> N/A		
	Remarks:		
2.	Gas Monitoring Probes	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Routinely sampled
	Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Good condition	<input checked="" type="checkbox"/> N/A
3.	Monitoring Wells (within surface area of landfill)	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Routinely sampled
	Remarks: Locked with protective bollards bounding the wells. The concrete apron is intact and the protective stickups show no signs of rust.	<input type="checkbox"/> Good condition	<input checked="" type="checkbox"/> N/A
4.	Leachate Extraction Wells	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Routinely sampled
	Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Good condition	<input checked="" type="checkbox"/> N/A
5.	Settlement Monuments	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed
	Remarks: <u>Not applicable.</u>		<input checked="" type="checkbox"/> N/A
E. Gas Collection and Treatment		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Gas Treatment Facilities	<input type="checkbox"/> Flaring	<input type="checkbox"/> Thermal destruction
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Collection for reuse
	Remarks: <u>Not applicable</u>		
2.	Gas Collection Wells, Manifolds and Piping	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance
	Remarks: <u>Not applicable</u>		
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings)	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance
	Remarks:		<input checked="" type="checkbox"/> N/A
F. Cover Drainage Layer		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Outlet Pipes Inspected	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
	Remarks:		

2.	Outlet Rock Inspected	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
G. Detention/Sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Siltation	Areal extent _____	Depth _____ <input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Siltation not evident			
Remarks:			
2.	Erosion	Areal extent _____	Depth _____
<input type="checkbox"/> Erosion not evident			
Remarks: <u>Not applicable</u>			
3.	Outlet Works	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
4.	Dam	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Deformations	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
Horizontal displacement _____			
Vertical displacement _____			
Rotational displacement _____			
Remarks: <u>Not applicable.</u>			
2.	Degradation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
Remarks: <u>Not applicable.</u>			
I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Siltation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
Areal extent _____			
Depth _____			
Remarks: <u>Not applicable.</u>			
2.	Vegetative Growth	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Vegetation does not impede flow			
Areal extent _____			
Type _____			
Remarks:			
3.	Erosion	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Erosion not evident
Areal extent _____			
Depth _____			
Remarks:			
4.	Discharge Structure	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			

VIII. VERTICAL BARRIER WALLS		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Settlement	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
	Areal extent _____	Depth _____	
	Remarks: <u>Not applicable</u>		
2.	Performance Monitoring	Type of monitoring _____	
	<input type="checkbox"/> Performance not monitored		
	Frequency _____	<input type="checkbox"/> Evidence of breaching	
	Head differential _____		
	Remarks: <u>Not applicable</u>		
IX. GROUNDWATER/SURFACE WATER REMEDIES		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
A. Groundwater Extraction Wells, Pumps, and Pipeline		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Pumps, Wellhead Plumbing, and Electrical	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> All required wells properly operating
	Remarks:	<input type="checkbox"/> Need Maintenance	
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Good condition
	Remarks:	<input type="checkbox"/> Needs Maintenance	
3.	Spare Parts and Equipment	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Good Condition
	Remarks: <u>Not applicable</u>	<input type="checkbox"/> Requires Upgrade	<input type="checkbox"/> Needs to be Provided
B. Surface Water Collection Structures, Pumps, and Pipelines		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Collection Structures, Pumps and Electrical	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Good Condition
	Remarks:	<input type="checkbox"/> Need Maintenance	
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Appurtenances	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Good condition
	Remarks:	<input type="checkbox"/> Needs Maintenance	
3.	Spare Parts and Equipment	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Good Condition
	Remarks: <u>Not applicable</u>	<input type="checkbox"/> Requires Upgrade	<input type="checkbox"/> Needs to be Provided

C. Treatment System		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Treatment Train (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks: <u>Not applicable</u>		
2.	Electrical Enclosures and Panels (properly rated and functional) <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:		
3.	Tanks, Vaults, Storage Vessels <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks:		
4.	Discharge Structure and Appurtenances <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:		
5.	Treatment Building(s) <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks:		
6.	Monitoring Wells (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A Remarks:		
D. Monitoring Data			
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality Remarks: <u>Groundwater monitoring has not yet been implemented.</u>		
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining Remarks: <u>Remedy has not yet been completed.</u>		

E. Monitored Natural Attenuation	
1.	Monitoring Wells (natural attenuation remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A Remarks:
X. OTHER REMEDIES	
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.	
XI. OVERALL OBSERVATIONS	
A. Implementation of the Remedy	
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). <u>The purpose of the remedy at Site 17 will be to treat monitor groundwater while preventing human contact with MEC. Remedy is not fully implemented.</u>	
B. Adequacy of O&M	
Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. <u>Not yet fully implemented.</u>	
C. Early Indicators of Potential Remedy Problems	
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. <u>Not yet fully implemented.</u>	
D. Opportunities for Optimization	
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. <u>None.</u>	

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III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1.	O&M Documents O&M manual As-built drawings Maintenance logs Remarks:	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
2.	Site-Specific Health and Safety Plan Contingency plan/emergency response plan Remarks:	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
3.	O&M and OSHA Training Records Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
4.	Permits and Service Agreements <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits: Remarks:	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
5.	Gas Generation Records Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
6.	Settlement Monument Records Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
7.	Groundwater Monitoring Records Remarks: <u>No records but quarterly sampling anticipated.</u>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A
8.	Leachate Extraction Records Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
9.	Discharge Compliance Records <input type="checkbox"/> Air <input type="checkbox"/> Water (effluent) Remarks:	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
10.	Daily Access/Security Logs Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A

IV. O&M COSTS

1. **O&M Organization**
- | | |
|---|--|
| <input type="checkbox"/> State in-house | <input type="checkbox"/> Contractor for State |
| <input type="checkbox"/> PRP in-house | <input type="checkbox"/> Contractor for PRP |
| <input checked="" type="checkbox"/> Federal Facility in-house | <input type="checkbox"/> Contractor for Federal Facility |
| <input type="checkbox"/> Other: | |

2. **O&M Cost Records NOT AVAILABLE**
- | | | |
|--|---|---|
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> Funding mechanism/agreement in place |
| Original O&M cost estimate <u>NA</u> | <input type="checkbox"/> Breakdown attached | |

Total annual cost by year for review period if available

From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**

None

V. ACCESS AND INSTITUTIONAL CONTROLS Applicable N/A

A. Fencing

1. **Fencing damaged** Location shown on site map Gates secured N/A
 Remarks: Located within NSF-IH which is a secure gated facility. There is no site fence.

B. Other Access Restrictions

1. **Signs and other security measures** Location shown on site map N/A
 Remarks: Signs not yet installed.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
 Site conditions imply ICs are properly implemented Yes No N/A
 Site conditions imply ICs are being fully enforced Yes No N/A

Note: Remedy not yet implemented.

Type of monitoring (e.g., self-reporting, drive by): Self-reporting

Frequency: Biannual inspections

Responsible party/agency: EPA/NAVY

Contact: Nick Carros NSF-IH IRPM
 Name Title

- Reporting is up-to-date Yes No N/A
 Reports are verified by the lead agency Yes No N/A
 Specific requirements in deed or decision documents have been met Yes No N/A
 Violations have been reported Yes No N/A
 Other problems or suggestions: Report attached

2. **Adequacy** ICs are adequate ICs are inadequate N/A
 Remarks: Remedy not yet implemented.

