



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION III

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Philadelphia, Pennsylvania 19103-2029

Department of the Navy
Captain Ben Shevchuk, Commanding Officer
Naval Air Station
Bldg 409 Room 200
22268 Cedar Point Road
Patuxent River, MD 20670-1154

RE: 2013 Five-Year Review Report
Naval Air Station (NAS) Patuxent River
Patuxent River, Maryland

Dear Capt. Shevchuk:

Thank you for submitting the report, entitled *Five-Year Review Report, Naval Air Station Patuxent River, St. Mary's County, Maryland, Contract No. N62470-11-D-8012, CTO-JU16, NAVFAC Clean 8012 Program*, dated December 2013, to the United States Environmental Protection Agency (EPA) for review and concurrence. The report was prepared to address the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Section 121 (c), five-year review requirements for Naval Air Station Patuxent River National Priorities List site. EPA has reviewed this five-year review report and found it consistent with EPA's June 2001 guidance document, *Comprehensive Five Year Review Guidance* (OSWER No. 9355.7-03B-P, EPA 540-R-01-007). EPA made an independent determination that the remedies are protective based upon a review of aforementioned document on December 19, 2013, while waiting for the signed document which we received on March 26, 2014.

EPA concurs with the U.S. Navy's determination that the remedies for Sites 1 and 12 Operable Units (OUs) 1 and 2, Site 6 OU1, Site 17 OU1 and OU2, Site 11 OU1 and OU2, and Site 39 are protective of human health and the environment. In addition, remedy selected in the record of decision (ROD) at Site 5 was no further action (NFA) and the Site is protective. Furthermore, as part of this five-year review, EPA has evaluated the Government Performance and Results Act (GPRA) measures for this site and has determined the status is as follows:

Environmental Indicators

1. Human Health: Current Exposure Controlled.
2. Groundwater Migration: Groundwater Migration is Under Control.

The Site is anticipated to be Site-Wide Ready for Anticipated Use on December 30, 2020.


EPA recommends sampling for perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) at Site 14 Old Firefighting Burn Pad and Site 41 Fire Fighting Burn Pad due to previous activities that may have caused a release of these contaminants into groundwater.

EPA also recommends that the Navy consider sampling for polychlorinated dibenzodioxins (dioxins) at Site 1 Fishing Point Landfill, Site 4 Hermanville Disposal Site (Area 4C Trenches), and Site 41 Firefighting Burn Pad due to previous activities that may have caused a release of dioxin. EPA lowered the integrated risk information system (IRIS) level for dioxin in February 2012. The new oral reference dose (RfD) is 0.7 picograms per kilogram-day (pg/kg-day).

The requirement for this five-year review at NAS Patuxent River was triggered by the Remedial Action start date of December 23, 2003 for Sites 1 and 12 OU 1 (Soil), 6 OU 1 (Soil), 11 OU 1 (Soil), and 17 OU 1 (Soil). A previous five-year review report was completed on December 23, 2008. The next five-year review will be due December 23, 2018.

If you have any questions, please contact Paula Estornell, Chief of the NPL/BRAC Federal Facilities Branch at 215-814-5632 or S Andrew Sochanski at (215) 814-3370 or at sochanski.andy@epa.gov.

Sincerely,



Cecil Rodrigues, Director
Hazardous Site Cleanup Division

cc: S Andrew Sochanski (3HS11)
Rick Grills MDE FFD
Linda Gustafson, MDE FFD
David Steckler, PG NAVFAC
Skip Simpson, NAS

Final

Five-Year Review Report

**Naval Air Station Patuxent River
St. Mary's County, Maryland**

Contract Task Order JU16

December 2013

Prepared for

**Department of the Navy
Naval Facilities Engineering Command
Washington**

Under the

**NAVFAC CLEAN 8012 Program
Contract N62470-11-D-8012**

Prepared by



Chantilly, Virginia

2013 Five-Year Review Report

Naval Air Station Patuxent River
St. Mary's County, Maryland

December 2013

This report documents the 2013 Five-Year Review for the following sites at Naval Air Station Patuxent River with a Record of Decision for taking action: Sites 1 and 12 Operable Unit (OU) 1, Site 6/6A OU-1, Site 11 OU-1 and OU-2, Site 17 OU-1 and OU-2, and Sites 28, and 39. This review was conducted 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, Part 300.430(f)(4)(ii) of the Code of Federal Regulations.

Approved by:



Captain Ben Shevchuk, United States Navy
Commanding Officer
Naval Air Station Patuxent River

19 MAR 2014

Date



Kathryn A. Hodgkiss, Acting Director
Hazardous Site Cleanup Division
United States Environmental Protection Agency, Region III

4/25/2014

Date

Executive Summary

The Department of the Navy (Navy) conducted this Five-Year Review for Naval Air Station (NAS) Patuxent River in St. Mary's County, 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 United States Environmental Protection Agency (USEPA) *Comprehensive Five-Year Review Guidance* (USEPA, 2001), and summarizes the evaluation of remedies and remedial actions that resulted in hazardous substances, pollutants, or contaminants remaining at sites exceeding levels that allow for unlimited use and unrestricted exposure (UU/UE), and for which there is a Record of Decision (ROD) or Decision Document in place. The following sites have a ROD requiring a Five-Year Review:

- Site 1, Fishing Point Landfill, and Site 12, Landfill Behind Rifle Range Operable Unit (OU) 1
- Site 6/6A OU-1, Bohneyard Site
- Site 11 OU-1 and OU-2, Former and Current Sanitary Landfill
- Site 17 OU-1 and OU-2, Pest Control Shop (Building 841)
- Site 28, Transformer Storage Area
- Site 39, Waste Perchloroethylene (PCE) Storage Area (Building 503)

The objective of the Five-Year Review is to evaluate the effectiveness of the remedies to determine whether 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 and inspections. An interview with the base ER manager was completed on April 10, 2013 to document how the base maintains, protects, and enforces the land use controls (LUCs) at each ER site (Appendix A). The community was notified of the review process through a public notice in the **Tester** newspaper on March 14, 2013 and Restoration Advisory Board (RAB) meetings. The RAB members indicated there were no concerns for sites addressed by this Five-Year Review. The Five-Year Review report identifies any circumstance that may prevent a particular remedy from functioning as designed, or from providing sufficient protection of human health and the environment. The overall evaluation of the effectiveness of each remedy is presented as a protectiveness statement developed for each site, presented as follows.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Naval Air Station Patuxent River		
EPA ID: MD7170024536		
Region: 03	State: MD	City/County: Lexington Park/St. Mary's County
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	Has the site achieved construction completion? No	
REVIEW STATUS		
Lead agency: Other Federal Agency If "Other Federal Agency" was selected above, enter Agency name: United States Navy		
Author name (Federal or State Project Manager): Naval Facilities Engineering Command		
Author affiliation: United States Navy		
Review period: December 22, 2008 – December 22, 2013		
Date of site inspection: Multiple inspection dates		
Type of review: Statutory		
Review number: 4		
Triggering action date: December 22, 2008		
Due date (five years after triggering action date): December 22, 2013		

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:
No issues were identified during the Five-Year Review with respect to the protectiveness of any remedy.

Protectiveness Statement(s)
<i>Include each individual OU protectiveness determination and statement. If you need to add more protectiveness determinations and statements for additional OUs, copy and paste the table below as many times as necessary to complete for each OU evaluated in the FYR report.</i>

<i>Operable Unit:</i>	<i>Protectiveness Determination:</i>	<i>Addendum Due Date</i>
-----------------------	--------------------------------------	--------------------------

Sites 1 and 12 OU-1	Protective	(if applicable): Not Applicable
<i>Protectiveness Statement:</i> The remedy for Sites 1 and 12, OU-1 is currently protective of human health and the environment. The land use restrictions for OU-1 and the soil cover prevent direct contact with landfill wastes.		

<i>Operable Unit:</i> Site 6/6A OU-1	<i>Protectiveness Determination:</i> Protective	<i>Addendum Due Date (if applicable):</i> Not Applicable
<i>Protectiveness Statement:</i> The remedy for Site 6/6A OU-1 currently protects human health and the environment because the parking lot and soil and gravel covers over Site 6 combined with access and use restrictions prevents direct contact with contaminated soil.		

<i>Operable Unit:</i> Site 11 OU-1	<i>Protectiveness Determination:</i> Protective	<i>Addendum Due Date (if applicable):</i> Not Applicable
<i>Protectiveness Statement:</i> The remedy at Site 11 OU-1 is protective of human health and the environment under current and future conditions. The cap prevents direct contact with landfill wastes, and is effective at containing contaminants by preventing the infiltration of precipitation and subsequent generation of leachate as indicated by the decreasing rate of leachate flow since implementation of the remedy. LUCs are currently in place to restrict access and land use.		

<i>Operable Unit:</i> Site 11 OU-2	<i>Protectiveness Determination:</i> Protective	<i>Addendum Due Date (if applicable):</i> Not Applicable
<i>Protectiveness Statement:</i> The remedy for Site 11 OU-2 is protective of human health and the environment under current and future conditions because of the LUCs in place to restrict access and site use, including a restriction to prevent use of groundwater beneath and immediately downgradient of the landfill as a potable supply.		

<i>Operable Unit:</i> Site 17 OU-1	<i>Protectiveness Determination:</i> Protective	<i>Addendum Due Date (if applicable):</i> Not Applicable
<i>Protectiveness Statement:</i> The remedy for Site 17 OU-1 is protective of human health and the environment under current conditions, and exposure pathways that could result in unacceptable risks are being controlled. The remedy for Site 17 OU-2 is also protective of human health and the environment under current conditions, and exposure pathways that could result in unacceptable risks are being controlled.		

Operable Unit:
Site 28

Protectiveness Determination:
Will be Protective

*Addendum Due Date
(if applicable):*
Not Applicable

Protectiveness Statement:

The remedy for Site 28 will be protective of human health and the environment under current conditions, and exposure pathways that could result in unacceptable risks will be controlled or eliminated once the remedy has been implemented. If the remedy works as designed, the remedy will also be protective of human health and the environment under future conditions, and is expected to result in unrestricted use when the remedial action is completed.

Operable Unit:
Site 39

Protectiveness Determination:
Protective

*Addendum Due Date
(if applicable):*
Not Applicable

Protectiveness Statement:

The remedy, including LUCs, for Site 39 is protective of human health and the environment under current conditions, and exposure pathways that could result in unacceptable risks are being controlled.

Contents

Executive Summary	5
Acronyms and Abbreviations.....	xiii
1 Introduction.....	1-15
2 Five-Year Review Process	2-1
2.1 Administrative Components	2-1
2.2 Community Involvement	2-1
3 Background Information	3-1
3.1 Physical Characteristics.....	3-1
3.2 Land and Resource Use.....	3-1
3.3 History of Contamination and Initial Response	3-2
4 Site 1, Fishing Point Landfill and Site 12, Landfill Behind Rifle Range OU-1	4-1
4.1 Site Chronology.....	4-1
4.2 History and Background	4-2
4.2.1 Site History.....	4-2
4.2.2 Land and Resource Use	4-2
4.2.3 Contamination	4-3
4.2.4 Basis for Taking Remedial Action.....	4-3
4.3 Remedial Actions	4-3
4.3.1 Remedy Selection	4-3
4.3.2 Remedy Implementation	4-4
4.4 Progress Since Last Five-Year Review	4-6
4.4.1 Land Use Restrictions	4-6
4.4.2 Wetlands Mitigation	4-6
4.4.3 Data Review	4-7
4.4.4 Site Inspections.....	4-8
4.5 Technical Assessment	4-8
4.6 Technical Assessment Summary.....	4-9
4.6.1 Issues	4-9
4.6.2 Recommendations and Follow-up Actions.....	4-9
4.7 Protectiveness Summary	4-9
4.8 Next Review	4-9
5 Site 6/6A OU-1, Bohnyard Site	5-1
5.1 Site Chronology.....	5-1
5.2 History and Background	5-2
5.2.1 Site History.....	5-2
5.2.2 Land and Resource Use	5-2
5.2.3 Contamination	5-3
5.2.4 Basis for Taking Remedial Action.....	5-3
5.3 Remedial Actions	5-4
5.3.1 Remedy Selection	5-4
5.3.2 Remedy Implementation	5-5
5.4 Progress Since Last Five-Year Review	5-5
5.4.1 Land Use Restrictions	5-6
5.4.2 Site Inspections.....	5-6

5.5	Technical Assessment	5-6
5.6	Technical Assessment Summary.....	5-7
5.6.1	Issues	5-7
5.6.2	Recommendations and Follow-up Actions.....	5-7
5.7	Protectiveness Summary	5-7
5.8	Next Review	5-7
6	Site 11, Former and Current Sanitary Landfills, OU-1 and OU-2	6-1
6.1	Site Chronology.....	6-1
6.2	History and Background	6-2
6.2.1	Land and Resource Use	6-3
6.2.2	Contamination	6-3
6.2.3	Basis for Taking Remedial Action.....	6-3
6.3	Remedial Actions	6-4
6.3.1	Remedy Selection	6-4
6.3.2	Remedy Implementation	6-5
6.4	Progress Since Last Five-Year Review	6-6
6.4.1	Land Use Restrictions	6-6
6.4.2	Site Inspections.....	6-6
6.5	Technical Assessment	6-7
6.6	Technical Assessment Summary.....	6-7
6.6.1	Issues	6-7
6.6.2	Recommendations and Follow-up Actions.....	6-7
6.7	Protectiveness Summary	6-8
6.8	Next Review	6-8
7	Site 17 OU-1 and OU-2, Pest Control Shop (Building 841)	7-1
7.1	Site Chronology.....	7-1
7.2	History and Background	7-2
7.2.1	Land and Resource Use	7-2
7.2.2	Contamination	7-3
7.2.3	Basis for Taking Remedial Action.....	7-3
7.3	Remedial Actions	7-3
7.3.1	Remedy Selection	7-3
7.3.2	Remedy Implementation	7-4
7.4	Progress Since Last Five-Year Review	7-5
7.4.1	OU-1 Land Use Restrictions	7-5
7.4.2	OU-1 Site Inspections	7-5
7.4.3	OU-2 Land Use Restrictions	7-5
7.5	Technical Assessment	7-5
7.6	Technical Assessment Summary.....	7-6
7.6.1	Issues	7-6
7.6.2	Recommendations and Follow-up Actions.....	7-6
7.7	Protectiveness Summary	7-6
7.8	Next Review	7-6
8	Site 28 – Transformer Storage Area	8-1
8.1	Site Chronology.....	8-1
8.2	History and Background	8-1
8.2.1	Land and Resource Use	8-2
8.2.2	Contamination	8-2
8.2.3	Basis for Taking Remedial Action.....	8-2

8.3	Remedial Actions	8-3
8.3.1	Remedy Selection	8-3
8.3.2	Remedy Implementation	8-3
8.4	Progress Since Last Five-Year Review	8-3
8.5	Technical Assessment	8-3
8.6	Protectiveness Summary	8-3
8.7	Next Review	8-3
9	Site 39, Waste PCE Storage Area (Building 503)	9-1
9.1	Site Chronology.....	9-1
9.2	Background	9-1
9.2.1	Site History.....	9-1
9.2.2	Land and Resource Use	9-1
9.2.3	Contamination	9-2
9.2.4	Basis for Taking Remedial Action.....	9-2
9.3	Remedial Actions	9-3
9.3.1	Remedy Selection	9-3
9.3.2	Remedy Implementation	9-3
9.4	Progress Since last Five-Year Review	9-4
9.4.1	Land Use Restrictions	9-4
9.5	Technical Assessment	9-5
9.6	Technical Assessment Summary.....	9-5
9.6.1	Issues	9-5
9.6.2	Recommendations and Follow-up Actions.....	9-5
9.7	Protectiveness Summary	9-5
9.8	Next Review	9-5
10	Interim Remedial Action Sites	10-1
10.1	Site 3, Disposal Site near Goose Creek	10-1
10.2	Site 4, Hermanville Disposal Site	10-2
11	Administrative Closure – No Action and Desktop Evaluation Sites.....	11-1
11.1	Site 5 OU-5 and OU-6, Disposal Site Near Pine Hill Run	11-2
11.2	Site 6/6A OU-2, Bohneyard Site	11-3
11.3	Site 44, Fill Area	11-6
12	Other Sites	12-1
12.1	Site 2, Disposal Site near Pond 1	12-1
12.2	Site 9, Former Drum Disposal Area (Building 665)	12-2
12.3	Site 21, Sludge Drying Beds	12-3
12.4	Site 23, DPDO Salvage Yard Site (includes former Site 42, Former Coal Storage Area)	12-3
12.5	Site 31, Tire Shop (Building 307).....	12-4
12.6	Site 34, Drum Disposal Area	12-5
12.7	Site 42, Coal Disposal Area (Building 604)	12-6
12.8	Site 55, PCBs in Soil	12-7
12.9	Site 56, Abandoned Hazardous Waste UST	12-7
13	References	13-1