D. General

1. **Vandalism/trespassing** Location shown on site map No vandalism evident
 Remarks:

2. **Land use changes on site** N/A
 Remarks: None

3. **Land use changes off site** N/A
 Remarks: None

VI. GENERAL SITE CONDITIONS

- A. Roads** Applicable N/A

1. **Roads damaged** Location shown on site map Roads adequate N/A
 Remarks: Roads will be removed.

B. Other Site Conditions

Remarks: Site is hilly with well established vegetation. Some asphalt debris seen. A slump was seen in the south-central portion of the site.

- VII. LANDFILL COVERS** Applicable N/A

Note: Remedial cover (earthen) not yet constructed.

A. Landfill Surface	
1.	<p>Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident</p> <p>Areal extent: _____ Depth: _____</p> <p>Remarks:</p>
2.	<p>Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident</p> <p>Lengths _____ Widths _____ Depths _____</p> <p>Remarks:</p>
3.	<p>Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident</p> <p>Areal extent _____ Depth _____</p> <p>Remarks: <u>Some erosion seen but remedial landfill cover not yet in place. Existing cover will be covered with an additional 2 feet of soil.</u></p>
4.	<p>Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident</p> <p>Areal extent _____ Depth _____</p> <p>Remarks:</p>
5.	<p>Vegetative Cover <input checked="" type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input checked="" type="checkbox"/> No signs of stress</p> <p><input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram)</p> <p>Remarks:</p>
6.	<p>Alternative Cover (armored rock, concrete, etc.) <input checked="" type="checkbox"/> N/A</p> <p>Remarks:</p>
7.	<p>Bulges <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Bulges not evident</p> <p>Areal extent _____ Height _____</p> <p>Remarks:</p>
8.	<p>Wet Areas/Water Damage <input checked="" type="checkbox"/> Wet areas/water damage not evident</p> <p><input type="checkbox"/> Wet areas <input type="checkbox"/> Location shown on site map Areal extent _____</p> <p><input type="checkbox"/> Ponding <input type="checkbox"/> Location shown on site map Areal extent _____</p> <p><input type="checkbox"/> Seeps <input type="checkbox"/> Location shown on site map Areal extent _____</p> <p><input type="checkbox"/> Soft subgrade <input type="checkbox"/> Location shown on site map Areal extent _____</p> <p>Remarks: <u>None</u></p>
9.	<p>Slope Instability</p> <p><input checked="" type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability</p> <p>Areal extent _____</p> <p>Remarks: <u>Minor slide due to a slump in south-central portion of the site.</u></p>

B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	Flows Bypass Bench Remarks:	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
2.	Bench Breached Remarks:	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
3.	Bench Overtopped Remarks:	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
C. Letdown Channels <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	Settlement Areal extent _____ Depth _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of settlement
2.	Material Degradation Material type _____ Areal extent _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of degradation
3.	Erosion Areal extent _____ Depth _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of erosion
4.	Undercutting Areal extent _____ Depth _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of undercutting
5.	Obstructions Type _____ <input type="checkbox"/> Location shown on site map Areal extent _____ Size _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> No obstructions
6.	Excessive Vegetative Growth <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map Remarks: <u>Not applicable.</u>	Type _____ Areal extent _____

D. Cover Penetrations		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Gas Vents	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Good condition
	<input checked="" type="checkbox"/> N/A		
	Remarks:		
2.	Gas Monitoring Probes	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Routinely sampled
	Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Good condition	<input checked="" type="checkbox"/> N/A
3.	Monitoring Wells (within surface area of landfill)	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Routinely sampled
	Remarks: <u>Locked with protective bollards bounding the wells. The concrete apron is intact and the protective stickups show no signs of rust.</u>	<input type="checkbox"/> Good condition	<input checked="" type="checkbox"/> N/A
4.	Leachate Extraction Wells	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Routinely sampled
	Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Good condition	<input checked="" type="checkbox"/> N/A
5.	Settlement Monuments	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed
	Remarks: <u>Not applicable.</u>		<input checked="" type="checkbox"/> N/A
E. Gas Collection and Treatment		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Gas Treatment Facilities	<input type="checkbox"/> Flaring	<input type="checkbox"/> Thermal destruction
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Collection for reuse
	Remarks: <u>Not applicable</u>		
2.	Gas Collection Wells, Manifolds and Piping	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance
	Remarks: <u>Not applicable</u>		
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings)	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance
	Remarks:	<input checked="" type="checkbox"/> N/A	
F. Cover Drainage Layer		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Outlet Pipes Inspected	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
	Remarks:		

2.	Outlet Rock Inspected	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
G. Detention/Sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Siltation	Areal extent _____	Depth _____ <input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Siltation not evident			
Remarks:			
2.	Erosion	Areal extent _____	Depth _____
<input type="checkbox"/> Erosion not evident			
Remarks: <u>Not applicable</u>			
3.	Outlet Works	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
4.	Dam	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Deformations	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
Horizontal displacement _____			
Vertical displacement _____			
Rotational displacement _____			
Remarks: <u>Not applicable.</u>			
2.	Degradation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
Remarks: <u>Not applicable.</u>			
I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Siltation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
Areal extent _____			
Depth _____			
Remarks: <u>Not applicable.</u>			
2.	Vegetative Growth	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Vegetation does not impede flow			
Areal extent _____			
Type _____			
Remarks:			
3.	Erosion	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Erosion not evident
Areal extent _____			
Depth _____			
Remarks:			
4.	Discharge Structure	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			

VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks: <u>Not applicable</u>
2.	Performance Monitoring Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks: <u>Not applicable</u>
IX. GROUNDWATER/SURFACE WATER REMEDIES <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
A. Groundwater Extraction Wells, Pumps, and Pipeline <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Pumps, Wellhead Plumbing, and Electrical <input checked="" type="checkbox"/> N/A <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Need Maintenance Remarks:
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:
3.	Spare Parts and Equipment <input type="checkbox"/> Readily Available <input type="checkbox"/> Good Condition <input type="checkbox"/> Requires Upgrade <input type="checkbox"/> Needs to be Provided Remarks: <u>Not applicable</u>
B. Surface Water Collection Structures, Pumps, and Pipelines <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Collection Structures, Pumps and Electrical <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good Condition <input type="checkbox"/> Need Maintenance Remarks:
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Appurtenances <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:
3.	Spare Parts and Equipment <input type="checkbox"/> Readily Available <input type="checkbox"/> Good Condition <input type="checkbox"/> Requires Upgrade <input type="checkbox"/> Needs to be Provided Remarks: <u>Not applicable</u>

C. Treatment System		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Treatment Train (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks: <u>Not applicable</u>		
2.	Electrical Enclosures and Panels (properly rated and functional) <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:		
3.	Tanks, Vaults, Storage Vessels <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks:		
4.	Discharge Structure and Appurtenances <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:		
5.	Treatment Building(s) <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks:		
6.	Monitoring Wells (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A Remarks:		
D. Monitoring Data			
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality Remarks: <u>Groundwater monitoring has not yet been implemented.</u>		
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining Remarks: <u>Remedy has not yet been implemented.</u>		

E. Monitored Natural Attenuation	
1.	Monitoring Wells (natural attenuation remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A Remarks:
X. OTHER REMEDIES	
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.	
XI. OVERALL OBSERVATIONS	
A. Implementation of the Remedy	
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). <u>Remedy will protect human and ecological receptors from exposure to site contaminants and will monitor groundwater at the site. Remedy has not yet been implemented.</u>	
B. Adequacy of O&M	
Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. <u>Not yet implemented.</u>	
C. Early Indicators of Potential Remedy Problems	
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. <u>Not yet implemented.</u>	
D. Opportunities for Optimization	
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. <u>None.</u>	

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III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1.	O&M Documents O&M manual As-built drawings Maintenance logs Remarks:	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
2.	Site-Specific Health and Safety Plan Contingency plan/emergency response plan Remarks:	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
3.	O&M and OSHA Training Records Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
4.	Permits and Service Agreements <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits: Remarks:	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
5.	Gas Generation Records Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
6.	Settlement Monument Records Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
7.	Groundwater Monitoring Records Remarks: <u>No records just yet since remedy not in place and running. Quarterly sampling is anticipated.</u>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
8.	Leachate Extraction Records Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
9.	Discharge Compliance Records <input type="checkbox"/> Air <input type="checkbox"/> Water (effluent) Remarks:	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
10.	Daily Access/Security Logs Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A

IV. O&M COSTS

1. **O&M Organization**
- | | |
|---|--|
| <input type="checkbox"/> State in-house | <input type="checkbox"/> Contractor for State |
| <input type="checkbox"/> PRP in-house | <input type="checkbox"/> Contractor for PRP |
| <input checked="" type="checkbox"/> Federal Facility in-house | <input type="checkbox"/> Contractor for Federal Facility |
| <input type="checkbox"/> Other: | |

2. **O&M Cost Records NOT AVAILABLE**
- | | | |
|--|---|---|
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> Funding mechanism/agreement in place |
| Original O&M cost estimate <u>NA</u> | <input type="checkbox"/> Breakdown attached | |

Total annual cost by year for review period if available

From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**

None

V. ACCESS AND INSTITUTIONAL CONTROLS Applicable N/A

A. Fencing

1. **Fencing damaged** Location shown on site map Gates secured N/A
 Remarks: Located within NSF-IH Stump Neck Annex which is a secure gated facility. There is no site fence.

B. Other Access Restrictions

1. **Signs and other security measures** Location shown on site map N/A
 Remarks: Signs not yet installed.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs are properly implemented Yes No N/A
Site conditions imply ICs are being fully enforced Yes No N/A

Note: Remedy not yet fully implemented.

Type of monitoring (e.g., self-reporting, drive by): Self-reporting

Frequency: Biannual inspections

Responsible party/agency: EPA/NAVY

Contact: Nick Carros NSF-IH IRPM
Name Title

- Reporting is up-to-date Yes No N/A
Reports are verified by the lead agency Yes No N/A
Specific requirements in deed or decision documents have been met Yes No N/A
Violations have been reported Yes No N/A
Other problems or suggestions: Report attached

2. **Adequacy** ICs are adequate ICs are inadequate N/A
Remarks: Remedy has not yet been implemented.

D. General

1. **Vandalism/trespassing** Location shown on site map No vandalism evident
Remarks:

2. **Land use changes on site** N/A
Remarks: None

3. **Land use changes off site** N/A
Remarks: None

VI. GENERAL SITE CONDITIONS

- A. Roads** Applicable N/A

1. **Roads damaged** Location shown on site map Roads adequate N/A
Remarks: No roads onsite.

B. Other Site Conditions

Remarks: The western portion of the site is mowed grass, while the eastern portion is tall grasses or forest. Some metal debris was seen the eastern portion in Chicamuxen Creek.

VII. LANDFILL COVERS

Applicable N/A

A. Landfill Surface

1. **Settlement** (Low spots) Location shown on site map Settlement not evident
 Areal extent: _____ Depth: _____
 Remarks:

2. **Cracks** Location shown on site map Cracking not evident
 Lengths _____ Widths _____ Depths _____
 Remarks:

3. **Erosion** Location shown on site map Erosion not evident
 Areal extent _____ Depth _____
 Remarks:

4. **Holes** Location shown on site map Holes not evident
 Areal extent _____ Depth _____
 Remarks:

5. **Vegetative Cover** Grass Cover properly established No signs of stress
 Trees/Shrubs (indicate size and locations on a diagram)
 Remarks:

6. **Alternative Cover (armored rock, concrete, etc.)** N/A
 Remarks:

7. **Bulges** Location shown on site map Bulges not evident
 Areal extent _____ Height _____
 Remarks:

8. **Wet Areas/Water Damage** Wet areas/water damage not evident
 Wet areas Location shown on site map Areal extent _____
 Ponding Location shown on site map Areal extent _____
 Seeps Location shown on site map Areal extent _____
 Soft subgrade Location shown on site map Areal extent _____
 Remarks: Not applicable

9. **Slope Instability** Slides Location shown on site map No evidence of slope instability
 Areal extent _____
 Remarks:

B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	Flows Bypass Bench Remarks:	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
2.	Bench Breached Remarks:	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
3.	Bench Overtopped Remarks:	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
C. Letdown Channels <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	Settlement Areal extent _____ Depth _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of settlement
2.	Material Degradation Material type _____ Areal extent _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of degradation
3.	Erosion Areal extent _____ Depth _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of erosion
4.	Undercutting Areal extent _____ Depth _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of undercutting
5.	Obstructions Type _____ <input type="checkbox"/> Location shown on site map Areal extent _____ Size _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> No obstructions
6.	Excessive Vegetative Growth <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map Remarks: <u>Not applicable.</u>	Type _____ Areal extent _____

D. Cover Penetrations		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Gas Vents	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Good condition
	<input checked="" type="checkbox"/> N/A		
	Remarks:		
2.	Gas Monitoring Probes	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
		<input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> N/A
	Remarks: <u>Not applicable.</u>		
3.	Monitoring Wells (within surface area of landfill)	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
		<input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> N/A
	Remarks: Locked with protective bollards bounding the wells. The concrete apron is intact and the protective stickups show no signs of rust.		
4.	Leachate Extraction Wells	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
		<input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> N/A
	Remarks: <u>Not applicable.</u>		
5.	Settlement Monuments	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed
	Remarks: <u>Not applicable.</u>		<input checked="" type="checkbox"/> N/A
E. Gas Collection and Treatment		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Gas Treatment Facilities	<input type="checkbox"/> Flaring	<input type="checkbox"/> Thermal destruction
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Collection for reuse
	Remarks: <u>Not applicable</u>		
2.	Gas Collection Wells, Manifolds and Piping	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance
	Remarks: <u>Not applicable</u>		
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings)	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance
	Remarks:		<input checked="" type="checkbox"/> N/A
F. Cover Drainage Layer		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Outlet Pipes Inspected	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
	Remarks:		
2.	Outlet Rock Inspected	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
	Remarks:		