Appendix

- A Interview Questionnaire
- B Inspection Reports

Tables

- 1-1 Summary of Five-Year Review Status of NAS Patuxent River Sites
- 1-2 Summary of Recommendations and Follow-up Actions
- 4-1 O&M for Sites 1 and 12 OU-1
- 4-2 Annual O&M Costs, Sites 1 and 12, OU-1
- 4-3 Sites 1 and 12, OU-1, Issues Identified
- 4-4 Sites 1 and 12, OU-1, Recommendations and Follow-up Actions
- 5-1 Site 6 Issues Identified
- 5-2 Site 6 Recommendations and Follow-up Actions
- 6-1 Annual O&M Costs for Site 11
- 6-2 Site 11 OU-1 and OU-2 Issues Identified
- 6-3 Site 11 OU-1 Recommendations and Follow-up Actions
- 7-1 Site 17 OU-1 Issues Identified
- 7-2 Site 17 OU-1 Recommendations and Follow-up Actions
- 9-1 Site 39 Issues Identified
- 9-2 Site 39 Recommendations and Follow-up Actions
- 11-1 Summary of all NAS Patuxent River ER Sites that have been closed as of the 2013 Five-Year Review Period

Figures

- 1-1 Location of Naval Air Station Patuxent River
- 1-2 Locations of ER Sites
- 4-1 Operable Units at Sites 1 and 12
- 4-2 Sites 1 and 12 LUC Boundary
- 5-1 Operable Units at Sites 6 and 6A
- 5-2 Site 6 LUC Boundary
- 6-1 Operable Units at Site 11
- 6-2 Site 11 LUC Boundary
- 7-1 Operable Units at Site 17
- 7-2 Site 17 LUC Boundary
- 8-1 Site 28
- 9-1 Site 39
- 9-2 Site 39 LUC Boundary
- 10-1 Operable Units at Site 4

Acronyms and Abbreviations

3DME	3-D Microemulsion
ACM	asbestos containing material
AIMD	Aircraft Intermediate Maintenance Department
ARARs	applicable or relevant and appropriate requirements
ATSDR	Agency for Toxic Substances and Disease Registry
AWQC	ambient water quality criteria
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-term Environmental Action—Navy
COCs	constituents of concern
DCE	dichloroethene
DDESB	Department of Defense Explosive Safety Board
DDT	dichlorodiphenyltrichloroethane
DE	Desktop Evaluation
DPDO	Defense Property Disposal Office
DRMO	Defense Reutilization and Marketing Office
EE/CA	Engineering Evaluation/Cost Analysis
ER	Environmental Restoration
ERA	Ecological Risk Assessment
ESI	Expanded Site Investigation
ESS	Explosives Safety Submission
FFA	Federal Facilities Agreement
FFS	Focused Feasibility Study
FS	Feasibility Study
ft ²	square feet
ft ³	cubic feet
HHRA	Human Health Risk Assessment
HI	hazard index
IAS	Initial Assessment Study
ICs	institutional controls
IRI	Interim Remedial Investigation
LCS	leachate collection system
LTM	long-term monitoring
LUCs	land use controls
LUC RD	land use control remedial design
MCLs	Maximum Contaminant Levels
MDE	Maryland Department of the Environment
MEC	munitions and explosives of concern
METCOM	Metropolitan Commission Pine Hill Run Wastewater Treatment Facility
mg/kg	milligram per kilogram
NACIP	Navy Assessment and Control of Installation Pollutants
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command

Navy	Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOSSA	Naval Ordnance Safety and Security Activity
NPL	National Priorities List
NTCRA	non-time critical removal action
O&M	operation and maintenance
OU	operable unit
PAHs	polycyclic aromatic hydrocarbons
PAL	project action level
PCBs	polychlorinated biphenyls
PCE	tetrachloroethene or perchloroethylene
POL	petroleum, oil, and lubricant
ppm	part per million
PSs	performance standards
RAB	Restoration Advisory Board
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RFA	Resource Conservation and Recovery Act Facilities Assessment
RI	Remedial Investigation
ROD	Record of Decision
SSI	Site Screening Investigation
SVOCs	semivolatile organic compounds
TAL	Target Analyte List
TCE	trichloroethene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TRC	Technical Review Committee
TSCA	Toxic Substances Control Act
USEPA	United States Environmental Protection Agency
UST	underground storage tank
UU/UE	unlimited use and unrestricted exposure
µg/kg	microgram per kilogram
VC	vinyl chloride
VOC	volatile organic compound
yd ³	cubic yard

SECTION 1

Introduction

This document presents the results of the Five-Year Review under the Atlantic Division, Naval Facilities Engineering Command (NAVFAC) Comprehensive Long-term Environmental Action—Navy (CLEAN) Program, Contract No. N62470-11-D-8012, Contract Task Order JU16, as required 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). CH2M HILL has prepared this Five-Year Review Report on behalf of the Department of the Navy (Navy) for Naval Air Station (NAS) Patuxent River, St. Mary's County, Maryland (Figure 1-1), in accordance with the Comprehensive Review Guidance (USEPA, 2001).

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

TABLE 1-1
Summary of Five-Year Review Status of NAS Patuxent River Sites

NAS Patuxent River Environmental Restoration (ER) Site	Five-Year Review Status	Section Where Documented in this Five-Year Review Report
Site 1 Fishing Point Landfill and Site 12, Landfill Behind Rifle Range, Operable Unit (OU)-1	Five-Year Review required.	4
Site 6/6A, OU-1 – Bohnyard Site	Five-Year Review required.	5
Site 11 OU-1 and OU-2- Former and Current Sanitary Landfills	Five-Year Review required.	6
Site 17, OU-1 and OU-2– Pest Control Shop (Building 841)	Five-Year Review required.	7
Site 28 – Transformer Storage Area	Five-Year Review required.	8
Site 39 – Waste Perchloroethylene (PCE) Storage Area (Building 503)	Five-Year Review required.	9

NAS Patuxent River has elected to follow the Navy recommendation of conducting an installation-wide Five-Year Review to include all ER sites with remedies in place based on the remedy initiation trigger date for the first site. In accordance with the Navy-recommended procedure, a Five-Year Review is required 5 years from the initiation of the first remedial action that leaves hazardous substances, pollutants, or contaminants at a site exceeding 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 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 5 years after the 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 of CERCLA], 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.

United States Environmental Protection Agency (USEPA) interpreted this requirement further in the NCP at 40 CFR §300.430 (f)(4)(ii), which states:

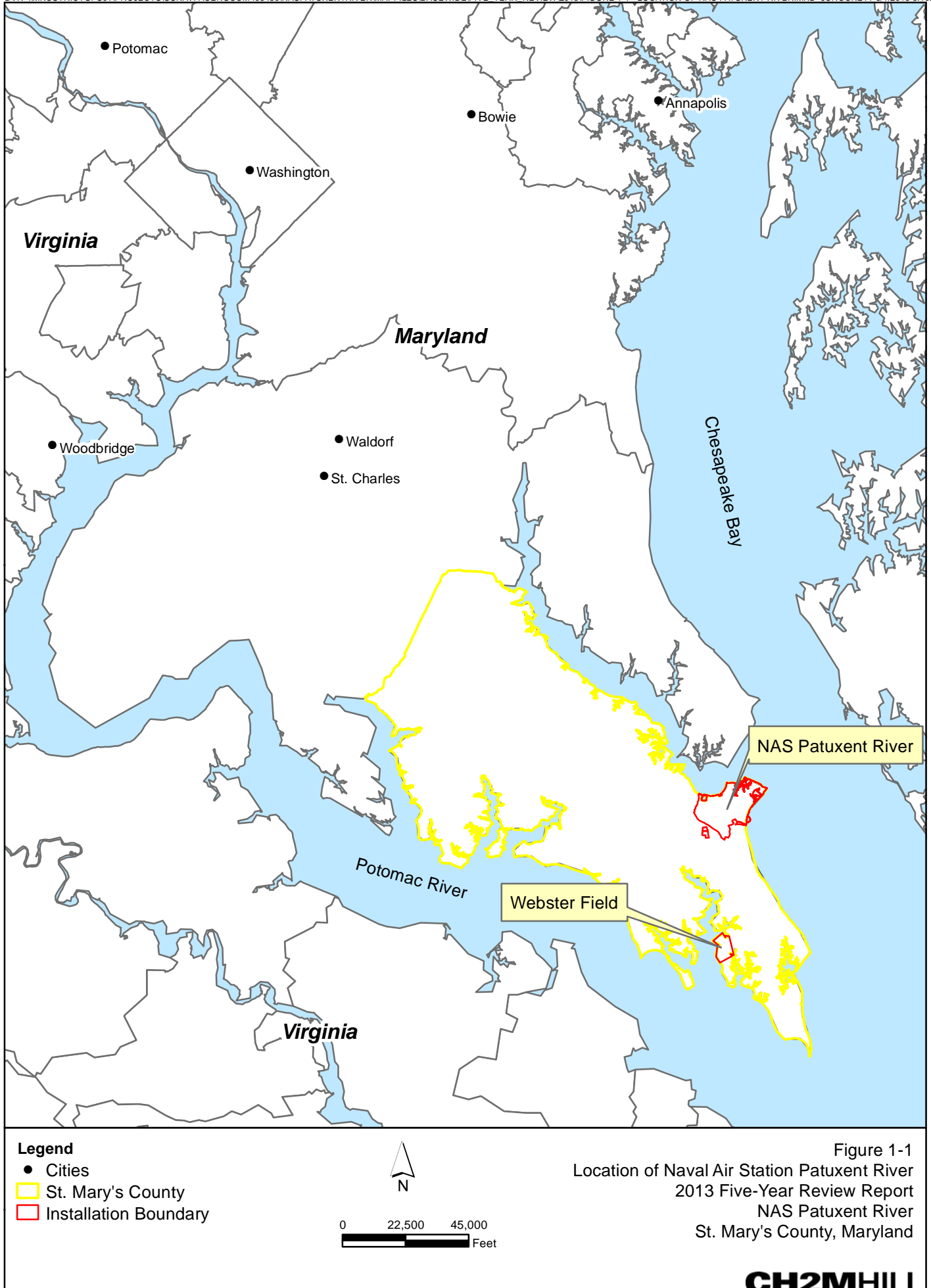
If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for [UU/UE], the lead agency shall review such action no less often than every 5 years after initiation of the selected remedial action.

The triggering action of the statutory review process was the remedial action for Site 11 OU-1, as described in the ROD signed by the Navy and USEPA on July 29, 1996. The first Five-Year Review was signed in July 2001, which was for Site 11 OU-1 and is the triggering action for the second Five-Year Review. The second Five-Year Review was signed on December 23, 2003, which is the triggering action for the third Five-Year Review, consistent with Section 1.1.3 of the *Comprehensive Five-Year Review Guidance* (USEPA, 2001). The third Five-Year Review was signed on December 23, 2008, which is the triggering action for this fourth Five-Year Review. This is the fourth Five-Year Review for NAS Patuxent River and was accomplished through a review of various reports and documents pertaining to post-remedy-implementation activities and findings, and through site visits and inspections. An interview with the base ER manager was completed on April 10, 2013 to document how the base maintains, protects, and enforces the land use controls (LUCs) at each ER site (Appendix A). The community was notified of the review process through a public notice in the **Tester** newspaper on March 14, 2013, and Restoration Advisory Board (RAB) meetings.

A summary of the recommendations and follow-up actions documented in this Five-Year Review is provided in Table 1-2.

TABLE 1-2
Summary of Recommendations and Follow-up Actions

Site	Issue	Recommendations/ Follow-up Actions	Party Responsible for Action	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
						Current	Future
No recommendations or follow up actions were identified in this Five Year Review							



Active Sites				
Site Number	Operable Unit	Site Name	Area (Acres)	Risk
2	OU-1	Disposal Site Near Pond 1	5.33	Medium
3		Disposal Site near Goose Creek	21.92	High
4		Hermanville Disposal Site	76.39	High
9		Former Drum Disposal Area Building 665	2.04	High
21		Sludge Drying Beds	2.47	Medium
23		DPDO Salvage Yard	5.28	Medium
28		Transformer Storage Yard	0.32	Medium
31		Tire Shop Building 307	1.47	High
34		Drum Disposal Area	6.92	High
55		PCBs in Soil/Sediment	Unknown	High
56		Abandoned Hazardous Waste UST	Unknown	High

Remedy in Place Sites				
Site Number	Operable Unit	Site Name	Area (Acres)	Risk
1	OU-1	Fishing Point Landfill	65.03	High
5	OU-5	Disposal Site Near Pine Hill Run	11.44	High
6	OU-1	Bohneyard	8.4	Medium
11	OU-1, OU-2	Former Sanitary Landfill	17.23	High
12	OU-1	Landfill behind Rifle Range	1.15	High
17	OU-1, OU-2	Pesticide Control Shop Building 841	1.63	High
28		Transformer Storage Yard	0.32	Medium
39		Waste PCE Storage Area Building 503	2.25	High

Response Complete Sites				
Site Number	Operable Unit	Site Name	Area (Acres)	Risk
1	OU-2	Fishing Point Landfill	65.03	High
4	OU-2	Hermanville Disposal Site	76.39	High
4	OU-3	Hermanville Disposal Site	76.39	High
4	OU-4	Hermanville Disposal Site	76.39	High
4	OU-6	Hermanville Disposal Site	76.39	High
5	OU-6	Disposal Site Near Pine Hill Run	11.44	High
6/6A	OU-2	Bohneyard	6.41	Medium
13	OU-2	PCB Transformer Spill Area Building 585	0.07	Medium
14		Old Fire Fighting Burn Pad	3.64	High
15		Former Washrack Drainage Way Building 110/111	1.27	Medium
16		Drainage Ditch Buildings 305/306	6.7	Medium
17		Pesticide Control Shop Building 841	1.63	High
18		Hobby Shop Building 415	0.5	Medium
19		Drainage Ditch Buildings 101/109	1.6	Medium
20		Battery Shop Building 158	0.05	Medium
22		Washrack and Bowser Buildings 115/201	0.29	Medium
24		Dry Well Building 114	0.01	High
25		Solvent Spills at Building 114	0.28	High
27		Construction Debris Disposal Area	7.43	High
29		Carbon Tetrachloride Disposal Area	2.05	High
30		Paint and Solvent Locker Building 863	0.03	Medium
35		Agricultural Area	1.51	Medium
36		Waste Battery Storage Building 214	0.003	Medium
37		Sand Blasting Area Building 214	0.001	Medium
38		Scrap Storage Building 1811	0.93	Medium
40		Construction Debris Landfill	0.009	Medium
41		Fire Fighting Burn Pad	11.83	High
42		Coal Disposal Area Building 604	5.28	Medium
43		Solid & Probable Liquid Waste Disposal Area	18.07	Medium
44		Fill Area	17.09	Medium
45		Disposal Area	2.01	Medium
46		Liquid Spill/Disposal Area	0.76	Medium
47		Dry Well Building 1354	0.008	High
48		Water Tower Building 519	0.04	High
49		Water Tower Building 520	0.02	High
50		Water Tower Building 521	0.02	High
52		Communication Towers	Unknown	Medium
53		Waste Flammable Storage Building 1811	0.005	Medium

Active IR Sites (High Risk)

Active IR Sites (Medium Risk)

Response Complete Sites

Remedy In Place Sites

Roads

Buildings

Base Boundary

Note: Communications Towers located throughout the base.