G. Detention/Sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Siltation Areal extent _____ Depth _____ <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks:
2.	Erosion Areal extent _____ Depth _____ <input type="checkbox"/> Erosion not evident Remarks: <u>Not applicable</u>
3.	Outlet Works <input type="checkbox"/> Functioning <input checked="" type="checkbox"/> N/A Remarks:
4.	Dam <input type="checkbox"/> Functioning <input checked="" type="checkbox"/> N/A Remarks:
H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks: <u>Not applicable.</u>
2.	Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Degradation not evident Remarks: <u>Not applicable.</u>
I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Siltation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Siltation not evident Areal extent _____ Depth _____ Remarks: <u>Not applicable.</u>
2.	Vegetative Growth <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Vegetation does not impede flow Areal extent _____ Type _____ Remarks:
3.	Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks:
4.	Discharge Structure <input type="checkbox"/> Functioning <input checked="" type="checkbox"/> N/A Remarks:

VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks: <u>Not applicable</u>
2.	Performance Monitoring Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks: <u>Not applicable</u>
IX. GROUNDWATER/SURFACE WATER REMEDIES <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
A. Groundwater Extraction Wells, Pumps, and Pipeline <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Pumps, Wellhead Plumbing, and Electrical <input checked="" type="checkbox"/> N/A <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Need Maintenance Remarks:
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:
3.	Spare Parts and Equipment <input type="checkbox"/> Readily Available <input type="checkbox"/> Good Condition <input type="checkbox"/> Requires Upgrade <input type="checkbox"/> Needs to be Provided Remarks: <u>Not applicable</u>
B. Surface Water Collection Structures, Pumps, and Pipelines <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Collection Structures, Pumps and Electrical <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good Condition <input type="checkbox"/> Need Maintenance Remarks:
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Appurtenances <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:
3.	Spare Parts and Equipment <input type="checkbox"/> Readily Available <input type="checkbox"/> Good Condition <input type="checkbox"/> Requires Upgrade <input type="checkbox"/> Needs to be Provided Remarks: <u>Not applicable</u>

C. Treatment System		<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
1.	Treatment Train (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks: <u>Not applicable</u>	
2.	Electrical Enclosures and Panels (properly rated and functional) <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:	
3.	Tanks, Vaults, Storage Vessels <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks:	
4.	Discharge Structure and Appurtenances <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:	
5.	Treatment Building(s) <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks:	
6.	Monitoring Wells (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A Remarks:	
D. Monitoring Data		
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality Remarks: <u>Groundwater and sediment pore water monitoring have not yet been implemented.</u>	
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining Remarks: <u>Groundwater and sediment pore water monitoring have not yet been implemented.</u>	
E. Monitored Natural Attenuation		

<p>1. Monitoring Wells (natural attenuation remedy)</p> <p> <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A </p> <p>Remarks:</p>
<p>X. OTHER REMEDIES</p>
<p>If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.</p>
<p>XI. OVERALL OBSERVATIONS</p>
<p>A. Implementation of the Remedy</p>
<p>Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).</p> <p><u>The existing soil and vegetative cover will prevent physical exposure to landfill waste. Metal debris will be removed in Winter of 2012/2013. The remedy otherwise is effective and functioning.</u></p>
<p>B. Adequacy of O&M</p>
<p>Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <p><u>None.</u></p>
<p>C. Early Indicators of Potential Remedy Problems</p>
<p>Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.</p> <p><u>None.</u></p>
<p>D. Opportunities for Optimization</p>
<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <p><u>None</u></p>

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III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1.	<p>O&M Documents</p> <p>O&M manual <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A As-built drawings <input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> N/A Maintenance logs <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A</p> <p>Remarks: <u>Inspection checklists are included in LTM reports.</u></p>
2.	<p>Site-Specific Health and Safety Plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Contingency plan/emergency response plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A</p> <p>Remarks:</p>
3.	<p>O&M and OSHA Training Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A</p> <p>Remarks:</p>
4.	<p>Permits and Service Agreements</p> <p><input type="checkbox"/> Air discharge permit <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Other permits: <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A</p> <p>Remarks:</p>
5.	<p>Gas Generation Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A</p> <p>Remarks:</p>
6.	<p>Settlement Monument Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A</p> <p>Remarks:</p>
7.	<p>Groundwater Monitoring Records <input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> N/A</p> <p>Remarks: <u>See LTM reports and end or sequence reports for details.</u></p>
8.	<p>Leachate Extraction Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A</p> <p>Remarks:</p>
9.	<p>Discharge Compliance Records</p> <p><input type="checkbox"/> Air <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Water (effluent) <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A</p> <p>Remarks:</p>
10.	<p>Daily Access/Security Logs <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A</p> <p>Remarks: <u>Landfill is located within NSF-Indian Head, which is a secure gated facility.</u></p>

IV. O&M COSTS

1. **O&M Organization**
- | | |
|---|--|
| <input type="checkbox"/> State in-house | <input type="checkbox"/> Contractor for State |
| <input type="checkbox"/> PRP in-house | <input type="checkbox"/> Contractor for PRP |
| <input checked="" type="checkbox"/> Federal Facility in-house | <input type="checkbox"/> Contractor for Federal Facility |
| <input type="checkbox"/> Other: | |

2. **O&M Cost Records NOT AVAILABLE**
- Readily available Up to date Funding mechanism/agreement in place
Original O&M cost estimate NA Breakdown attached
- Total annual cost by year for review period if available
- | | | |
|----------------------|------------|---|
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| Date Date | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| Date Date | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| Date Date | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| Date Date | Total cost | |

3. **Unanticipated or Unusually High O&M Costs During Review Period**
None

V. ACCESS AND INSTITUTIONAL CONTROLS Applicable N/A

A. Fencing

1. **Fencing damaged** Location shown on site map Gates secured N/A
Remarks: Located within NSF-IH which is a secure gated facility. There is no site fence.

B. Other Access Restrictions

1. **Signs and other security measures** Location shown on site map N/A
Remarks: The signs are in good condition and in clear view. They clearly display information and are adequately spaced.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs are properly implemented Yes No N/A
Site conditions imply ICs are being fully enforced Yes No N/A

Type of monitoring (e.g., self-reporting, drive by): Self-reporting
Frequency: Ground water sampling every 9 months, and regular site inspections
Responsible party/agency: EPA/NAVY
Contact: Nick Carros NSF-IH IRPM
Name Title

Reporting is up-to-date Yes No N/A
Reports are verified by the lead agency Yes No N/A
Specific requirements in deed or decision documents have been met Yes No N/A
Violations have been reported Yes No N/A
Other problems or suggestions: Report attached

2. **Adequacy** ICs are adequate ICs are inadequate N/A
Remarks:

D. General

1. **Vandalism/trespassing** Location shown on site map No vandalism evident
Remarks:

2. **Land use changes on site** N/A
Remarks: None

3. **Land use changes off site** N/A
Remarks: None

VI. GENERAL SITE CONDITIONS

A. Roads Applicable N/A

1. **Roads damaged** Location shown on site map Roads adequate N/A
Remarks: Paved cap area next to Building 1866 parking lot intact with no signs of damage.

B. Other Site Conditions

Remarks: None

VII. LANDFILL COVERS Applicable N/A

A. Landfill Surface

1.	Settlement (Low spots) Areal extent: Remarks:	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Settlement not evident
2.	Cracks Lengths _____ Widths _____ Depths _____ Remarks:	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Cracking not evident
3.	Erosion Areal extent _____ Remarks:	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Erosion not evident
4.	Holes Areal extent _____ Remarks:	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Holes not evident
5.	Vegetative Cover Remarks:	<input checked="" type="checkbox"/> Grass	<input checked="" type="checkbox"/> Cover properly established
		<input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram)	<input type="checkbox"/> No signs of stress
6.	Alternative Cover (armored rock, concrete, etc.) Remarks: <u>Rip rap in ditches have small trees and grasses which could inhibit drainage.</u>	<input type="checkbox"/> N/A	
7.	Bulges Areal extent _____ Remarks:	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Bulges not evident
8.	Wet Areas/Water Damage Remarks: <u>There is a small creek hydraulically downgradient of the site which is draining properly with no signs of damage.</u>	<input checked="" type="checkbox"/> Wet areas/water damage not evident	
		<input type="checkbox"/> Wet areas	<input type="checkbox"/> Location shown on site map Areal extent _____
		<input type="checkbox"/> Ponding	<input type="checkbox"/> Location shown on site map Areal extent _____
		<input type="checkbox"/> Seeps	<input type="checkbox"/> Location shown on site map Areal extent _____
		<input type="checkbox"/> Soft subgrade	<input type="checkbox"/> Location shown on site map Areal extent _____
9.	Slope Instability Remarks:	<input type="checkbox"/> Slides	<input type="checkbox"/> Location shown on site map
		<input checked="" type="checkbox"/> No evidence of slope instability	
B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			

1.	Flows Bypass Bench Remarks:	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
2.	Bench Breached Remarks:	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
3.	Bench Overtopped Remarks:	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
C. Letdown Channels <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	Settlement Areal extent _____ Depth _____ Remarks:	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No evidence of settlement
2.	Material Degradation Material type _____ Areal extent _____ Remarks:	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No evidence of degradation
3.	Erosion Areal extent _____ Depth _____ Remarks:	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No evidence of erosion
4.	Undercutting Areal extent _____ Depth _____ Remarks:	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No evidence of undercutting
5.	Obstructions <u>Type: Small trees and grasses</u> <input type="checkbox"/> No obstructions <input type="checkbox"/> Location shown on site map Areal extent _____ Size: <u><2 inches in diameter</u> Remarks: <u>Should be pruned and trimmed when necessary.</u>		
6.	Excessive Vegetative Growth <input checked="" type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map Remarks:	Type _____ Areal extent _____	

D. Cover Penetrations		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Gas Vents	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> Good condition
	<input checked="" type="checkbox"/> N/A		
	Remarks:		
2.	Gas Monitoring Probes	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> N/A	
	Remarks:		
3.	Monitoring Wells (within surface area of landfill)	<input checked="" type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input checked="" type="checkbox"/> Routinely sampled	<input checked="" type="checkbox"/> Good condition
	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A	
	Remarks: <u>Locked with protective bollards bounding the wells. The concrete aprons are intact and the protective stickups show no signs of rust.</u>		
4.	Leachate Extraction Wells	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> N/A	
	Remarks:		
5.	Settlement Monuments	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed
	Remarks:	<input checked="" type="checkbox"/> N/A	
E. Gas Collection and Treatment		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Gas Treatment Facilities	<input type="checkbox"/> Flaring	<input type="checkbox"/> Thermal destruction
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Collection for reuse
	Remarks: <u>Not applicable</u>		
2.	Gas Collection Wells, Manifolds and Piping	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance
	Remarks: <u>Not applicable</u>		
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings)	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance
	Remarks:	<input checked="" type="checkbox"/> N/A	
F. Cover Drainage Layer		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	Outlet Pipes Inspected	<input checked="" type="checkbox"/> Functioning	<input type="checkbox"/> N/A
	Remarks: Culverts in good condition. Beaver seen in area of culvert but no signs of a dam or damming activity.		

2.	Outlet Rock Inspected	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
G. Detention/Sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Siltation	Areal extent _____	Depth _____ <input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Siltation not evident			
Remarks:			
2.	Erosion	Areal extent _____	Depth _____
<input type="checkbox"/> Erosion not evident			
Remarks: <u>Not applicable</u>			
3.	Outlet Works	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
4.	Dam	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
H. Retaining Walls <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	Deformations	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Deformation not evident
Horizontal displacement _____			
Vertical displacement _____			
Rotational displacement _____			
Remarks:			
2.	Degradation	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Degradation not evident
Remarks:			
I. Perimeter Ditches/Off-Site Discharge <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	Siltation	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Siltation not evident
Areal extent _____			
Depth _____			
Remarks:			
2.	Vegetative Growth	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
<input checked="" type="checkbox"/> Vegetation does not impede flow			
Areal extent _____			
Type _____			
Remarks: <u>Saplings are present within the drainage channels.</u>			
3.	Erosion	<input checked="" type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
Areal extent _____			
Depth _____			
Remarks: <u>6 inches to 1 ft of erosion observed in unlined portion of western drainage channel.</u>			
4.	Discharge Structure	<input checked="" type="checkbox"/> Functioning	<input type="checkbox"/> N/A
Remarks: <u>All culverts in good working order.</u>			

VIII. VERTICAL BARRIER WALLS		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Settlement	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks: <u>Not applicable</u>	
2.	Performance Monitoring	Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks: <u>Not applicable</u>	
IX. GROUNDWATER/SURFACE WATER REMEDIES		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
A. Groundwater Extraction Wells, Pumps, and Pipeline		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Pumps, Wellhead Plumbing, and Electrical	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Need Maintenance Remarks:	
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:	
3.	Spare Parts and Equipment	<input type="checkbox"/> Readily Available <input type="checkbox"/> Good Condition <input type="checkbox"/> Requires Upgrade <input type="checkbox"/> Needs to be Provided Remarks: <u>Not applicable</u>	
B. Surface Water Collection Structures, Pumps, and Pipelines		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Collection Structures, Pumps and Electrical	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good Condition <input type="checkbox"/> Need Maintenance Remarks:	
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Appurtenances	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:	
3.	Spare Parts and Equipment	<input type="checkbox"/> Readily Available <input type="checkbox"/> Good Condition <input type="checkbox"/> Requires Upgrade <input type="checkbox"/> Needs to be Provided Remarks: <u>Not applicable</u>	