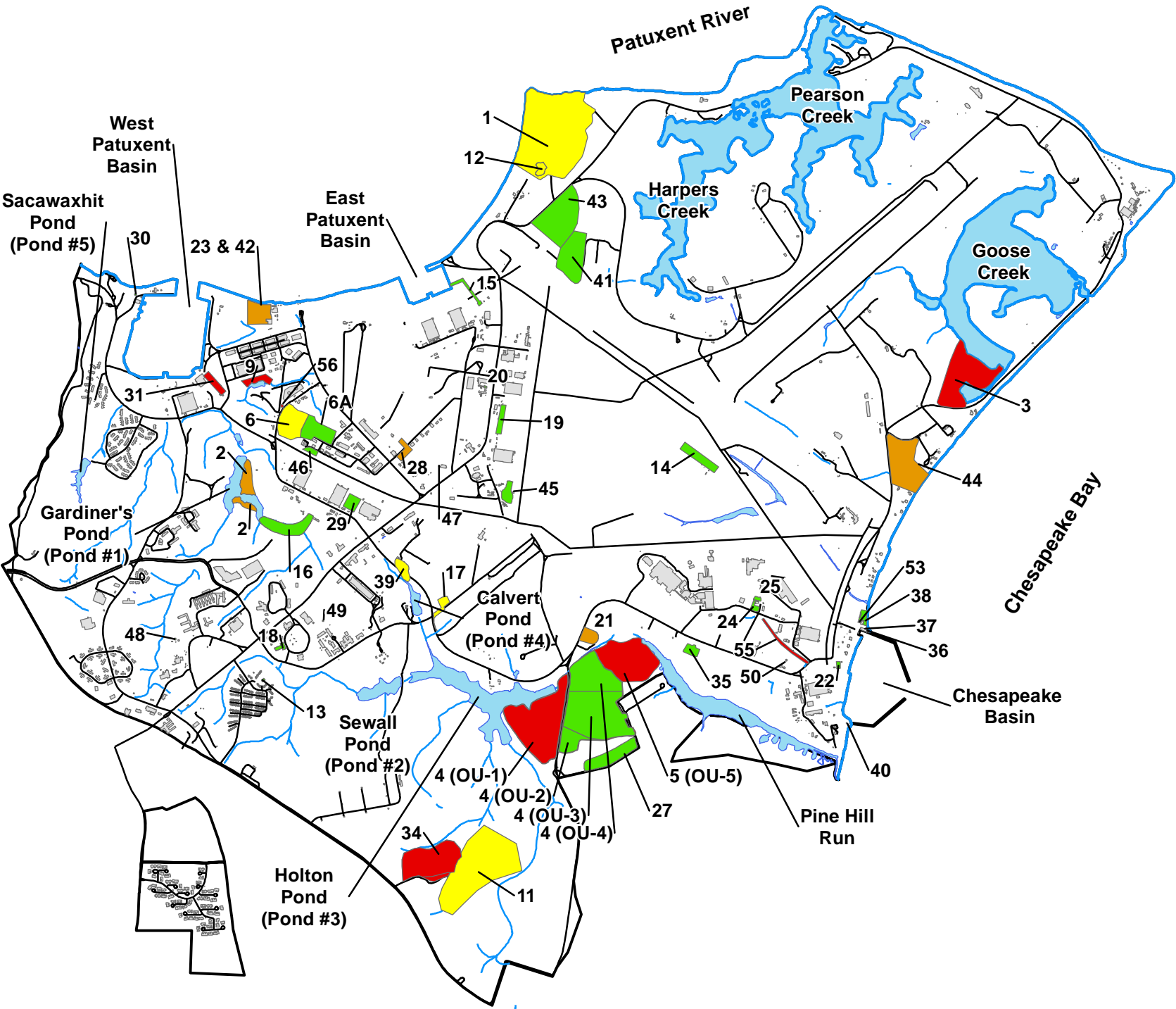


Figure 1-2
Locations of ER Sites
2013 Five-Year Review Report
NAS Patuxent River
St. Mary's County, Maryland

Five-Year Review Process

2.1 Administrative Components

NAS Patuxent River is a federal facility at which CERCLA activities are funded and implemented by the Navy under the Environmental Restoration Program. The Navy implements CERCLA at NAS Patuxent River in partnership with the MDE and USEPA.

The NAS Patuxent River Five-Year Review team is led by NAVFAC Washington, with assistance provided by CH2M HILL, the contractor to NAVFAC Washington that provides technical support for the NAS Patuxent River ER Program. Applicable data and documentation covering the period of the review were reviewed and evaluated. Information relevant to the ROD sites is presented in Sections 4 through 10. The Five-Year Review process included the following elements:

- Community involvement
- Document review
- Data review
- Site inspection
- Five-Year Review report preparation and review

2.2 Community Involvement

NAS Patuxent River initially established a Technical Review Committee (TRC), which is a smaller group with less extensive community membership than a RAB, to promote public participation in the ER process. The TRC was established in 1990 and served as the basis for the current RAB (CH2M HILL, 2008a).

The RAB was established in 1995 and is composed of community members as well as representatives of the Navy, MDE, and USEPA. The RAB meets quarterly to keep the community informed of environmental issues at NAS Patuxent River. The community was informed of the initiation of the Five-Year Review through a RAB meeting in 2013. Prior to this meeting, a public notice was published in the **Tester** newspaper for NAS Patuxent River on March 14, 2013, informing the public of the Five-Year Review. Community relations activities are documented in the Administrative Record. The Administrative Record is maintained in the following public repositories:

St. Mary's County Public Library
Lexington Park Branch
21677 FDR Boulevard
Lexington Park, MD 20653

Naval Air Station Patuxent River Library
22269 Cedar Point Road, Building 407
Patuxent River, MD 20629

Background Information

3.1 Physical Characteristics

NAS Patuxent River is located in St. Mary's County, Maryland, approximately 65 miles southeast of Washington, D.C. The facility encompasses approximately 7,350 acres, including both the primary NAS parcel on Cedar Point (6,500 acres), at the confluence of the Patuxent River and the Chesapeake Bay, and Webster Field Annex (850 acres), an outlying parcel in St. Inigoes located approximately 8 miles south of the NAS (Figure 1-1). Webster Field does not have any ER sites to be addressed under CERCLA. NAS Patuxent River is surrounded by a security fence and routinely patrolled, and access to the facility is through three manned security gates along or just off of Maryland State Highway 235.

NAS Patuxent River is bounded on the north, east, and southeast by more than 11.7 miles of shoreline, ranging from sandy beaches to tidal marshes. State Highway 235 and the town of Lexington Park, an unincorporated community, border the station to the west and southwest. The station has three seaplane basins, five man-made freshwater ponds, and three tidal creeks.

The station is located in the Patuxent River basin. The majority of the streams that drain NAS Patuxent River are intermittent and originate northwest of State Highway 235. Streams that originate on the facility remain within the facility boundaries and discharge into man-made ponds, the Patuxent River, or Chesapeake Bay. A few small intermittent streams discharge primarily to Harper Creek, Pearson Creek, or Goose Creek. Harper and Pearson Creeks discharge directly into the Patuxent River, which is estuarine, in the vicinity of the facility. Goose Creek and Pine Hill Run discharge directly into the Chesapeake Bay. Man-made structures, such as aircraft runways and the stormwater drainage system, affect surface water flow. The stormwater drainage system consists of concrete storm sewers that receive surface water and groundwater seepage from a network of shallow roadside ditches, culverts, sub-drains, storm drains and associated laterals, and natural streams. Discharge points for the stormwater drainage system include onsite ponds, the Patuxent River, and the Chesapeake Bay.

Three types of wetlands and four types of forest have been identified at the station. Forests cover approximately 30 percent of NAS Patuxent River, along with an estimated 11 percent covered by shrubs and young trees. Freshwater and saltwater marshes and open water habitat cover a little less than 8 percent of the facility.

3.2 Land and Resource Use

The primary mission of NAS Patuxent River is to serve as the Navy's principal research development, testing, evaluation, engineering, and fleet support activity for aircraft engines, avionics, aircraft support systems, and ship/ shore/air operations. Additionally, the station provides office space for the Naval Air Systems Command headquarters, the Naval Air Warfare Center Aircraft Division and more than 50 other tenant commands (CH2M HILL, 2008a).

Five man-made ponds located on the facility are used for recreational fishing and are periodically stocked. Due to historical detection of pesticides in Pond 3 (Holton Pond) downgradient of Site 17, the former Pest Control Shop, fish consumption limits have been introduced. Saltwater fishing occurs along the northern shoreline and seaplane basin walls. An effort to seed oyster beds in Harper Creek and Pearson Creek has been initiated, but harvesting oysters for human consumption currently is not allowed (CH2M HILL, 2003a).

Groundwater beneath the facility occurs in four principal aquifers, specifically the shallow water-table aquifer (within Upland and Lowland deposits), and three deeper confined aquifers (Piney Point-Nanjemoy, Aquia, and Patapsco). The Piney Point-Nanjemoy aquifer is a major source of potable water for residential users in southern Maryland. The Aquia aquifer, which is beneath the Piney Point-Nanjemoy aquifer, is the principal source of potable and industrial water for both NAS Patuxent River and local public water suppliers. The Patapsco aquifer is the deepest of the three confined aquifers, and NAS Patuxent River has drilled one water supply well into the Patapsco

aquifer. Operation of the Patapsco aquifer production wells has replaced some of the groundwater being withdrawn from the Aquia aquifer by NAS Patuxent River, thus reducing the overall regional groundwater demand on the Aquia aquifer.

Anticipated land and resource use at NAS Patuxent River is not expected to change in the foreseeable future. As a result of the Department of Defense Base Realignment and Closure initiative in the 1990s, NAS Patuxent River has grown dramatically due to the relocation of various military activities from closed bases to the NAS.

3.3 History of Contamination and Initial Response

Commissioned in 1943, NAS Patuxent River has provided support for flight test operations, research and development testing, air and ground test evaluations, aircraft logistics, and maintenance management for Navy aviation and other branches of the armed services. The historical land uses and practices at NAS Patuxent River have resulted in localized areas of potential or confirmed contamination of soil, groundwater, surface water and/or sediment. Environmental restoration activities began in 1984 and were modified in 1986 to reflect the requirements of CERCLA. NAS Patuxent River was added to the National Priorities List (NPL) on June 30, 1994, based on a Hazard Ranking System score of 36.87. The Federal Facilities Agreement (FFA) between the Navy and the USEPA was signed December 2000 (Department of the Navy and USEPA Region III, 2000).

SECTION 4

Site 1, Fishing Point Landfill and Site 12, Landfill Behind Rifle Range OU-1

To efficiently manage remedial action priorities, Site 1 (Fishing Point Landfill) and Site 12 (Landfill Behind Rifle Range) were divided into two OUs as follows:

- OU-1 consists of soil and groundwater at Sites 1 and 12, and surface water and sediment in the Patuxent River adjacent to Site 1
- OU-2 consists of surface water and sediment in the marsh also known as Area E, which is located to the south of the Site 1 landfill and west of the Site 12 landfill

The ROD for OU-1 addresses remedies for contaminated soil and groundwater, which further subdivides the OU-1 site into areas designated as A, B, C, D, and F and surface water and the sediment in the adjacent Patuxent River (CH2M HILL, 2012a). The ROD for OU-2 addresses remedies for contaminated surface water and sediment in the marsh (Area E) (NAVFAC Washington, 2005a). The Sites 1 and 12 investigation area was split into two OUs after investigation of the landfills was completed and a remedy was selected (a landfill cover). This decision was made because the marsh contains a different contaminated medium (sediment) than the landfill area and required further study to quantify the potential ecological risks and assess the need for remedial action. The remedy for OU-2 has been completed and is discussed in Section 12.1.

Sites 1 and 12 and associated areas are shown on Figure 4-1. The history of Sites 1 and 12, discussion of the remedial actions, rationale and implementation, technical assessment, issues, recommendations, and protectiveness statements are presented herein.

4.1 Site Chronology

The chronology of Sites 1 and 12, OU-1 is summarized as follows.

Date	Event
mid-1950s-1960	Site 12 Landfill active (CH2M HILL, 2012a)
1960-1974	Site 1 Landfill active (NAVFAC Engineering Field Activity Chesapeake, 1999)
1984	Sites 1 and 12 included in the Initial Assessment Study (IAS) conducted at NAS Patuxent River. A confirmation study was recommended for Site 1; however, no confirmation study was recommended for Site 12 due to the inert nature of material disposed at that site (CH2M HILL, 2012a).
1985-1987	A Navy Assessment and Control of Installation Pollutants (NACIP) Program confirmation study was conducted at Site 1. Additional sampling was recommended for Site 1 due to the potential for contamination from the site to pose a hazard to human health or the environment (CH2M HILL, 2012a).
1989	Resource Conservation and Recovery Act Facilities Assessment (RFA) conducted by USEPA to assess the waste handling and disposal practices at various areas of the NAS (A.T. Kearney, Inc., and Earth Technology Corporation, 1989)
July 1991	Interim Remedial Investigation (IRI) conducted at Site 1 (CH2M HILL, 1994)
June 1992	Analysis of interim action alternatives to stabilize the eroding north shoreline of the landfill conducted by University of Maryland (University of Maryland, 1992)
1993	Shoreline protection program initiated at Site 1 as an interim remedial action to prevent landfill wastes from being washed into the Patuxent River (CH2M HILL, 2012a)
1998-1999	Remedial Investigation (RI)/Feasibility Study (FS) conducted for Sites 1 and 12. Soil and groundwater sampled as recommended in the IRI. FS evaluated two alternatives for capping the landfill (NAVFAC Engineering Field Activity Chesapeake, 1999; CH2M HILL, 1998).
November 1998	A Supplemental Ecological Risk Evaluation for Sites 1 and 12 conducted to refine the risk estimates from the screening Ecological Risk Assessment (ERA) (CH2M HILL, 2012a)

Date	Event
February 2000	ROD for OU-1
April 3, 2000	Start of remedial action and construction of soil cover for Site 1 and Site 12 OU-1
October 31, 2001	Remedial action and construction of soil cover completed for both Site 1 and Site 12; wetland mitigation component of ROD was initiated in 2002 and completed in 2004, followed by wetland monitoring to ensure survival.
December 2001 - present	Long-term monitoring (LTM) of groundwater at Sites 1 and 12 conducted in accordance with the "Post-Closure Plan for Site 1- Fishing Point Landfill and Site 12-Rifle Range Landfill" (CH2M HILL, 2001a)
March 20, 2002	Remedial construction closeout report for OU-1 submitted to USEPA
2004	Passive landfill gas vent system deemed unnecessary due to the low volume of gas produced by the landfill. Perimeter landfill gas monitoring was conducted to verify that complete closure of the landfill gas vent system will not result in offsite transport of landfill gas.
2008	Documentation of LUCs completed for OU-1
July 2011	Revised Final LUC Remedial Design for OU-1 completed

4.2 History and Background

Site 1 (Figures 4-1 and 4-2) occupies approximately 65 acres and is located along the shoreline of the Patuxent River in the northern portion of the station, upstream from the confluence of the Patuxent River and the Chesapeake Bay. Site 12 occupies approximately 2.6 acres and is located between the old rifle range and Fishing Point Landfill (Site 1), south of the Patuxent River on the northern portion of the NAS.

Area E abuts the Fishing Point Landfill and the Landfill behind the Rifle Range (Sites 1 and 12, respectively), which are shown on Figure 4-1. Figure 4-2 illustrates the specific location of Area E relative to Site 12 and the upgradient former rifle range.

4.2.1 Site History

Site 1 was in operation from 1960 through 1974 (NAVFAC Engineering Field Activity Chesapeake, 1999). An estimated 54,350 tons of solid waste and 120 gallons of liquid waste were reportedly disposed at the site. Liquid wastes deposited at the landfill consisted primarily of liquid-soaked rags and liquid residue in cans. Solid waste included petroleum, oil, and lubricant (POL) products, construction debris, sewage treatment plant sludge, paints, paint thinners, solvents, antifreeze products, photographic laboratory wastes, pesticides, miscellaneous station wastes, and residue from the open burning of various liquid wastes. Disposal operations consisted of land filling waste material in 10-foot lifts along a 50-foot working face (CH2M HILL, 2012a). In 1990, approximately 6 inches of wastewater treatment plant sludge from St. Mary's County was applied to Area F, the hillside located east of Site 1, as approved by the State of Maryland (CH2M HILL, 2012a).

Site 12 was in operation from the mid-1950s to 1960 (CH2M HILL, 2012a). The site was used as an alternate disposal site during the same period the Hermanville Disposal Area (Site 4) was being used as the main disposal area. Trash and construction debris were deposited at the site. Prior to completion of the OU-1 remedy, the landfill was not officially closed under State of Maryland solid waste regulations; however, a minimal soil cover was added on top of the waste materials (NAVFAC Engineering Field Activity Chesapeake, 2000).

4.2.2 Land and Resource Use

Sites 1 and 12 were historically used for disposal operations. Current use of the site consists of military training and limited recreational use (CH2M HILL, 2007a). Land use restrictions have been implemented to prevent intrusive activities and future residential development within the landfill boundaries, and to prohibit usage of groundwater beneath the closed landfill (CH2M HILL, 2011a).

Groundwater under Sites 1 and 12 is not used as a drinking water source. Groundwater contained in the surficial aquifer beneath the site would experience brackish water intrusion if pumped routinely, making water withdrawn

from the aquifer non-potable. Because St. Mary's County prohibits installation of drinking water wells within the surficial aquifer, it is anticipated that groundwater beneath Sites 1 and 12 will not be used as a future drinking water source (NAVFAC Engineering Field Activity Chesapeake, 2000). The future land use (military training and limited recreational), absence of groundwater resource uses, and LUCs are anticipated to remain unchanged.

4.2.3 Contamination

Based on previous site investigation and RI findings (CH2M HILL, 1998), waste materials disposed at Sites 1 and 12 have impacted groundwater, marsh surface water, and marsh sediment. The investigations at Sites 1 and 12 were developed using USEPA's guidance on presumptive remedies for municipal landfills. The investigations to characterize the landfills focused on media impacted by the migration of any contamination from the landfill waste.

Groundwater

Concentrations of several analytes detected in groundwater exceeded federal Maximum Contaminant Levels (MCLs) for drinking water. For samples from the 19 groundwater monitoring wells sampled during the RI, four detected metals (antimony, cadmium, nickel, and thallium) and one volatile organic compound (VOC) (chlorobenzene) exceeded MCLs. However, as indicated previously in Sec. 4.2.2, groundwater at Sites 1 and 12 cannot be used as a drinking water source because the surficial aquifer beneath the site would experience brackish water intrusion if pumped routinely, making water withdrawn from the aquifer non-potable. Furthermore, St. Mary's County prohibits installation of drinking water wells within the surficial aquifer (NAVFAC Engineering Field Activity Chesapeake, 2000).

Soil

During the RI (CH2M HILL, 1998), surface soil samples were collected around the Fishing Point and Rifle Range landfills, primarily in Area F. Samples of waste material in the landfills were not analyzed for chemical constituents, since contamination in the landfills was assumed to exist throughout the landfill footprints. This approach is consistent with the use of a presumptive remedy for municipal landfills, and the entire landfill site was covered with soil to prevent contact with materials presumed to be contaminated.

4.2.4 Basis for Taking Remedial Action

The basis for taking action for Sites 1 and 12 OU-1 was exposure to landfill debris that could pose a physical hazard to recreational users, trespassers, and environmental receptors.

4.3 Remedial Actions

Disposal activities at the Sites 1 and 12 landfills primarily impacted soil, groundwater, and sediment in the vicinity of these sites (CH2M HILL, 2012a). The remedial actions for OU-1 at Sites 1 and 12 addressed soil and groundwater impacts to Areas A, B, C, and F, and surface water and sediment for Area E and the adjacent Patuxent River are presented herein.

4.3.1 Remedy Selection

The ROD for NAS Patuxent River Sites 1 and 12 OU-1 was signed by the Navy and USEPA on February 8, 2000. The interim remedial action objectives (RAOs) were to:

- Protect human health and the environment
- Comply with all applicable or relevant and appropriate federal and state environmental laws and regulations
- Be cost-effective
- Use permanent solutions and alternative treatment technologies or resource-recovery technologies to the maximum extent practicable
- Prevent or minimize direct contact of human and ecological receptors with landfill contents and surface soil within the landfill boundaries, and with surface debris in the adjacent areas

- Prevent surface water run-on, control surface water runoff, and minimize erosion within the Site 1 and Site 12 landfill boundaries
- Enhance ecological habitat through re-vegetation
- Reduce further migration of contamination from the landfill to the groundwater and surface water

The remedy selected for Sites 1 and 12 OU-1 offered the best balance of the nine NCP criteria based on available information and the understanding of site conditions. The remedy reduced the potential risk to human health and the environment associated with surface soils and subsurface soils at the sites. The remedy also provides effective source control and reduces the potential for contaminant migration. The main components of the selected remedial action for OU-1 consisted of:

- Placing a soil cover (minimum 2-foot thickness) over the waste disposal areas of Site 1 (the Fishing Point Landfill) and Site 12 (the Rifle Range Landfill) with appropriate design to enhance runoff and minimize erosion of the cover
- Shoreline stabilization
- Land use restrictions
- Mitigation for emergent wetlands that were adversely impacted during construction of the soil cover
- LTM
- Maintenance of the stormwater management system, vegetation cover, and erosion control structures

4.3.2 Remedy Implementation

The Remedial Design (RD) for the site was initiated in April 2000 and completed in October 2001. A summary of remedial activities is presented in the remedial construction closeout report (OHM, 2002).

Documentation of LUCs for Sites 1 and 12 OU-1 that prohibit residential use of the site, digging or any other intrusive activity on the landfill cover, and all use of groundwater from the site, has been completed (CH2M HILL, 2011a). LUCs will be verified by the Navy through annual inspections.

Since the intended future use of Sites 1 and 12 is as a recreational area, there are no fences or gates erected to prohibit access by authorized personnel or the general public. However, base personnel responsible for base and airfield security have responsibility for monitoring and preventing physical disturbance of the site, and restricting vehicular traffic to the designated roadways (CH2M HILL, 2008b). Details of the implementation and reporting requirements for Site 1 and 12 LUCs are documented in the land use control remedial design (LUC RD) (CH2M HILL, 2011a). The LUC boundary for Sites 1 and 12 is shown on Figure 4-2.

NAVFAC Washington retains the responsibility for overseeing the administrative and substantive requirements of the Post Closure Plan for Site 1 and Site 12 (CH2M HILL, 2001a) to ensure that the plan is being implemented. In the past, all official correspondence with the USEPA and MDE, including submission reports, was generated by NAS Patuxent River, however, in the future NAVFAC Washington will assume this responsibility as a result of Navy reorganization of organizational responsibilities. The O&M will be conducted in accordance with the approved Post-Closure Plan for Site 1 and Site 12 (CH2M HILL, 2001a) and the Sites 1 and 12 Post-Closure O&M Manual (CH2M HILL, 2008b). A summary of the O&M to be performed, as well as its frequency and duration, is presented in Table 4-1.

TABLE 4-1
O&M for Sites 1 and 12 OU-1

Site Area	Activities to be Performed	Frequency	Duration (after Remedial Action)
1 and 12	Site inspection including final cover; cover drainage system; drainage structures; permanent survey benchmarks; signage; roadways; parking areas, walkways, and stairways; steep natural bluff area on the northeast corner; shoreline located along north and west side; and visual inspection of all groundwater monitoring wells (CH2M HILL, 2008b)	Semi-annually in the spring and autumn	2008 and beyond.
	Vegetative Cover Maintenance - Mowing and "haying" of grasses over landfill cap and (CH2M HILL, 2008b)	Once a year and only 1/3 of site. (Note: mowing will not be conducted during the nesting season – April 15 through July 30)	2008 and beyond.
	Erosion-Related Maintenance – Filling and regarding of erosion damaged landfill cover areas; repairing cover areas that have settled, subsided, or been displaced; regrading of runoff control structures; and shoreline stabilization (CH2M HILL, 2008b)	As needed	2008 and beyond.
	Groundwater monitoring (CH2M HILL, 2008b)	Selected Target Analyte List (TAL) total metals (arsenic, cadmium, aluminum, barium, chromium, iron, lead, manganese, and vanadium) every 15 months beginning January 2006	2008 and beyond.
	Groundwater monitoring (CH2M HILL, 2008b)	Target Compound List (TCL) VOCs, TCL semi-volatile organic compounds (SVOCs), TCL pesticides/PCBs, TAL total and dissolved metals and cyanide every 5 years	Once every 5 years, next event is scheduled for January 2015.
		All LTM data for each Five-Year Review period will be evaluated every 5 years	Once every 5 years, next event is scheduled for January 2015.
	Landfill Gas Vent Monitoring	Discontinued as of June 2006	No longer applicable

O&M costs have exceeded the original estimate of \$153,000 annually, but the additional costs are attributed to an increase in the frequency of monitoring and conducting optimization studies. Table 4-2 presents annual O&M costs to date for the site (excludes LTM costs).

TABLE 4-2
Annual O&M Costs, Sites 1 and 12, OU-1

Year	Total Cost (rounded to the nearest \$100)
2001	\$225,000
2002	\$268,000
2003	\$268,000
2004	\$268,000
2005	\$268,000
2006	\$268,000
2007	\$268,000

TABLE 4-2
Annual O&M Costs, Sites 1 and 12, OU-1

Year	Total Cost (rounded to the nearest \$100)
2008	NA
2009	NA
2010	\$21,000
2011	\$19,000
2012	\$12,000

In addition, a routine sampling and analysis plan for groundwater and gas vents was implemented. The results of the gas vent monitoring provided data to support closing the remaining gas vents

4.4 Progress Since Last Five-Year Review

Two issues were identified for OU-1 during the 2008 Five-Year Review (CH2M HILL, 2008d), specifically to conduct and document semi-annual site inspections, and to submit annual LUC inspection reports to USEPA and MDE. These administrative issues were not considered by the Navy to warrant a finding that the remedy was not protective as long as corrective actions were implemented in a timely manner with respect to these issues. Semi-annual site inspections have been documented since 2008.

The Sites 1 and 12 Post-Closure O&M Manual was completed in 2008 after completion of the OU-2 remedial action, so corrective action was implemented in accordance with the manual to address the lack of proper documentation for site inspections.

Additional recommendations for OU-1 identified during the 2008 Five-Year Review included the following:

- Initiate and maintain a permanent log of all semi-annual site inspections using the Post-closure Inspection Log developed for the Sites 1 and 12 Post-Closure O&M Manual
- The semi-annual site inspections were recorded using the Post-closure Inspection Logs and documented in the Post-closure Monitoring Reports.
- Submit annual LUC inspection report as set forth in the LUC Implementation Plan for Site 1 and Site 12
- The LUC inspections were completed using the Annual LUC Inspection Checklists according to the LUC RD (CH2M HILL, 2011a) starting in 2011 and submitted annually to EPA and MDE.

4.4.1 Land Use Restrictions

Land use restrictions for OU-1 have been implemented and documented (CH2M HILL, 2011a). The land use restrictions for OU-1 prohibit residential use of the site, digging or any other intrusive activity on the landfill cover, and all use of groundwater from the site. The LUC implementation actions include annual site inspections, submittal of an annual LUC inspection report to the USEPA and MDE, and CERCLA Five-Year Reviews of the OU-1 LUCs.

4.4.2 Wetlands Mitigation

The wetland compensation component of the OU-1 ROD was completed in October 2004. A 5-year wetland monitoring program began in 2005 to monitor the condition of the wetland constructed at Site 5 as mitigation for the wetlands destroyed by implementation of the Sites 1 and 12 remedy. After 5 years of monitoring, 100 percent of the site was vegetated with planted and/or native wetland species. The soils were generally saturated throughout the profile, and inundation occurred in low-lying areas of the wetland. Therefore, vegetative cover and hydrology criteria established for the mitigation Monitoring Plan were met, and the mitigation site successfully achieved the stated performance goals (CH2M HILL, 2010a).

4.4.3 Data Review

Long-term Monitoring

As documented in the original Post-Closure Plan for Site 1 and Site 12 (CH2M HILL, 2001a), two components of the remedial action for Sites 1 and 12 were landfill gas and groundwater monitoring. The Post-closure Plan detailed long-term O&M for the sites. Since the 2008 Five-Year Review and as documented in the current O&M manual (CH2M HILL, 2008b), several of these monitoring requirements have been modified and are described herein.

Landfill Gas Monitoring

A routine sampling and analysis plan for gas vents was implemented. Qualitative monitoring of landfill gas was conducted from May 2001 until April 2002. The results of this monitoring indicated that 15 landfill gas vents did not produce any landfill gas. Based on this information, in August 2002, the USEPA and MDE agreed that 15 of the 23 gas vents used to vent methane gas from the landfill could be closed. The Navy agreed to conduct 1 year of additional monitoring for the remaining gas vents using quantitative monitoring procedures to conduct a more thorough evaluation of methane off-gassing before making decisions regarding the closure of the remaining eight gas vents.

In 2004, the remaining vents for the passive landfill gas vent system were deemed to be unnecessary due to the low volume of gas produced by the landfill (CH2M HILL, 2005a). Subsequently, the eight remaining vents were closed in 2005 (CH2M HILL, 2008b). Perimeter landfill gas monitoring was conducted to verify that complete closure of the landfill gas vent system would not result in offsite transport of landfill gas.

Groundwater Monitoring

In accordance with the Post-Closure Plan for Site 1 and Site 12, quarterly groundwater monitoring was conducted at Sites 1 and 12 from 2001 to 2003. A trend analysis of available groundwater monitoring data (a total of seven monitoring events) was performed in early 2004 to track constituent concentrations over time for the purpose of modifying the groundwater monitoring plan. The results of the trend analysis are documented in a technical memorandum (CH2M HILL, 2004a). Based on the results of the trend analysis, the USEPA and MDE agreed to the following modifications of the groundwater monitoring program:

- SVOCs, pesticides, and PCBs were eliminated from the suite of analyses performed during future groundwater LTM events because these constituents either were not detected during the seven rounds of groundwater monitoring, or were detected only sporadically and were not reproducible.
- VOCs were eliminated from further monitoring since vinyl chloride (VC) was detected only in well (1MW-03AR) at concentrations slightly exceeding the VC MCL for groundwater, and there was no substantial change in VC concentrations during the LTM conducted from 2001 to 2003. Furthermore, the well (1MW-03AR) where VC has been detected is within the boundary of the landfill and, therefore, samples from this well do not represent groundwater conditions beyond the downgradient limit of the landfill.
- The list of metals for monitoring was reduced to only those metals that exceeded screening criteria (arsenic and cadmium), and those metals (aluminum, barium, chromium, iron, lead, manganese, and vanadium) that have had a significantly increasing trend based on the 2001 to 2003 data and could pose a future potential risk due to toxicity.
- Sample for total metals only during the first three groundwater monitoring events conducted every 15 months during each Five-Year Review period since the results for the total and the dissolved metal samples were not significantly different and particulate loading did not appear to be a problem. (TAL total and dissolved metals and cyanide will continue to be sampled during the last [4th] groundwater monitoring event for each Five-Year Review period.)

- Monitoring wells within the landfill boundary (1MW-01AR, 1MW-01BR, 1MW-03AR, 1MW-03BR, 1MW-07A, and 1MW-07B) were eliminated from the monitoring program.
- The monitoring frequency was modified to be conducted every 15 months to provide data on seasonal variations and to confirm the existing trends observed for groundwater quality.

In accordance with the final Sites 1 and 12 Post-Closure O&M Manual (CH2M HILL, 2008b), four rounds of groundwater sampling has occurred in the last 5 years at Sites 1 and 12. Sampling occurred in April 2008, August 2009, December 2010, and February 2012. At Site 1, monitoring well PX-S01-MW-02R has historically contained arsenic concentrations greater than the federal MCL. However, arsenic concentrations in this well have decreased steadily during the past last 11 years. All other monitoring well concentrations at Sites 1 and 12 were less than federal MCLs. The next groundwater monitoring event was recently completed in November 2013.

4.4.4 Site Inspections

With completion of the final Sites 1 and 12 Post-Closure O&M Manual, annual O&M site inspections have occurred since 2008 and have been documented as specified in the plan. Since 2011 annual LUC inspections by the ER manager have been performed and documented according to the LUC RD (CH2M HILL, 2011a). The purpose of the site inspections is to ensure that the soil cover integrity, vegetation, and run-on and run-off controls are maintained.

4.5 Technical Assessment

Question A: Is the remedy functioning as intended by the decision document?

Review of documents, applicable or relevant and appropriate requirements (ARARs), risk assumptions, and site inspections demonstrate that the soil cover placed at Sites 1 and 12 is functioning to prevent direct exposure with landfill debris as intended by the ROD. Implementation of LUCs effectively prevents breach of the soil cover, and inspections ensure the soil cover integrity is maintained. LUC objectives are to prohibit residential use of the site, digging or any other intrusive activity on the landfill cover, and all use of groundwater at the site.

The LUCs have been effective to date. Site access is allowed for limited recreational use and military activities associated with helicopter training, and all signage is in place in accordance with the O&M manual. Upgrades or termination of activities may be warranted if recreational or military use results in degradation of access roads or parking areas on the soil cover.

As previously discussed, monitoring of gas vents was discontinued in 2006 and the remaining vents were closed.

Site 1 and Site 12 gas monitoring and LTM have been reduced from an initial annual estimate of approximately \$56,000 to approximately \$12,800 per year. The reduction in these monitoring costs is mainly due to the fact that the landfill gas monitoring has been terminated, and the groundwater monitoring program has been reduced substantially by reductions in the number of monitoring wells, laboratory analyses for each sample, and frequency of sampling. All monitoring wells used in the monitoring program are intact and functioning properly.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

Since execution of the OU-1 ROD, the physical conditions of Sites 1 and 12 have not changed in any manner that would negatively affect the protectiveness of the remedy. The exposure assumptions, toxicity data, cleanup levels, and RAOs are still valid based on the remedy evaluation for data in existing documents, and the applicable federal MCLs for the constituents of concern (COCs) have not changed. The remedy is in compliance with the ARARs. Minor repairs have periodically been made to the soil cover as needed since the 2003 Five-Year Review to ensure the integrity of the soil cover. These repairs consisted of activities necessary to maintain the roads as a result of vehicle traffic associated with recreational use of the landfill.

The Human Health Risk Assessment (HHRA) presumed unacceptable risks for exposure to landfill materials. There have been no changes to the RAOs, exposure assumptions, and comparison criteria, which was relied upon to select a soil cover remedy. 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, Sites 1 and 12 will continue to be subject to the requirement for Five-Year Reviews.