C. Treatment System		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Treatment Train (Check components that apply)	<input type="checkbox"/> Metals removal <input type="checkbox"/> Air stripping <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____	<input type="checkbox"/> Oil/water separation <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Bioremediation <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____
Remarks: <u>Not applicable</u>			
2.	Electrical Enclosures and Panels (properly rated and functional)	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:	
3.	Tanks, Vaults, Storage Vessels	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks:	
4.	Discharge Structure and Appurtenances	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:	
5.	Treatment Building(s)	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks:	
6.	Monitoring Wells (pump and treatment remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A Remarks:	
D. Monitoring Data			
1.	Monitoring Data	<input checked="" type="checkbox"/> Is routinely submitted on time <input checked="" type="checkbox"/> Is of acceptable quality	
2.	Monitoring data suggests:	<input checked="" type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining	

E. Monitored Natural Attenuation	
1. Monitoring Wells (natural attenuation remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A
Remarks:	
X. OTHER REMEDIES	
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.	
XI. OVERALL OBSERVATIONS	
A. Implementation of the Remedy	
<p>Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).</p> <p><u>The remedy for Site 42 consisted of removing potentially hazardous waste within the landfill, capping then regarding with a soil cover, LUCs, and shallow groundwater and surface water sampling to confirm no contaminants are migrating offsite.</u></p> <p><u>The remedy is functioning as designed. Tall vegetation was observed in the western drainage ditch. In addition, some small trees and grass are present within central drainage ditch. They currently do not seem to be affecting drainage, but should be trimmed. The retaining walls, monitoring wells, and ground cover are in good condition. Erosion was also observed in the unlined portion of the central drainage ditch. This does not have an impact on the effectiveness of the remedy.</u></p>	
B. Adequacy of O&M	
<p>Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <p><u>No issues other than trees and grasses in ditch. An invasive plant (S. Lespedeza) is dominating the vegetation. It was stated that this will be sprayed so that native grasses can grow.</u></p>	
C. Early Indicators of Potential Remedy Problems	
<p>Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.</p> <p><u>None</u></p>	
D. Opportunities for Optimization	
<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <p><u>None</u></p>	

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III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1.	O&M Documents O&M manual As-built drawings Maintenance logs Remarks:	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
2.	Site-Specific Health and Safety Plan Contingency plan/emergency response plan Remarks:	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
3.	O&M and OSHA Training Records Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
4.	Permits and Service Agreements <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits: Remarks:	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
5.	Gas Generation Records Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
6.	Settlement Monument Records Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
7.	Groundwater Monitoring Records Remarks: <u>Groundwater monitoring has not yet been implemented.</u>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
8.	Leachate Extraction Records Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
9.	Discharge Compliance Records <input type="checkbox"/> Air <input type="checkbox"/> Water (effluent) Remarks:	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
10.	Daily Access/Security Logs Remarks:	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A

IV. O&M COSTS

1. **O&M Organization**
- | | |
|---|--|
| <input type="checkbox"/> State in-house | <input type="checkbox"/> Contractor for State |
| <input type="checkbox"/> PRP in-house | <input type="checkbox"/> Contractor for PRP |
| <input checked="" type="checkbox"/> Federal Facility in-house | <input type="checkbox"/> Contractor for Federal Facility |
| <input type="checkbox"/> Other: | |

2. **O&M Cost Records NOT AVAILABLE**
- | | | |
|--|---|---|
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> Funding mechanism/agreement in place |
| Original O&M cost estimate <u>NA</u> | <input type="checkbox"/> Breakdown attached | |

Total annual cost by year for review period if available

From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**
- None

V. ACCESS AND INSTITUTIONAL CONTROLS Applicable N/A

A. Fencing

1. **Fencing damaged** Location shown on site map Gates secured N/A
 Remarks: Located within NSF-IH which is a secure gated facility. There is no site fence.

B. Other Access Restrictions

1. **Signs and other security measures** Location shown on site map N/A
 Remarks:

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs are properly implemented Yes No N/A
Site conditions imply ICs are being fully enforced Yes No N/A

Type of monitoring (e.g., self-reporting, drive by): Self-reporting
Frequency: Quarterly inspections
Responsible party/agency: EPA/NAVY
Contact: Nick Carros NSF-IH IRPM
Name Title

Reporting is up-to-date Yes No N/A
Reports are verified by the lead agency Yes No N/A
Specific requirements in deed or decision documents have been met Yes No N/A
Violations have been reported Yes No N/A
Other problems or suggestions: Report attached

2. **Adequacy** ICs are adequate ICs are inadequate N/A
Remarks: Remedy has not yet been implemented.

D. General

1. **Vandalism/trespassing** Location shown on site map No vandalism evident
Remarks:

2. **Land use changes on site** N/A
Remarks: None

3. **Land use changes off site** N/A
Remarks: None

VI. GENERAL SITE CONDITIONS

A. Roads Applicable N/A

1. **Roads damaged** Location shown on site map Roads adequate N/A
Remarks:

B. Other Site Conditions

Remarks: Site is located over several acres and comprises an area that is well traveled by vehicles since the buildings in the area are operational. Site cover consists of roads, buildings, grass and trees, and ditches. There are numerous monitoring wells (stick ups and flush mounts) all of which seem to be in good condition.

VII. LANDFILL COVERS

Applicable N/A

A. Landfill Surface

1. **Settlement** (Low spots) Location shown on site map Settlement not evident
 Areal extent: _____ Depth: _____
 Remarks: Not applicable.

2. **Cracks** Location shown on site map Cracking not evident
 Lengths _____ Widths _____ Depths _____
 Remarks: Not applicable.

3. **Erosion** Location shown on site map Erosion not evident
 Areal extent _____ Depth _____
 Remarks: Not applicable.

4. **Holes** Location shown on site map Holes not evident
 Areal extent _____ Depth _____
 Remarks: Not applicable.

5. **Vegetative Cover** Grass Cover properly established No signs of stress
 Trees/Shrubs (indicate size and locations on a diagram)
 Remarks: Not applicable.

6. **Alternative Cover (armored rock, concrete, etc.)** N/A
 Remarks: Not applicable.

7. **Bulges** Location shown on site map Bulges not evident
 Areal extent _____ Height _____
 Remarks: Not applicable.

8. **Wet Areas/Water Damage** Wet areas/water damage not evident
 Wet areas Location shown on site map Areal extent _____
 Ponding Location shown on site map Areal extent _____
 Seeps Location shown on site map Areal extent _____
 Soft subgrade Location shown on site map Areal extent _____
 Remarks: Not applicable.

9. **Slope Instability**
 Slides Location shown on site map No evidence of slope instability
 Areal extent _____
 Remarks: Not applicable.