Question C: Has any other information come to light that could question the protectiveness of the remedy?

No new information has come to light that would question the protectiveness of the remedy for OU-1.

4.6 Technical Assessment Summary

The remedy for media of OU-1 is protective of human health and the environment and is functioning as intended by the OU-1 ROD. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy in this area. There have been no relevant changes in the toxicity factors for the COCs that were used in the risk assessments, and there has been no change to the standardized risk assessment methodology that could affect the assessment of protectiveness of the remedy.

4.6.1 Issues

TABLE 4-3

Sites 1 and 12, OU-1, Issues Identified

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
No issues identified for Sites 1 and 12 OU-1	N	N

4.6.2 Recommendations and Follow-up Actions

TABLE 4-4

Sites 1 and 12, OU-1, Recommendations and Follow-up Actions

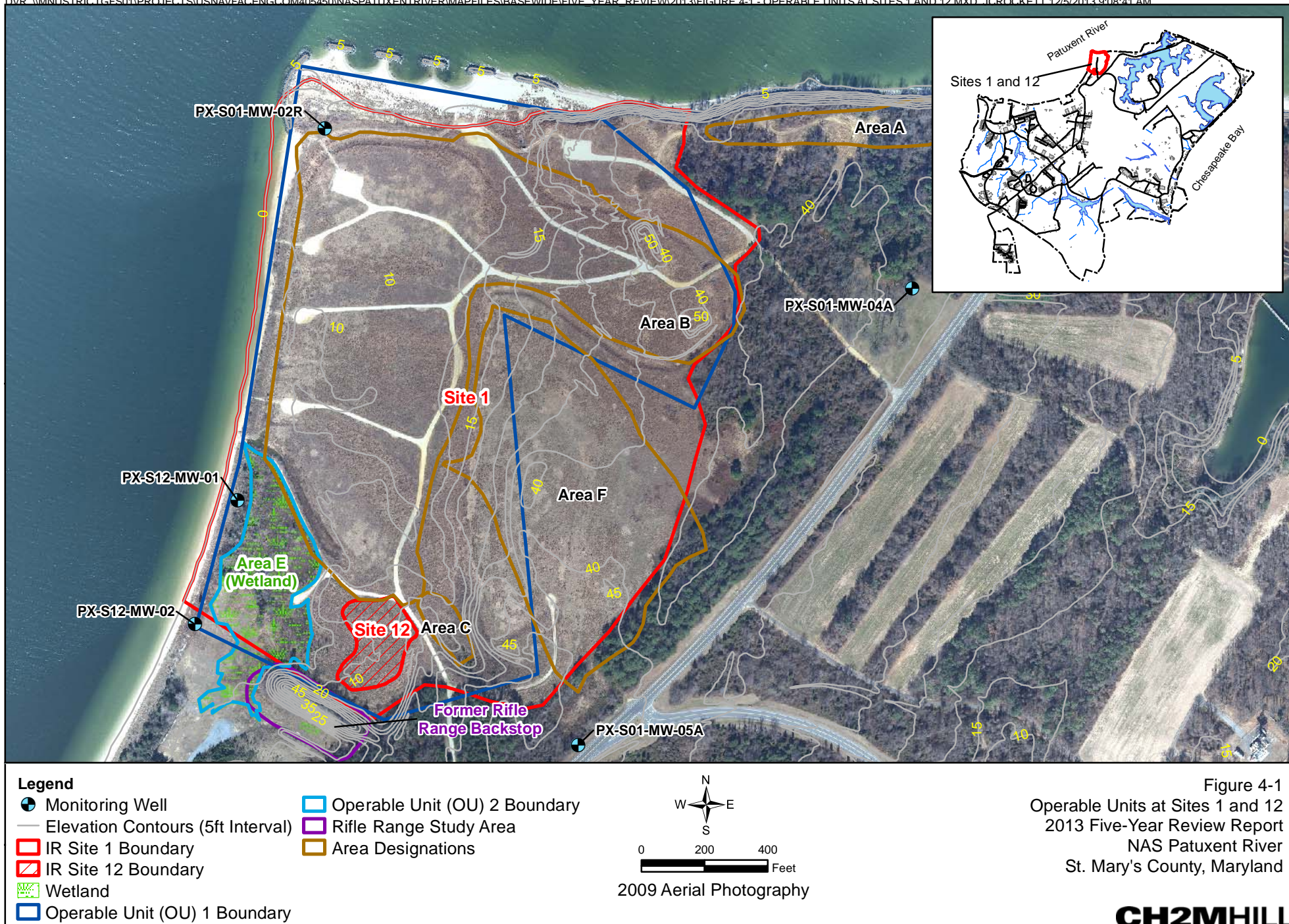
Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
No issues identified	No follow-up actions recommended	NAVFAC Washington	USEPA	Not applicable	N	N

4.7 Protectiveness Summary

The remedy for Sites 1 and 12, OU-1 is currently protective of human health and the environment. The land use restrictions for OU-1 and the soil cover prevent direct contact with landfill wastes.

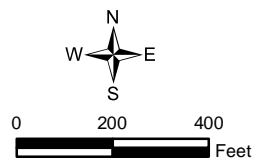
4.8 Next Review

The next Five-Year Review for Sites 1 and 12 OU-1 will be in 2018.





Legend
LUC Boundary, Sites 1 and 12 OU-1
IR Site Boundary



2009 Aerial Photography

Figure 4-2
Sites 1 and 12 LUC Boundary
2013 Five-Year Review Report
NAS Patuxent River
St. Mary's County, Maryland

SECTION 5

Site 6/6A OU-1, Bohneyard Site

To manage remedial action priorities at Site 6/6A and meet station needs, Site 6/6A was divided into two OUs – OU-1 and OU-2. OU-1 consists of soil in the area adjacent to the Fuel Farm where drums and tanks historically were stored at Site 6, and the area to the east referred to as Site 6A. OU-2 consists of groundwater, and both surface water and sediment downgradient of Sites 6 and 6A. The RD and remedial action schedule for OU-1 was implemented prior to that of OU-2.

The future land use of Site 6A changed from industrial to unrestricted land use due to planned future use of the site and vicinity for construction of an aircraft hangar and associated structures, including an office building and parking lot (NAVFAC Washington, 2004). To address the emerging future reuse of Site 6A, a post-ROD investigation was conducted in 2003 to specifically address potential risk for exposure pathways and receptors not evaluated by the original HHRA. The post-ROD investigation did not identify unacceptable risks for soil based on unrestricted land use. Consequently, a ROD Amendment for OU-1 was signed by the Navy and USEPA for Site 6A soil in September 2004. The ROD for OU-2 was signed by the Navy and USEPA in October 2008 (NAVFAC Washington, 2008a).

5.1 Site Chronology

The chronology for Site 6/6A is presented as follows.

Site 6 OU-1 and OU-2

Date	Event
March 1984	IAS of NAS Patuxent River, Maryland (Hart and Associates, 1984)
1984	Confirmation study conducted at Site 6. Soil, groundwater, surface water, and sediment samples collected.
1989	RFA conducted by USEPA to assess historical waste handling and disposal practices at Site 6 and other areas of the NAS. Site 6 was identified in the RFA as a location of potential contamination (A.T. Kearney, Inc., and Earth Technology Corporation, 1989)
1991	IRI completed.
October 1992	Installation Restoration Activities included removal, cleaning, and scraping of 10,000-gallon waste oil tank. Contents of tank removed and disposed offsite; no offsite soil disposal associated with tank removal
1995	EE/CA (Halliburton NUS Corporation, 1995); soil and groundwater samples collected and EE/CA report prepared to evaluate response options for contaminated soil at Site 6
1996	Preliminary ERA prepared to assess potential risks to ecological receptors from contaminants for Site 6
1996	Site 6A identified
1997	Pre-design OU-1 Investigation. Additional surface and subsurface soil sampling to provide additional information regarding nature and extent of contamination and to evaluate characteristics of the Bohneyard soil
1998	Baseline HHRA conducted
1999	Focused Feasibility Study (FFS) prepared to: 1) provide basis for soil remedial action; 2) evaluate and screen remedial technologies; and 3) develop remedial action alternatives
1999	Proposed Remedial Action Plan completed
September 29, 1999	OU-1 ROD signed for Site 6 soil
October 18, 1999	OU-1 Remedial Action start
May 10, 2001	OU-1 Remedial Action completion
February 2003	Post-ROD investigation work plan approved
September 23, 2004	OU-1 ROD Amendment approved for Site 6A soil
May 2004	OU-2 RI started
January 2008	OU-2 EE/CA completed for NTCRA to address soil and sediment

Date	Event
April 22, 2008	OU-2 NTCRA started for soil and sediment removal
May 30, 2008	OU-2 NTCRA completed for soil and sediment removal
July 2008	OU-2 RI completed
October 2008	OU-2 ROD signed for downgradient soil and sediment, surface water and groundwater
July 2011	Revised Final LUC Remedial Design for OU-1 completed

5.2 History and Background

Site 6 is located south of Bohne Road in the northwestern quadrant of the station, adjacent to the Fuel Farm and east of the intersection of Bohne Road and the taxiway. For purposes of the ER Program, Site 6 consists of two discrete areas referred to as Site 6 and 6A, as shown on Figure 5-1. Site 6 is approximately 10 acres in size and comprises the western portion of the ER site where a fuel truck parking area was constructed. Site 6A, approximately 4 acres in size, refers to the portion of Site 6 to the east of the fuel truck parking area that was previously used as an equipment and materials storage area (the Bohneyard) (NAVFAC Engineering Field Activity Chesapeake, 1999; CH2M HILL, 2007b).

5.2.1 Site History

Site 6

Between 1943 and 1949, the area was used for the disposal of approximately 6,000 tons (107,000 cubic feet [ft³]) of fly-ash and bottom-ash material generated by the NAS coal-fired power plant. This material reportedly covered the area in a 6-inch-thick layer of ash. Between 1949 and approximately 1955, the area was used as the Defense Property Disposal Office (DPDO) storage yard. Beginning approximately 1955, an estimated 8 tons of liquid wastes were stored at the site in drums and a partially buried 10,000-gallon tank. Many of the drums stored at the site reportedly leaked. The drums were removed prior to inception of the ER Program, and the tank was removed in 1992. In October 1989, an approximately 6-inch layer of sludge from the St. Mary's County Wastewater Treatment Plant was spread over the site. Liquid wastes stored at Site 6 included POL wastes, solvents, paint thinners, paints, and oil-water separator sludge. Scrap metal and faulty or unused vehicles and equipment were also stored at Site 6 (CH2M HILL, 2007b).

Site 6A

Historical aerial photographs from 1952 indicated that drums were also stored on Site 6A. The materials stored in the drums (solvents, paints, pesticides, oil-water separator sludge, and paint thinner) at Site 6 may have been contained in the drums stored at Site 6A (NAVFAC Engineering Field Activity Chesapeake, 1999).

5.2.2 Land and Resource Use

Site 6 is currently used as a parking area for aircraft refueling trucks in accordance with the OU-1 ROD. The parking area serves as a cover for the contaminated soil. Site 6A is currently used as a storage area for equipment and other materials. Land use restrictions have been implemented for Site 6 as part of the OU-1 ROD to prevent intrusive activities where the soil cover/cap was installed, limit future land development to industrial uses for the site, and prohibit use of groundwater beneath the site (CH2M HILL, 2007b).

A ROD Amendment for Site 6A OU-1 was issued September 2004 because changes in future land use for Site 6A were identified, specifically the construction of a new aircraft hangar, aircraft apron, office building and parking lots. Due to this proposed change in land use, the previously selected remedy was no longer consistent with the Navy's originally intended land use plan, and as a result, additional receptors and exposure pathways needed to be evaluated to address potential human health risks.

In response to the change in future land use, additional samples were collected and analyzed to better characterize conditions for Site 6A OU1, and to evaluate potential risks associated with the new land use. The risk assessment results indicated there were no unacceptable risks to human health or the environment associated with surface or subsurface soils at Site 6A. Therefore, it was concluded that a “No Remedial Action” determination was appropriate for Site 6A OU-1, and that the site was suitable for UU/UE at that time and in the future (CH2M HILL, 2007b). At this time, the planned future land use for Site 6/6A and vicinity (aircraft parking area, aircraft hangar and apron, office building, and parking lots) is not anticipated to change.

5.2.3 Contamination

The sources of potential contamination at Site 6 are primarily related to former storage of liquid wastes in drums and the partially buried 10,000-gallon waste oil tank, historical disposal of fly ash and bottom ash, and the placement of wastewater treatment plant sludge. Contaminants identified at Site 6/6A are briefly summarized below.

Site 6

VOCs, including trichloroethene (TCE) and some of its degradation products, were detected in soil samples. The maximum concentrations were detected in the vicinity of the former waste oil tank. Fuel-related compounds, including benzene, toluene, ethylbenzene, and xylene, were also detected in soil.

The maximum concentrations of most contaminants were detected within the boundary of Site 6, primarily in shallow soil samples (0 to 2 feet below ground surface). Several metals were detected at concentrations exceeding background concentrations. PCBs and polycyclic aromatic hydrocarbons (PAHs) were also detected in soil and sediment in an area downgradient of Site 6 that historically received and currently receives precipitation runoff from Site 6. Concentrations of PCBs and PAHs in soil and sediment had the potential for adverse impacts to ecological receptors further downgradient within the watershed.

Potential Risks.

The Navy evaluated unrestricted land use and unlimited exposures for site COCs by evaluating risks to hypothetical future residents as a conservative approach to the HHRA. As documented in the OU-1 ROD (NAVFAC Engineering Field Activity Chesapeake, 1999), the results of the HHRA indicated cumulative noncarcinogenic hazards at Site 6 exceeded the target risk level (HI = 1.0) for a hypothetical future residential child (HI = 4.9) and adult (HI = 1.1), and for a hypothetical child exposure to the site for recreation (HI = 1.5). The noncarcinogenic hazards result from the presence of metals in soil. The cumulative noncarcinogenic hazards at Site 6A were initially determined to exceed the target risk level for a future residential child (HI = 4.6), and for a child visiting the site for recreation (HI = 1.4). The Bohnyard COCs in soil for human health are aluminum, arsenic, cadmium, chromium, iron, silver, thallium, and vanadium. The human health risk assessment found that cancer risks to all receptors at the Bohnyard were within or below the range of acceptable excess lifetime cancer risks identified by the EPA.

With regard to ecological risk, based on the results of Step 1 (preliminary conceptual model) of the ERA conducted for Site 6/6A, it was determined that ecological receptors are not likely to occur on the Bohnyard in the future (that is, the fuel truck parking lot which had not been constructed at the time the ecological risk was evaluated) due to the lack of suitable habitat. Since ecological receptors are not likely to be present, there is no complete exposure pathway linking site constituents to an ecological receptor (NAVFAC Engineering Field Activity Chesapeake, 1999).

5.2.4 Basis for Taking Remedial Action

The basis for taking action at Site 6/6A OU-1 was to address contaminated soil that posed potential unacceptable risks to human health. Unacceptable risks were identified for human receptors from exposure to aluminum, arsenic, cadmium, chromium, iron, silver, thallium, and vanadium in soils.

5.3 Remedial Actions

5.3.1 Remedy Selection

Site 6

The OU-1 ROD for NAS Patuxent River Site 6 was signed by the Navy and USEPA on September 29, 1999. The RAOs were to:

- Protect human health and the environment
- Comply with all applicable or relevant and appropriate federal and state environmental laws and regulations
- Be cost-effective

The remedial action selected for OU-1 Site 6 was construction of a concrete and asphalt parking lot for fuel trucks over approximately one-half of Site 6 where constituents in soil have concentrations exceeding the designated performance standards (PSs) for site worker exposure. This parking lot consisted of the following items (OHM, 1999a):

- A 3-acre, 8-inch thick, reinforced concrete pad
- Overhead lighting for night illumination
- A concrete containment area to contain any fuel spills
- A stormwater detention basin to control stormwater runoff
- Two concrete access ramps for ingress and egress
- Asphalt access to and from the spent fuel storage area
- A soil cover for the remainder of Site 6

Site 6A

Site 6A was originally addressed in the September 1999 final OU-1 ROD which documented a soil remedy for Site 6A (NAVFAC Engineering Field Activity Chesapeake, 1999). The remedy originally selected was an asphalt cover to be constructed for the purposes of storage and staging of materials and equipment. Institutional controls (ICs) would consist of access restrictions to prevent trespassing at the Bohnyard, LUCs to control site development and access to groundwater, and monitoring to assess whether contaminants are migrating to the environment.