B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	Flows Bypass Bench Remarks:	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
2.	Bench Breached Remarks:	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
3.	Bench Overtopped Remarks:	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
C. Letdown Channels <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	Settlement Areal extent _____ Depth _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of settlement
2.	Material Degradation Material type _____ Areal extent _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of degradation
3.	Erosion Areal extent _____ Depth _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of erosion
4.	Undercutting Areal extent _____ Depth _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of undercutting
5.	Obstructions Type _____ <input type="checkbox"/> Location shown on site map Areal extent _____ Size _____ Remarks: <u>Not applicable.</u>	<input type="checkbox"/> No obstructions
6.	Excessive Vegetative Growth <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map Remarks: <u>Not applicable.</u>	Type _____ Areal extent _____

D. Cover Penetrations		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Gas Vents	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Good condition
	<input checked="" type="checkbox"/> N/A		
	Remarks:		
2.	Gas Monitoring Probes	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Routinely sampled
	Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Good condition	<input checked="" type="checkbox"/> N/A
3.	Monitoring Wells (within surface area of landfill)	<input checked="" type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Routinely sampled
	Remarks: Locked with protective bollards bounding the wells. The concrete apron is intact and the protective stickups show no signs of rust.	<input type="checkbox"/> Good condition	<input checked="" type="checkbox"/> N/A
4.	Leachate Extraction Wells	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Routinely sampled
	Remarks: <u>Not applicable.</u>	<input type="checkbox"/> Good condition	<input checked="" type="checkbox"/> N/A
5.	Settlement Monuments	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed
	Remarks: <u>Not applicable.</u>		<input checked="" type="checkbox"/> N/A
E. Gas Collection and Treatment		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Gas Treatment Facilities	<input type="checkbox"/> Flaring	<input type="checkbox"/> Thermal destruction
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> Collection for reuse
	Remarks: <u>Not applicable</u>		
2.	Gas Collection Wells, Manifolds and Piping	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance
	Remarks: <u>Not applicable</u>		
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings)	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance
	Remarks:	<input checked="" type="checkbox"/> N/A	
F. Cover Drainage Layer		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Outlet Pipes Inspected	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
	Remarks:		

2.	Outlet Rock Inspected	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
G. Detention/Sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Siltation	Areal extent _____	Depth _____ <input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Siltation not evident			
Remarks:			
2.	Erosion	Areal extent _____	Depth _____
<input type="checkbox"/> Erosion not evident			
Remarks: <u>Not applicable</u>			
3.	Outlet Works	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
4.	Dam	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			
H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Deformations	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
Horizontal displacement _____			
Vertical displacement _____			
Rotational displacement _____			
Remarks: <u>Not applicable.</u>			
2.	Degradation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
Remarks: <u>Not applicable.</u>			
I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Siltation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
Areal extent _____			
Depth _____			
Remarks:			
2.	Vegetative Growth	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Vegetation does not impede flow			
Areal extent _____			
Type _____			
Remarks:			
3.	Erosion	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
Areal extent _____			
Depth _____			
Remarks: <u>Not applicable.</u>			
4.	Discharge Structure	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks:			

VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks: <u>Not applicable</u>
2.	Performance Monitoring Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks: <u>Not applicable</u>
IX. GROUNDWATER/SURFACE WATER REMEDIES <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
A. Groundwater Extraction Wells, Pumps, and Pipeline <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Pumps, Wellhead Plumbing, and Electrical <input checked="" type="checkbox"/> N/A <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Need Maintenance Remarks:
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:
3.	Spare Parts and Equipment <input type="checkbox"/> Readily Available <input type="checkbox"/> Good Condition <input type="checkbox"/> Requires Upgrade <input type="checkbox"/> Needs to be Provided Remarks: <u>Not applicable</u>
B. Surface Water Collection Structures, Pumps, and Pipelines <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Collection Structures, Pumps and Electrical <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good Condition <input type="checkbox"/> Need Maintenance Remarks:
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Appurtenances <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:
3.	Spare Parts and Equipment <input type="checkbox"/> Readily Available <input type="checkbox"/> Good Condition <input type="checkbox"/> Requires Upgrade <input type="checkbox"/> Needs to be Provided Remarks: <u>Not applicable</u>

C. Treatment System		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A	<u>Note:</u> Using A-SOX in Wells.
1.	Treatment Train (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks: <u>Not applicable</u>			
2.	Electrical Enclosures and Panels (properly rated and functional) <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:			
3.	Tanks, Vaults, Storage Vessels <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks:			
4.	Discharge Structure and Appurtenances <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks:			
5.	Treatment Building(s) <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks:			
6.	Monitoring Wells (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A Remarks:			
D. Monitoring Data				
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality Remarks: <u>Groundwater monitoring has not yet been implemented.</u>			
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining Remarks: <u>Remedy has not yet been implemented.</u>			

E. Monitored Natural Attenuation	
1. Monitoring Wells (natural attenuation remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A
Remarks:	
X. OTHER REMEDIES	
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.	
XI. OVERALL OBSERVATIONS	
A. Implementation of the Remedy	
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).	
<u>The remedy is to accomplish the breakdown of TCE and daughter products in groundwater. Implementation of A-SOX is scheduled for Fall 2012.</u>	
B. Adequacy of O&M	
Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.	
<u>Not yet fully implemented.</u>	
C. Early Indicators of Potential Remedy Problems	
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.	
<u>Not yet fully implemented.</u>	
D. Opportunities for Optimization	
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.	
<u>None.</u>	

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APPENDIX B

SITE INSPECTION PHOTOGRAPHS

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Site 11 Five-Year Review Photo Log



Photo 1: Looking south across unvegetated flat area at wetlands area (wetland plants not established), monitoring well IS11MW10, and Mattawoman Creek.



Photo 2: Along Site boundary with Mattawoman Creek looking west. Wetlands vegetation present. Trees slumping and cages not secured to ground. Hillslope not fully vegetated but matting preventing erosion and slumping.

Site 11 Five-Year Review Photo Log



Photo 3: On access road looking south down drainage channel. Vegetation well established and silt fencing in good condition.

Site 12 Five Year Review Photo Log



Photo 1: Fallen tree located in rip rap lined ditch on east side of northern portion of the landfill.



Photo 2: Sapling located in rip rap lined ditch on eastern side of center portion of landfill.

Site 12 Five Year Review Photo Log



Photo 3: Looking west at the culvert that connects the unnamed pond at Site 12 to South Pond. Culvert is in good condition with no signs of siltation or blockage.

Sites 14, 15,16,49,50, 51/54, 52/55, and 53 Five-Year Review Photo Log



Photo 1: Looking at the small gabion controlling erosion within the drainage channel.



Photo 2: Looking northeast along the drainage channel at Buildings 103 (white building) and 502 (green and brick building).

Sites 14, 15,16,49,50, 51/54, 52/55, and 53 Five-Year Review Photo Log



Photo 3: North of Building 109A looking north at Buildings 102 (brick building on left), 103 (white building in middle), and 502 (green and brick building on right).

Site 17 Five-Year Review Photo Log



Photo 1: At the southern edge of the area of attainment looking north across a vegetated drainage ditch with IS17MW06 in background. Cattails are present within the ditch.



Photo 2: At the drainage ditch looking north towards Building 1569. Vegetation is fully established and no signs of erosion or unauthorized activity.

Site 17 Five-Year Review Photo Log



Photo 3: At the southwestern boundary of the Site looking Northeast down the Mattawoman Creek bank. Water is at high tide which has submerged metal debris.

Site 21 Five-Year Review Photo Log



Photo 1: Looking southeast, at the intersection of S. Bronson Road and Components Place, at IS21MW03 which is locked and in good condition.



Photo 2: At intersection of two dirt roads looking north down the length of the landfill.

Site 21 Five-Year Review Photo Log



Photo 3: At a monitoring well, near the terminus of the eastern trending small dirt trail, looking north at an exposed earthen face where a slump occurred.

Site 36 Five-Year Review Photo Log



Photo 1: Looking southwest across Roach Road into Site 36.



Photo 2: Looking west down mowed path to S36MW001.

Site 42 Five-Year Review Photo Log



Photo 1: Looking north at upslope along central drainage channel. Saplings observed growing in channel.



Photo 2: Looking southwest down western drainage channel where it transitions from vegetation to rip rap. Rip rap is in good shape with some grass growth.

Site 42 Five-Year Review Photo Log



Photo 3: Looking southeast down rip rap retention wall where rip rap drainage channel ends. Retention wall is intact with no signs of damage. Creek on left has a steady flow without major obstructions or damming.

Site 57 Five-Year Review Photo Log



Photo 1: On Bailey Road looking northwest at Building 292. All monitoring wells (stickups and flush mounts) in good condition.



Photo 2: Standing south of Building 292 looking southeast down Bailey Road.

APPENDIX C

FIVE-YEAR REVIEW INTERVIEWS

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FIVE-YEAR REVIEW QUESTIONNAIRE

Facility: Naval Support Facility, Indian Head

Site(s): Site 11-Caffee Road Landfill, Site 12-Town Gut Landfill, Site 17-Disposed Metal Parts Along Shoreline, Site 21-Bronson Road Landfill, Site 36-Cosed Landfill, Site 42-Olsen Road Landfill, Site 57-Building 292 TCE Contamination, Lab Area (Sites 14, 15, 16, 49, 50, 53, 54, 55)

Interviewee: Joseph Rail

Agency/Title/etc: Naval Facilities Engineering Command Washington
Date: 6/13/12

Background

1. What effects have site operations had on the surrounding community or area?
None.
2. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
No.
3. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, give details.
No.
4. Are you aware of any recreational uses of the surface water, such as fishing, boating, or other casual uses?
Fishing and boating occurs in the Mattawoman Creek adjacent to Site 11 but is not subject to Navy control and is not on Navy property.
5. Are you aware of any intrusive activities being conducted on the cap or uses of the site other than monitoring or maintenance?
No.
6. Are you aware of any uses of the groundwater at or downgradient of the site?
No.

State and Local Considerations (Regulatory)

1. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.
Yes, landfill inspections were completed at Sites 12 and 42 and post-closure inspection forms were included in Long-Term Monitoring (LTM) Reports. In 2012, Remedial

Actions were completed for Site 11 and the Lab Area and final inspections were completed in the field. Remedial Designs have been completed for Sites 17, 21, and 57 and Remedial Actions are planned for the latter half of 2012. Site visits have been completed at Site 36 and long-term monitoring is expected to begin in late 2012.

2. Have there been any complaints, violations, or other compliance issues related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

At Site 57, a groundwater treatment effort using injection of food-grade emulsified vegetable oil in November 2011 encountered issues of daylighting into a storm sewer. Injections were halted immediately and a more passive system of A-SOX diffusers (hydrogen-releasing socks) was installed. Approval of the system was first obtained from the Maryland Department of Environment and Environmental Protection Agency. No violations or compliance issues were submitted.

3. Have there been any changes in regulations or cleanup levels since implementation that may impact the site?

No.

Performance, Operation, and Maintenance Problems

1. Is the remedy functioning intended by the decision documents? How well is the remedy performing?

Yes, all remedies are functioning as intended.

2. Describe the O&M staff and activities. If there is not a continuous on-site presence, describe the staff and frequency of site inspections and activities.

None of the sites have a continuous on-site presence; however, they are inspected periodically. Sites 12 and 42 are currently in a long-term monitoring program with periodic inspections. Sites 11, 17, 21, and 36 have LTM Plans that are under review and will undergo biannual inspections in the future. A Remedial Action was completed at the Lab Area in 2012 but LTM is not required at the site.

3. Have there been any significant changes in the O&M requirements, operational adjustments, maintenance schedules, or sampling routines since start up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe the changes and impacts.

Yes, the frequency of LTM at Site 12 was reduced from quarterly to once every 15 months beginning in March 2011 and Site 42 was reduced from quarterly to once every 9 months beginning in March 2012. The changes in frequency were approved by the regulators and were consistent with procedures outlined in the LTM Plans. Finally, the protectiveness or effectiveness of the remedy was not affected.

4. Do you have any comments or feedback on the adequacy of the implemented remedy? Are all the right constituents included? Is the monitoring frequency adequate?

For all sites currently being monitored, the right constituents are included and monitoring frequencies are adequate per the approved LTM Plans.

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

No.

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FIVE-YEAR REVIEW QUESTIONNAIRE

Facility: Naval Support Facility, Indian Head

Site(s): Site 11-Caffee Road Landfill, Site 12-Town Gut Landfill, Site 17-Disposed Metal Parts Along Shoreline, Site 21-Bronson Road Landfill, Site 36-Cosed Landfill, Site 42-Olsen Road Landfill, Site 57-Building 292 TCE Contamination, Lab Area (Sites 14, 15, 16, 49, 50, 53, 54, 55)

Interviewee: Curtis DeTore

Agency/Title/etc: Maryland Department of the Environment Remedial Project Manager

Date: 6/19/12

Background

1. What effects have site operations had on the surrounding community or area?
None.
2. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
No.
3. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, give details.
No.
4. Are you aware of any recreational uses of the surface water, such as fishing, boating, or other casual uses?
No.
5. Are you aware of any intrusive activities being conducted on the cap or uses of the site other than monitoring or maintenance?
No.
6. Are you aware of any uses of the groundwater at or downgradient of the site?
No.

State and Local Considerations (Regulatory)

1. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.

The Navy satisfactorily communicates with this office regarding any issues related to these sites. Site visits are performed occasionally.

2. Have there been any complaints, violations, or other compliance issues related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

Site 57 (Building 292 TCE Spill) had an issue with food-grade emulsified vegetable oil infiltrating a storm sewer. Injections were halted, and a different technology was instituted (A-SOX diffusers). This change in the site remedy was discussed and approved by both the EPA and the MDE.

3. Have there been any changes in regulations or cleanup levels since implementation that may impact the site?

No.

Performance, Operation, and Maintenance Problems

1. Is the remedy functioning intended by the decision documents? How well is the remedy performing?

Yes. All remedies are performing to expected levels.

2. Describe the O&M staff and activities. If there is not a continuous on-site presence, describe the staff and frequency of site inspections and activities.

There is no O&M presence required for any site from this office.

3. Have there been any significant changes in the O&M requirements, operational adjustments, maintenance schedules, or sampling routines since start up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe the changes and impacts.

Yes. Frequency of sampling at Sites 12 and 42 were amended. This change was approved by the EPA and the MDE.

4. Do you have any comments or feedback on the adequacy of the implemented remedy? Are all the right constituents included? Is the monitoring frequency adequate?

The remedies are performing to expected levels, all appropriate constituents are included and the monitoring frequency is adequate.

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

No.