In 2000, NAS Patuxent River selected Site 6A as part of the location for construction of a new aircraft hangar and associated facilities. In 2002, the Navy decided that the future land use for Site 6A OU-1 would need to change from industrial to unrestricted land use due to the planned construction of the new aircraft hangar and associated facilities. As a result of this future land use change, a post-ROD investigation was conducted at Site 6A to collect additional data to adequately characterize potential risks to human health and the environment based on different receptors and exposure scenarios than were evaluated in the original risk assessment (CH2M HILL, 2012a). The risk assessment results indicated that there were no unacceptable risks to human health or the environment associated with surface or subsurface soils at Site 6A. It was therefore concluded that a “No Remedial Action” determination was appropriate for Site 6A OU-1, and that the site is suitable for unrestricted land use now and in the future. A ROD Amendment for Site 6A OU-1 was issued September 2004 to address changes to the remedy as a result of the change in future land use for Site 6A (NAVFAC Washington, 2004).

As a result of the concentrations of PAHs and PCBs detected in the surface soil/sediment within the Site 6/6A drainage area, the Navy and USEPA, in consultation with the MDE, made a decision to conduct a removal action to remove soil and sediment posing a potential risk to ecological receptors. Prior to conducting the removal action, an EE/CA was completed to evaluate remedial alternatives to address the potential risks to ecological receptors. The objective of the removal action was to reduce the current potential risk to the environment posed by PCBs and PAHs in surface soil/sediment downgradient of Site 6/6A to levels acceptable for unrestricted site use. As part of the EE/CA, ecological risk-based removal action levels were developed for total PCBs (1,000 micrograms per kilogram [$\mu\text{g}/\text{kg}$]) and total PAHs (6,150 $\mu\text{g}/\text{kg}$) to address impacted surface soil/sediment in the drainage area. The removal action levels that were calculated established the concentrations at which site-related COPCs do not pose an unacceptable risk to the environment.

In April and May 2008, a removal action was completed to remove surface soil/sediment from portions of the Site 6/6A drainage area between Site 6 and Beaver Pond. Approximately 674 tons (449 cubic yards) of soil were excavated during the removal activity. Three separate localized areas of impacted soil/sediment were excavated and the excavated material was disposed off-site as nonhazardous waste at a permitted landfill that accepts waste with PCB concentrations less than 50 parts per million. Analytical results for confirmatory samples showed PCB and PAH concentrations were less than the removal action levels at all sample locations after 1 foot of soil was removed in the two areas west of Bohne Road and downgradient of Site 6. Sample results for depths of 1-2 feet and 2-3 feet in the third area east of Bohne Road in Site 6 showed PCB concentrations exceeding the action level. Consequently, soil in this area was excavated below a depth of 2 feet to remove any possible risk to ecological receptors at this location. All three areas were backfilled with clean backfill material. Prior to backfilling, confirmation samples were collected to verify removal of the soil impacted by PAHs and PCBs that exceeded the removal action levels (NAVFAC Washington, 2008a).

5.3.2 Remedy Implementation

Site 6. The remedial action design for Site 6 was initiated on October 18, 1999, and completed on May 10, 2001. Remedial action activities included:

- Site preparation, including clearing and grubbing of trees and vegetation and installation of temporary erosion and sedimentation controls (OHM, 1999a; OHM, 1999b)
- Construction activities, including site grading, construction of the fuel truck staging area, and installation of a stormwater collection, containment, and retention system (OHM, 1999b)
- Installation of a soil and gravel cover for the remaining portions of Site 6 not covered by the concrete parking area that had constituent concentrations in soil that exceeded the PSs for site worker exposure (OHM, 1999b)

Site 6A. The originally planned remedy at Site 6A was to place an asphalt cover over the area. However, due to a change in the future land use of the site, the construction of this remedy was not implemented. A post-ROD investigation was completed in spring 2003 to address data gaps as documented by the post-ROD risk assessment (CH2M HILL, 2004b). As detailed in the Site 6A ROD Amendment (NAVFAC Washington, 2004), the HHRA and ERA conducted for Site 6A OU-1 did not identify any unacceptable risks to human health or the environment as a result of constituents detected in soil. Consequently, the Navy and USEPA, in consultation with MDE, determined that remedial action was not necessary for Site 6A OU-1 to address the future planned land use.

As of 2008, the responsibility for overseeing the administrative and substantive requirements of the O&M plan for Site 6 has reverted to NAVFAC Washington. The work will be conducted in accordance with the approved Final O&M plan (OHM, 1999a). Specifically, inspections will be conducted to verify that the site containment and drainage in compliance with the requirements of the O&M plan.

To date, there have been no problems with the OU-1 remedy. The remedy is working as it was designed and O&M activities performed are visual inspections that have resulted in no incurred O&M costs.

Since there is no remedial action required for Site 6A, there are no associated O&M costs. The estimated costs for OU-1 identified in the FS included an estimated capital cost of \$460,000; an annual O&M cost of \$20,180, on average; and a net present worth cost of \$708,000 (CH2M HILL, 1999a). To date, the Navy has done some annual maintenance on the asphalt and concrete cover to repair cracks and joints in the cover. Recently, the Navy is planning to do another round of repairs on the cover with funding support from the Defense Logistic Agency.

5.4 Progress Since Last Five-Year Review

Site 6

The 2008 Five-Year Review (CH2M HILL, 2008d) identified two administrative issues that needed to be addressed; specifically, the lack of routine site inspections and associated documentation of the inspections, and the lack of formal documentation of LUCs implemented for the site. These issues were not considered by the Navy to

warrant a finding that the remedy is not protective as long as corrective actions were implemented in a timely manner with respect to these issues.

The ROD for Site 6 requires the application of LUCs to: 1) prevent intrusive activities; 2) limit future land development to industrial uses for the site; and 3) prohibit usage of groundwater beneath the site to preclude unacceptable risks to human health from exposure to any contaminants present in soil and groundwater beneath the site.

- The LUCs for Site 6 have been revised since the 2008 Five-Year Review as documented in the LUC RD for Site 6 (CH2M HILL, 2011b).
- The lack of routine site inspections and associated documentation of the inspections has been addressed by preparation of a post-closure O&M manual (CH2M HILL, 2011c) and the revised final LUC RD for Site 6 (CH2M HILL, 2011b).

Site 6A

The 2008 Five-Year Review (CH2M HILL, 2008d) did not identify an issues or deficiencies.

5.4.1 Land Use Restrictions

LUCs prohibiting residential development and intrusive activities in the portion of Site 6 containing the concrete parking lot, asphalt cover, and soil cover have been implemented as documented in the LUC RD for Site 6 (CH2M HILL, 2011b). The LUC boundaries are shown on Figure 5-2.

The LUCs will be maintained until such time as these restrictions are no longer required to protect human health or the environment. The LUC implementation actions include annual site inspections (to be evaluated at a minimum of once every 5 years), submittal of an annual LUC inspection report to the USEPA and MDE, and CERCLA Five-Year Reviews of the Site 6 LUCs.

5.4.2 Site Inspections

As part the ongoing operation of the site, inspections of the slab and associated stormwater components are conducted by Fuel Farm personnel weekly as part of the operational aspects associated with the fuel truck parking areas. Annual LUC inspections by the ER manager are documented in the base files and sent to USEPA and MDE. Additionally, O&M inspections were completed annually since 2008 and sent to USEPA and MDE.

5.5 Technical Assessment

The following information presents the technical assessment summary for Site 6 OU-1 and OU-2. Previous investigations did not identify unacceptable risks for soil at Site 6A for unrestricted land use. Consequently, a ROD Amendment was signed by the Navy and USEPA for Site 6A soil on September 23, 2004.

Question A: Is the remedy functioning as intended by the decision document?

A review of documents, ARARs, and risk assumptions demonstrate that the remedy, which consists of a concrete parking lot and soil and gravel cover, in conjunction with LUCs for Site 6 OU-1, is functioning for soil as intended by the ROD. Implementation of LUCs effectively combined with appropriate inspections and corrective action as needed will ensure the integrity of the soil cover is maintained. LUC objectives are to prohibit activities that interfere with or compromise the integrity of the Site 6 soil cover and prohibit residential development and use of all groundwater beneath the Site 6/6A area. Observations indicate that LUCs are intact and that the soil cover has not been disturbed. No early indicators of potential remedy failure were noted during this Five-Year Review.

There is no remedy in place for Site 6A OU-1 because the 2004 ROD Amendment documented that there were no unacceptable risks associated with current or planned future use of Site 6A.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, remediation action objectives used at the time of the remedy selection still valid?

The exposure assumptions, toxicity data, cleanup levels, and RAOs for Site 6/6A OU-1 are still valid based on the remedy evaluation for data in existing reports and confirmation that the state and federal standards for the COCs have not changed. Recently in 2012, EPA revised the dioxin toxicity and response standards. It is possible that there are low level dioxins from fly ash and bottom ash present beneath the Site 6 asphalt and concrete cover; however, the cover prohibits exposure to human health and ecological receptors and the remedy remains protective.

Question C: Has any other information come to light that could question the protectiveness of the remedy?

No additional information has been identified during this review that would call into question the protectiveness of the remedy for Site 6/6A OU-1. However, as a result of data obtained during the April-May 2008 soil removal, the Navy decided to open a new ER site (anticipated to be Site 56). Further investigation of the new site will be conducted when the Navy has funding available.

5.6 Technical Assessment Summary

5.6.1 Issues

TABLE 5-1
Site 6 Issues Identified

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
No issues identified for Site 6/6A OU-1	N	N

5.6.2 Recommendations and Follow-up Actions

TABLE 5-2
Site 6 Recommendations and Follow-up Actions

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
No issues identified	No follow-up actions recommended	NAVFAC Washington	USEPA		N	N

5.7 Protectiveness Summary

Site 6

The remedy for Site 6/6A OU-1 currently protects human health and the environment because the parking lot and soil and gravel covers over Site 6 combined with access and use restrictions prevents direct contact with contaminated soil.

5.8 Next Review

The next Five-Year Review for Site 6/6A OU-1 will be in 2018.



Legend

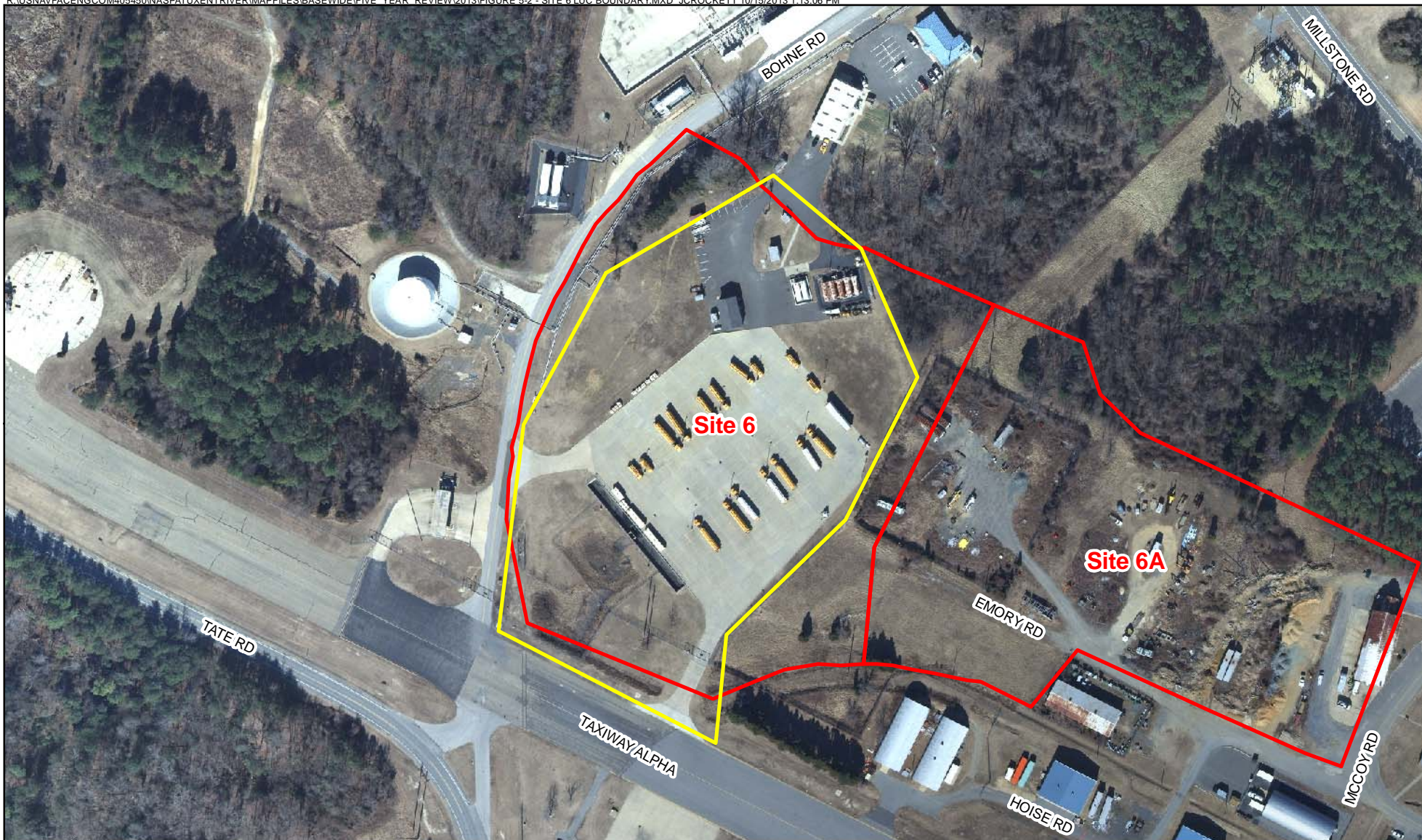
- IR Site Boundary
- Operable Unit (OU) 1 Boundary
- Operable Unit (OU) 2 Boundary



0 130 260
Feet

2009 Aerial Photography

Figure 5-1
Operable Units at Sites 6 and 6A
2013 Five-Year Review Report
Naval Air Station Patuxent River
St. Mary's County Maryland



Legend

- LUC Boundary, Site 6 OU-1
- IR Site Boundary



0 100 200
Feet

2009 Aerial Photography

Figure 5-2
Site 6 LUC Boundary
2013 Five-Year Review Report
NAS Patuxent River
St. Mary's County, Maryland

CH2MHILL

SECTION 6

Site 11, Former and Current Sanitary Landfills, OU-1 and OU-2

Site 11, Former and Current Sanitary Landfills, consists of OU-1 and OU-2. OU-1 is composed of the material in each landfill. OU-2 is the surface water and sediment in adjacent streams and groundwater beneath and downgradient of the landfills. This is the third Five-Year Review conducted for Site 11 OU-1 at NAS Patuxent River, but the first review for OU-2. The first OU-1 Five-Year Review was submitted in July 2001 (CH2M HILL, 2001b), with final USEPA acceptance obtained in September 2001. Site 11 OU-1 was included in the 2003 Five-Year Review to get the Five-Year Review process for all NAS Patuxent River sites on the same schedule.

The ROD for OU-1 was issued in July 1996 (Department of the Navy, 1996), and the OU-1 remedial action start and completion dates were June 25, 1996, and March 31, 1997, respectively. The ROD for OU-2 was completed in September 2008 (NAVFAC Washington, 2008b), and the remedy, which consists of LUCs and LTM, is being implemented. Since no construction activity was required to implement the OU-2 ROD, there are no remedial action start and completion dates.

6.1 Site Chronology

The chronology for Site 11 OU-1 and OU-2 is presented as follows.

Date	Event
March 1984	IAS of NAS Patuxent River, Maryland (Hart and Associates, 1984)
February 1985	Preliminary Assessment
January 1986	Hydrogeologic Investigation of the Current and Former Sanitary Landfills (CH2M HILL)
March 1986	Sanitary Landfill Utilization Report (Beavin Company)
March 1986	First Groundwater Monitoring Plan and Quality Report (Beavin Company)
April 1987	MDE issued a Notice of Violation for the Current Sanitary Landfill
1988	RFA Phase II Report (A.T. Kearny, Inc., and Earth Technology Corporation, 1989)
January 1991	RI/FS initiated
January 1991	IRI conducted (CH2M HILL)
August 1991	Confirmation Study Report (CH2M HILL, 1991)
January 1994	Proposed addition of NAS Patuxent River to NPL
February 1994	IRI Report complete (CH2M HILL 1994)
August 1995	GORE-SORBER Screening Survey conducted
April 1996	RD start
June 1996	OU-1 construction started
1996-1997	Initial fieldwork on RI/FS for groundwater, surface water and sediment under OU-2 conducted
July 1996	OU-1 RI/FS complete
July 29, 1996	OU-1 ROD (Department of the Navy, 1996)
July 1996	OU-1 RD complete
August 1996	OU-1 Remedial action started
March 1997	OU-1 construction finished
March 1999	OU-1 Final Contractor Closeout Report (OHM, 1999c)

Date	Event
August 2001	First Five-Year Review report approved for OU-1
2004-2006	Additional RI fieldwork completed for OU-2
2007	Groundwater monitoring plan for LTM submitted to MDE (state requirement)
2007	OU-2 RI report submitted to USEPA and MDE for review
August 2008	OU-2 RI completed
July 2008	OU-2 FS completed
September 2008	OU-2 ROD (NAVFAC Washington, 2008b)
July 2011	Revised Final LUC Remedial Design for OU-1 and OU-1 completed

6.2 History and Background

Site 11 occupies approximately 16.5 acres and consists of two areas referred to as the Former Sanitary Landfill (6.5 acres) and the Current Sanitary Landfill (10 acres). Site 11 is located approximately 1.5 miles southeast of Gate 2 near the southern border of the installation and adjacent to the intersection of State Route 235 and Hermanville Road (Figure 6-1). Adjacent to and downgradient of the Former Sanitary Landfill is the Current Sanitary Landfill. Surface hydrology at Site 11 is linked to small stream corridors on both the west (between Site 11 and Site 34) and east sides of the landfills. These streams are lined by forested wetlands and both eventually discharge to Holton Pond (Pond 3) approximately 3,000 feet north of Site 11 (CH2M HILL, 2008e).

Disposal operations at Site 11 began in April 1974, and consisted of placing solid waste in 10-foot lifts along 50-foot working faces. Once the solid waste was placed in the lifts, it was covered with soil from the borrow area next to Site 11. The borrow area for the Former Sanitary Landfill during operation is the area that became the Current Sanitary Landfill. It is estimated that the Former Sanitary Landfill received approximately 22,500 tons of plastic and paper trash, and approximately 43 tons of oil contaminated soils and liquid wastes consisting of POLs, solvents, thinners, paints, small amounts of pesticides, and photographic wastes. The liquid wastes were predominantly residues left in cans, rags, and absorbents. The Former Sanitary Landfill operated under MDE Solid Waste Permit number 79-18-08-04A from March 1979 until September 1980 when the Former Sanitary Landfill was closed.

Located next to the Former Sanitary Landfill is the 10-acre Current Sanitary Landfill. Disposal operations began at the Current Sanitary Landfill when the Former Sanitary Landfill closed in 1980. The Current Sanitary Landfill is regulated under the Resource Conservation and Recovery Act (RCRA) Subtitle D (Solid Waste Disposal Act), as administered by the MDE Solid Waste Program. This landfill was constructed with a synthetic bottom liner and an associated leachate collection system (LCS).

An estimated 145,000 tons of municipal solid waste were disposed at the Current Sanitary Landfill. The Current Sanitary Landfill received waste as defined under its Refuse Disposal Permit for municipal landfills from September 1, 1980, to November 17, 1991. From November 18, 1991, to May 27, 1994, the Current Sanitary Landfill accepted rubble fill only in accordance with Code of Maryland Regulations 26.04.07.13. From May 28, 1994, to September 30, 1994, the Current Sanitary Landfill accepted clean fill only. The purpose of this waste acceptance policy change was due to the amount of fill area remaining. On November 14, 1994, NAS Patuxent River provided verbal notification to the State that the Current Sanitary Landfill was closed on September 30, 1994.

During construction of the Current Sanitary Landfill, a LCS was extended along the downgradient perimeter of the landfill. The LCS was intended to intercept leachate generated by the wastes. The LCS was connected between the two landfills. The leachate is conveyed via underground piping to the St. Mary's Metropolitan Commission Pine Hill Run Wastewater Treatment Facility (METCOM) for treatment and discharge. Monthly monitoring of the leachate began in January 1985.

In 2007, the Navy began assessing the quality of the leachate being discharged to the county wastewater treatment facility. Preliminary evaluation indicates that a substantial portion of the fluids being discharged to the wastewater treatment facility is actually groundwater being intercepted by a portion of the LCS associated with the Former Sanitary Landfill. The Navy and MDE are currently negotiating the scope of further evaluation of fluids discharged by the LCS associated with the Former Sanitary Landfill to determine whether it is necessary to continue discharging the fluids from this system to the county wastewater treatment system.

6.2.1 Land and Resource Use

Site 11 is currently not in use. Land use restrictions have been implemented at Site 11 to prevent intrusive activities and groundwater use, and to prevent future land development within the landfill boundaries (CH2M HILL, 2011d). Current conditions for land use and the associated LUCs are not anticipated to change.

6.2.2 Contamination

The source of contamination at Site 11 is wastes present in the landfills. Preventing exposure and direct contact with landfill wastes was the driver for the OU-1 remedial action.

OU-2 includes the surface water and sediment in adjacent streams and groundwater beneath and downgradient of the landfills. VOCs, SVOCs, pesticides, and metals have been detected in surface water and sediment samples; however, detected concentrations were relatively low (that is, only several micrograms per liter) and sporadic in frequency. VOCs, SVOCs, and both total and dissolved concentrations of metals were detected in groundwater beneath the landfills. PCBs were not detected. The occurrence of VOCs and SVOCs was sporadic, and most detected metals occurred primarily in two wells at the landfill perimeter. Several VOCs were detected at low concentrations (that is, near detection limits) in wells downgradient of the landfills; however, SVOCs and PCBs were not detected in any of the samples downgradient of the landfills. Concentrations of both total and dissolved metals were detected in groundwater downgradient of the landfills.

Concentrations of three constituents (benzene, bis[2-ethylhexyl]phthalate, and thallium) detected in groundwater samples from Site 11 exceeded the respective MCLs and are the drivers for OU-2 remedial action. However, groundwater in the vicinity of Site 11 is not currently used for potable water supply, and will not be used for such purpose in the future due to LUCs established for the landfills.

Groundwater at Site 11 beneath and downgradient of the landfills meets acceptable risk standards for unrestricted use. However, concentrations of three constituents in groundwater exceeded MCLs in two monitoring wells located downgradient of the landfill boundary. Furthermore, available groundwater data indicates that concentrations of constituent in groundwater have been stable for over 10 years, indicating little to no migration of constituents leaching from wastes within the landfills. This finding indicates that the RCRA cap is preventing infiltration of precipitation into the landfills as designed. ICs instituted as part of the remedy selected for OU-2 ensures that groundwater with MCL exceedances is not withdrawn for potable use.

6.2.3 Basis for Taking Remedial Action

The basis for taking action at Site 11 OU-1 was to prevent risks associated with potential direct exposure to landfill wastes and to prevent infiltration of precipitation that could mobilize and transport contaminants in the landfill wastes to other environmental media. The ROD for OU-1 identified remedial actions necessary to protect human health and the environment pending completion of the OU-2 investigation.

For OU-2, the HHRA and ERA did not identify unacceptable risks to either human health or the environment based upon current and anticipated future use of the site as a landfill. Therefore, there are no unacceptable risks associated with OU-2 beyond the landfill cap. However, three constituents (benzene, bis[2-ethylhexyl]phthalate, and thallium) were detected at the perimeter of the landfills at concentrations exceeding the respective federal MCLs. MCLs were not exceeded in wells downgradient of the landfills. For OU-2, the basis for remedial action is to ensure that groundwater with constituents exceeding MCLs is not used for potable supply, and to ensure that constituents in groundwater migrating from the landfill remain at concentrations that do not pose unacceptable risks in the future since landfill wastes remain in place for OU-1.

6.3 Remedial Actions

Remedial actions have been implemented for OU-1 and OU-2 to address impacts associated with historical waste disposal in the landfills.

6.3.1 Remedy Selection

OU-1

The OU-1 ROD for Site 11 was signed by the Navy and USEPA on July 29, 1996. The remedial action RAOs were to:

- Reduce the long-term risk of possible exposure to contaminants originating from the landfill
- Allow for the control, treatment, and monitoring of landfill gases
- Reduce vertical infiltration of precipitation
- Decrease the amount of leachate generated
- Limit exposure to landfill wastes
- Provide adequate protection to human health and the environment

The remedial action for Site 11 OU-1 was designed to reduce contaminants emanating from the landfills and minimize subsequent degradation of groundwater beneath the landfill. The components of the remedial action for OU-1 are as follows:

- Installation of a RCRA Subtitle D landfill cap
- Implementation of ICs through land use and access restrictions
- Installation of a landfill gas collection and treatment system
- Groundwater monitoring
- Modification and upgrade of the LCS
- Replacement of wetlands impacted by implementation of the remedy

OU-2

The OU-2 ROD for Site 11 was signed by the Navy and USEPA in September 2008. The remedial action RAOs were to:

- Ensure that groundwater with constituents exceeding MCLs is not used for potable supply
- Ensure that constituents in groundwater migrating from the landfill remain at concentrations that do not pose unacceptable risks in the future since landfill wastes remain in place for OU-1
- Monitor groundwater quality to ensure concentrations of detected contaminants are stable or decreasing relative to baseline concentrations, and if increasing concentrations are observed and confirmed, perform evaluation of site conditions and modify the LTM program as appropriate to address changes in groundwater quality

The selected remedy for Site 11 OU-2, LUCs and LTM, was designed to prevent future use of groundwater for potable supply, and to monitor chemical and metal concentrations exceeding MCLs at the landfill perimeter over time to determine whether these concentrations are decreasing, and to ensure that concentrations of chemicals and metals migrating from the landfill do not exceed MCLs downgradient of the landfill. Key components of the selected remedy are as follows:

- ICs for both the landfills and a buffer zone around the landfills to limit exposure to groundwater beneath and in the immediate vicinity of the landfills until constituents currently detected at concentrations exceeding MCLs decrease to less than these regulatory criteria.
- Long-term periodic groundwater monitoring of VOCs, SVOCs, and metals over 5-year monitoring periods to evaluate the effectiveness of the OU-1 and OU-2 remedies to protect human health and the environment.

6.3.2 Remedy Implementation

The RD for the OU-1 RCRA cap was initiated in April 1996 and completed in July 1996. Remedial action began on June 26, 1996, and was completed on March 3, 1997.

The OU-1 remedial construction closeout report was approved by the USEPA on August 3, 1999.

The landfill gas collection and treatment system (an active vacuum pumping system and a gas flare) no longer operates on a regular or frequent basis due to insufficient volume of landfill gas to operate the system. As a result, the Navy conducted an evaluation of landfill gas generation to optimize the system, and concluded that the current volume of landfill gas generation does not support operation of the flare. As a result, the Navy will convert the existing gas collection system to a passive gas venting system. The landfill gas vents will be monitored in passive mode for 1 year to confirm that the gas volumes are too low to operate the gas flare. If low volumes are confirmed, the Navy will propose to USEPA and MDE that the flare system be permanently removed from the landfill.

- The final O&M manual for Site 11 (CH2M HILL, 2010b), requires routine inspections of the landfill cover and site conditions, maintenance and repairs, and operation of the passive gas venting system. Specifically, the O&M manual requires:
- Semiannual inspections (spring and autumn) of the landfill cover system to assure that the soil and cover system and related remedial elements continue to function as designed
- Landfill maintenance (maintenance of vegetative cover, repair of erosion damaged areas, repair of settlement damaged areas, and maintenance of runoff control structures) as needed, based on corrective actions noted during inspections of the landfill cover
- Monitoring of six landfill gas wells along the perimeter of the landfill to determine if methane is migrating from the landfill boundary. Monitoring of methane (concentration and volume being produced), explosive atmosphere, and the concentration of oxygen and carbon dioxide will occur monthly for the first quarter and quarterly for the subsequent three quarters
- Semiannual inspections of monitoring wells
- Groundwater LTM of existing monitoring wells to monitor constituent concentrations migrating in groundwater from the landfill area. Groundwater monitoring will be performed every 15 months during each Five-Year Review period and will include TCL VOCs, TCL SVOCs, TAL total and dissolved metals during the first three monitoring events of each review period, and TCL VOCs, TCL SVOCs, TCL pesticides and PCBs, TAL total and dissolved metals, and cyanide during the 4th monitoring event. Field measurements, to include pH, dissolved oxygen, temperature, oxidation-reduction potential, turbidity, and specific conductivity will also be collected during each monitoring event.

An evaluation of the LCS at the Former and Current Sanitary Landfills was conducted based on the large volumes of leachate that continue to be generated by the landfills approximately 10 years after installation of the impermeable landfill cap. The results of this evaluation indicated that groundwater elevations are consistently higher than the 1980 LCS invert elevations within the Former Landfill Area. As summarized in the technical memorandum (CH2M HILL, 2008c), the Navy has proposed blocking of a portion of the LCS to prevent groundwater intrusion into the northern (most downgradient) portion of the LCS, and collecting data for 1 year to evaluate the feasibility of permanently sealing off the portion of the LCS with suspected groundwater infiltration. The MDE is currently evaluating the Navy's proposed approach.

Table 6-1 presents the annual O&M costs for Site 11 (excludes LTM costs).

TABLE 6-1
Annual O&M Costs for Site 11
NAS Patuxent River

Year	Total Cost (rounded to the nearest \$100)
1997	\$13,800
1998	\$37,100
1999	\$37,300
2000	\$20,100
2001	\$204,100
2002	\$224,500
2003	\$247,000
2004	\$260,000
2005	\$272,000
2006	\$286,000
2007	\$300,000
2008	NA
2009	NA
2010	\$118,300
2011	\$121,900
2012	\$125,500

6.4 Progress Since Last Five-Year Review

The 2008 Five-Year Review (CH2M HILL, 2008d) did not identify an issues or deficiencies.

6.4.1 Land Use Restrictions

The LUC boundary (Figure 6-2) (CH2M HILL, 2011d) encompasses both landfills plus a buffer zone beyond the landfill boundaries. This boundary restricts land use on and in the vicinity of the landfills to maintain the integrity of the remedial components of OU 1 (that is, the landfill cap and vegetative cover, gas flare system, leachate collection and treatment system, monitoring well network, and ICs to restrict land use). This LUC boundary also addresses the ICs implemented by the OU-2 ROD.

The LUCs will be maintained until such time as such restrictions are no longer required to protect human health or the environment. The LUC implementation actions include annual site inspections, submittal of an annual LUC inspection report to the USEPA and MDE, and review of the Site 11 LUCs during each CERCLA Five-Year Review (CH2M HILL, 2011d).

6.4.2 Site Inspections

Inspections of the landfill gas collection and flare system and the leachate treatment system for leachate discharged to the METCOM have been conducted regularly since the landfill cap was completed and the gas flare installed. As of 2008, the responsibility for overseeing the administrative and substantive requirements of the O&M manual for Site 11 has reverted to NAVFAC Washington. This work has been conducted following the Final O&M manual (CH2M HILL, 2010b) for Site 11 OU-1 and OU-2.

6.5 Technical Assessment

Question A: Is the remedy functioning as intended by the decision document?

OU-1

The implemented remedy for OU-1 is functioning as intended and has been effective in isolating waste and contaminants, and is protective of human health and the environment. There have been no problems with the RCRA cap since its installation, with the exception of minor items such as erosional areas (located at drain areas or from burrowing animals) that have been corrected or repaired based on landfill inspections. Site access is restricted by a 6-foot-high chain-link fence with locked gates. Site access is also limited to authorized personnel only for routine inspections or O&M activities.

OU-2

The implemented remedy for OU-2 is functioning as intended and has been effective in isolating waste and contaminants, and is protective of human health and the environment. Site access is restricted by a 6-foot-high chain-link fence with locked gates. Site access is also limited to authorized personnel only for routine inspections or O&M activities.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, remediation action objectives used at the time of the remedy selection still valid?

OU-1

The exposure assumptions, cleanup levels, and RAOs are still valid for Site 11 OU-1 based on the remedy evaluation conducted during this Five-Year Review.

OU-2

The exposure assumptions, cleanup levels, and RAOs are still valid for Site 11 OU-2 based on the remedy evaluation conducted during this Five-Year Review.

Question C: Has any other information come to light that could question the protectiveness of the remedy?

No additional information has been identified during this review for either OU-1 or OU-2 that would call into question the protectiveness of the remedy.

6.6 Technical Assessment Summary

6.6.1 Issues

TABLE 6-2
Site 11 OU-1 and OU-2 Issues Identified

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
No issues identified for Site 11 OU-1 or OU-2	N	N

6.6.2 Recommendations and Follow-up Actions

TABLE 6-3
Site 11 OU-1 Recommendations and Follow-up Actions

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
No issues identified	No follow-up actions recommended	NAVFAC Washington	USEPA		N	N

6.7 Protectiveness Summary

OU-1

The remedy at Site 11 OU-1 is protective of human health and the environment under current and future conditions. The cap prevents direct contact with landfill wastes, and is effective at containing contaminants by preventing the infiltration of precipitation and subsequent generation of leachate as indicated by the decreasing rate of leachate flow since implementation of the remedy. LUCs are currently in place to restrict access and land use.

OU-2





The remedy for Site 11 OU-2 is protective of human health and the environment under current and future conditions because of the LUCs in place to restrict access and site use, including a restriction to prevent use of groundwater beneath and immediately downgradient of the landfill as a potable supply.

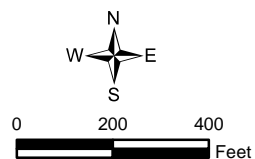
6.8 Next Review

The next Five-Year Review for Site 11 OU-1 and OU-2 will be required in 2018.



Legend

-  Monitoring Well
-  IR Site Boundary
-  Operable Unit (OU) 1 Boundary
-  Operable Unit (OU) 2 Boundary





2009 Aerial Photography

Figure 6-1
Operable Units at Site 11
2013 Five-Year Review Report
NAS Patuxent River
St. Mary's County, Maryland

CH2MHILL



Legend

-  LUC Boundary, Site 11 OU-1 and OU-2
-  IR Site Boundary



0 200 400
Feet

2009 Aerial Photography

Figure 6-2
Site 11 LUC Boundary
2013 Five-Year Review Report
NAS Patuxent River
St. Mary's County, Maryland

CH2MHILL

SECTION 7

Site 17 OU-1 and OU-2, Pest Control Shop (Building 841)

Site 17, Pest Control Shop, (Figure 7-1) covers approximately 0.75 acre and previously housed Building 841 and several ancillary structures that were used to prepare, handle, and store pesticides for the NAS pest and weed control program. All structures were removed from the site. Areas impacted by Site 17 consist of drainage ditches between Site 17 and Pond 3 (Holton Pond), located southwest of the site. To address site contamination, Site 17 was divided into two OUs as follows:

- OU-1 consists of soil that was within the fenced source area adjacent to Building 841 and sediment within the drainage ditches along Buse Road and Tate Road; and
- OU-2 consists of groundwater and downgradient surface water and sediment (CH2M HILL, 2012a).

The ROD for OU-1 addresses remedies for contaminated soil at Site 17. OU-2 addresses the impacts to the groundwater and downgradient surface water and sediment from historical activities at the Pest Control Shop. The OU-1 ROD was issued in December 1998. A ROD Amendment for OU-1 was subsequently issued in June 2001, with the associated remedial action completed in October 2001. The ROD for OU-2 was issued in September 2006. The OU-2 remedial action was completed in the October 2009.

7.1 Site Chronology

The chronology of Site 17 OU-1 and OU-2 is summarized as follows.

Date	Event
1984	IAS of NAS Patuxent River, Maryland (Hart and Associates, 1984)
1985-1987	NACIP Program Confirmation Study
1989-1990	OU-1 EE/CA completed for soil downgradient of the former wash pad
March 1991-April 1991	OU-1 soil removal action implemented for soil downgradient of the former wash pad
1991	IRI conducted
1995	OU-1 EE/CA for NTCRA for soil around Building 841 (Halliburton NUS Corporation, 1995)
1996	OU-2 RI – initial field work conducted
August 1997	Public Health Assessment performed
September 1998	OU-1 FFS completed
December 16, 1998	OU-1 ROD signed
June 25, 2001	OU-1 ROD Amendment signed
October 31, 2001	OU-1 remedial action completed
2004	OU-2 RI - additional field work conducted
August 2006	OU-2 RI completed
August 2006	OU-2 FFS completed
September 29, 2006	OU-2 ROD signed
2007-2008	OU-2 RD
January 2009	OU-2 remedial action begins
October 2009	OU-2 remedial action completed
July 2011	Revised Final LUC Remedial Design for OU-1 and OU-2 completed

7.2 History and Background

Site 17 was used between 1962 and 1989 as a mixing, storage, and general staging area for the NAS pest and weed control program. Residues from pesticide and herbicide containers and wastewater from cleaning containers, spraying equipment, and washing vehicles used in pesticide and herbicide application were released at this site between 1962 and 1979. An estimated 300 to 400 gallons of pesticide rinsate were generated per day. Until 1979, the rinsate was released to an interior mixing sink, an exterior wash-rack and asphalt wash pad, an exterior curbed concrete wash pad, and an exterior dry well (CH2M HILL, 2012a). Runoff from vehicle washing on the asphalt pad discharged directly to the surrounding soil or a nearby drainage ditch along Payne Road. The ditch drained to a culvert that passed under Tate Road, down a hillside to a feeder stream of Holton Pond.

In 1979, a concrete wash pad and holding tank was constructed northwest of Building 841 and the sink discharge was connected to the holding tank. Thus, in addition to receiving the rinse water from this pad, the holding tank also received the drainage from the sinks in Building 841. Rinse water draining into this holding tank was periodically pumped out and disposed offsite by a contractor.

Pesticides used in the pest control operations included chlorinated hydrocarbons, carbamates, hormones, fungicides, and wood preservatives. Herbicides were also used. Although pest control practices prior to 1962 cannot be documented, aerial spraying with 4,4'-dichlorodiphenyltrichloroethane (DDT) for control of mosquitoes was reportedly carried out until the late 1950s (Hart and Associates, 1984). Aerial spraying for control of Japanese beetles was done in the period from 1969 to 1971.

In 1991, a removal action was performed for the soil and sediment in the drainage ditch, culvert, and surrounding areas. Although this removal action was not specifically identified in the associated documentation to address OU-2, this removal action focused on OU-2 media impacted by discharges from the former pesticide shop. Confirmatory sampling included in this removal action ensured that total DDT compound concentrations (that is, total 4,4'-DDT, 4,4'-dichlorodiphenyldichloroethene, and 4,4'-dichlorodiphenyldichloroethane) and total chlordane concentrations did not exceed MDE criteria.

Implementation of the OU-1 remedy for Site 17 began on December 22, 1998. On February 2, 1999, after removing approximately 2,300 cubic yards (yd³) of soil at a total cost of \$2.6 million, excavation was halted. It became apparent to the Navy that the cost to complete the excavation and incineration of soil significantly exceeded the original ROD estimate. The Navy determined that additional soil samples were needed to better quantify the volume of soil requiring excavation and offsite incineration, and to determine the cost to complete the OU-1 remedial action.

Analytical results for sampling conducted in May 1999, February 2000, and April 2000 indicated excavation of an additional 2,300 yd³ of soil (that is, double the original volume) and an additional \$3.2 million would be required to complete the remedial action specified in the OU-1 ROD. Due to the unexpectedly high cost to complete the OU-1 remedial action, the Navy, with the concurrence of USEPA and in consultation with MDE, evaluated alternatives to complete the remedial action in a more expedient and economical manner while protecting human health and the environment.

Upon evaluation of additional alternatives, a ROD Amendment was issued on June 25, 2001, with a revised approach to the remedy. The revised remedy required excavation of an approximately 420 yd³ of soil for dieldrin and arsenic that exceeded the groundwater protection criteria and to protect leaching of these constituents into the groundwater. In addition, the remedy called for placement of a soil cover, and ICs in areas that posed a risk to human health and ecological receptors. Excavated soil was transported off site for incineration and disposed at a RCRA-compliant landfill. The remedial action for the OU-1 ROD Amendment began in June 2001, and was completed on October 31, 2001.

7.2.1 Land and Resource Use

Presently, Site 17 is a grass field with no structures (above or below ground) related to former site operations remaining. Site 17 is not currently in use and the Navy does not currently intend to build at Site 17 (NAVFAW Washington, 2006).

7.2.2 Contamination

Pest control shop operations resulted in the discharge of pesticides and associated residues to onsite soil, and soil, sediment, and surface water in discharge ditches adjacent to the site that flowed to Pond 3. Residues from pesticide and herbicide containers and wastewater from cleaning containers, spraying equipment, and washing vehicles used in pesticide and herbicide application were released at this site. An estimated 300 to 400 gallons of pesticide rinsate were generated per day. Until 1979, the rinsate was released to an interior mixing sink, an exterior wash-rack and asphalt wash pad, an exterior curbed concrete wash pad, and an exterior dry well (CH2M HILL, 2012a). Runoff from vehicle washing on the asphalt pad discharged directly to the surrounding soil or a nearby drainage ditch along Payne Road. Flow in the drainage ditch passed through a culvert beneath Tate Road and eventually discharged to Pond 3 (Holton Pond).

The Agency for Toxic Substances and Disease Registry (ATSDR) conducted a public health assessment that included fish consumption in Pond 3 (Holton Pond) (ATSDR, 1997). The report concluded that no apparent public health hazard was present, but fish consumption should be limited to 19 meals per year for a maximum of 7 years. The NAS has placed restrictions on the number of fish an individual should consume each year from Pond 3.

7.2.3 Basis for Taking Remedial Action

The basis for taking action for Site 17 OU-1 was the potential for direct exposure to contaminated soil and migration of contamination into the groundwater (TetraTech, 1998). The Site 17 OU-1 ROD (TetraTech, 1998) established remediation criteria for Site 17 soil for the protection of human health and groundwater.

The basis for taking action at Site 17 OU-2 is to minimize the potential ecological risk from DDT compounds in sediment in Holton Pond and two tributaries that discharge to the pond. Risks to human health from exposure to OU-2 media indicated the potential risks were within acceptable ranges.

7.3 Remedial Actions

7.3.1 Remedy Selection

OU-1

The ROD for NAS Patuxent River Site 17 OU-1 was signed by the Navy and USEPA on December 16, 1998. Implementation of the remedy was halted at the site in March 1999, when it became apparent that the cost to complete the work would significantly exceed the original estimate due to the increase in contaminated soil requiring excavation and offsite disposal. A ROD Amendment that revised the final remedy was signed by the Navy and USEPA on June 25, 2001. The RAOs were to:

- Protect potential human receptors from direct exposure to soil containing pesticides at levels exceeding human health remediation criteria
- Protect potential ecological receptors from direct exposure to soil containing pesticides and inorganic contaminants at levels exceeding ecological remediation criteria that will be determined via site-specific toxicity tests during the RD phase
- Protect groundwater from migration of arsenic and dieldrin mobilized from the soil

The remedy reduced the potential risk to human health and the environment associated with exposure to surface and subsurface soils at the site. The remedial action for Site 17 OU-1 consisted of the following elements:

- Excavation and disposal at an offsite incinerator of approximately 26,000 ft³ of soil that posed an unacceptable risk to human health, and the subsequent regrading and covering of the entire site with a 2-foot soil and gravel cover and vegetation
- ICs to limit future property development to industrial use and to protect the integrity of the soil and gravel cover

OU-2

The ROD for NAS Patuxent River Site 17 OU-2 was signed by the Navy and USEPA in September 2006. Implementation of the remedy began in January 2009 and was completed in October 2009. The RAO for OU-2 was to:

- Minimize the ecological risk posed by pesticide-contaminated sediment in Holton Pond

7.3.2 Remedy Implementation

OU-1

The remedial action for OU-1 was initiated in December 1998 and completed October 31, 2001. There was a hiatus in March 1999, when it became apparent that the cost to complete the work exceeded the original estimate due to the increase in contaminated soil requiring excavation and offsite disposal. Remedial activities included:

- Removal of all aboveground and underground structures within the site boundary, excavation of contaminated soils, and re-grading of the site to promote stormwater runoff
- Removal of contaminated soil hot spots, re-grading existing site soil, and installation of a minimum 24-inch-thick soil cover composed of clean, offsite soil.

During the initial phase of contaminated soil removal conducted from December 1998 through March 1999, an estimated 2,975 tons of contaminated soil was removed and transported to Culvert City, Kentucky, for disposal. During the second phase of soil removal, begun in July 2001, an estimated 832 tons of soil were removed from the site and transported to Bennett Environmental, Inc., in St. Ambroise, Quebec, for treatment (incineration) and disposal.

LUCs for Site 17 OU-1 were documented in November 2007 (CH2M HILL, 2011e). The final O&M manual (CH2M HILL, 2011f) for OU-1 was submitted to USEPA and MDE in October 2011. The focus of the LUCs and the O&M manual is to ensure that the integrity of the soil/ gravel cover is maintained to prevent exposure to pesticide-contaminated subsurface soil that remains onsite.

OU-2

The remedial design was completed in October 2008. The remedial action was completed in October 2009.

The remedial action for Site 17 OU-2 consisted of the following elements:

- Draining water from Holton Pond in conjunction with breaching of the dam
- Clearing and grubbing a total estimated area of 4.5 acres in 3 separate areas (A, B, and C) to gain access
- Excavation of sediments in areas A, B, and C to a depth of 1 foot, 2 feet, and 2 feet below sediment surface, respectively
- Sampling and characterization of excavated material to meet the sediment action level of 2,100 µg/kg for total DDT
- Solidification of excavated sediments to assist in physical handling and load out
- Offsite disposal of excavated sediments with elevated pesticide levels: approximately 883 tons from Area A, 1,563 tons from Area B, and 412 tons from Area C
- Collection of confirmation samples from the bottom of the excavated areas and lateral samples from adjacent areas
- Implementation of LUCs with the objective of limiting fish consumption until such time that it can be verified that fish consumption limits are no longer necessary for pesticides in the fish

During the remedial action at Site 17 OU-2, the Navy decided that repairs to the Holton Pond dam would not be made concurrently with implementation of the OU-2 remedy. As a result, dewatering of Holton Pond and removal

of pesticide-contaminated sediments with total DDT concentrations exceeding cleanup criteria occurred independently from dam repairs.

There are currently no O&M costs to report for Site 17 OU-2. There is no O&M required Site 17 OU-2; subsequently, there will not be any O&M costs in the future.

7.4 Progress Since Last Five-Year Review

OU-1

There were no deficiencies noted during the 2008 Five-Year Review Report and no recommendations or follow-up actions were warranted for Site 17 OU-1. To date, there are no O&M costs associated with implementing the remedy for OU-1. An access road was constructed across Site 17 in the spring of 2003 to provide access to a nearby field that is rented to local farmers.

7.4.1 OU-1 Land Use Restrictions

Since the last Five-Year Review period, LUCs (CH2M HILL, 2011e) have been implemented to prohibit excavation at Site 17 to protect the integrity of the soil and gravel cover and to limit future land development to industrial uses, as required by the OU-1 ROD. Figure 7-2 shows the LUC boundary applicable to OU-1. The LUC implementation actions include annual site inspections, submittal of an annual LUC inspection report to the USEPA and MDE, and CERCLA Five-Year Reviews of the Site 17 LUCs.

7.4.2 OU-1 Site Inspections

The only O&M activities for OU-1 are to maintain surface drainage channels, prevent erosion of the soil cover, and maintain vegetation.

OU-2

This is the second Five-Year Review for Site 17 OU-2. Since the 2008 Five-Year Review, the remedial action began in February 2009 with the dewatering of Holton Pond. In July 2009, the dam creating the pond was breached and a dewatering channel was cut through the dam to prevent the pond from refilling during and after the remedial action. In October 2009, the remedial action was completed, thus mitigating potential risk associated with total DDT concentrations in the sediment of Holton Pond. The construction closeout report was finalized in July 2010. Site 17 OU-2 cannot be removed from the ER Program until fish tissue samples are collected to show that unrestricted fish consumption would not pose an unacceptable risk to human health after the dam is reconstructed.

7.4.3 OU-2 Land Use Restrictions

LUCs (CH2M HILL, 2011e) have been implemented for OU-2 to require observation of the NAS Patuxent River Fish Advisory limiting fish consumption from Holton Pond, as required by the ROD for OU-2.

7.5 Technical Assessment

Question A: Is the remedy functioning as intended by the decision document?

OU-1

The remedy for OU-1 is functioning as intended. The removal of contaminated soil and subsequent installation of a soil cover has been effective in isolating contaminants from potential receptors. LUCs have been implemented to prohibit activities that would compromise the integrity of the soil cover. There are currently no required O&M activities for OU-1, and no formal monitoring is being conducted. There are no opportunities for optimization.

OU-2

The remedy for OU-2 is functioning as intended. The dewatering of Holden Pond and the removal of the sediment has been effective in removing pesticides from potential receptors. LUCs have been implemented to limit fish consumption from Holton Pond should the pond be refilled in the future. There are currently no required O&M activities for OU-2. Once the dam is reconstructed, fish tissue sampling will be performed to assess risk to human health from fish consumption. There are no opportunities for optimization.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, remediation action objectives used at the time of the remedy selection still valid?**OU-1**

The exposure assumptions, toxicity data, cleanup levels, and RAOs are still valid for Site 17 OU-1.

OU-2

The exposure assumptions, toxicity data, cleanup levels, and RAOs for Site 17 OU-2 are still valid.

Question C: Has any other information come to light that could question the protectiveness of the remedy?

No additional information has been identified during this review that would call into question the protectiveness of the remedies for OU-1 and OU-2.

7.6 Technical Assessment Summary

7.6.1 Issues

TABLE 7-1

Site 17 OU-1 and OU-2 Issues Identified

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
No issues identified for Site 11 OU-1 or OU-2	N/A	N/A

7.6.2 Recommendations and Follow-up Actions

TABLE 7-2

Site 17 OU-1 and OU-2 Recommendations and Follow-up Actions

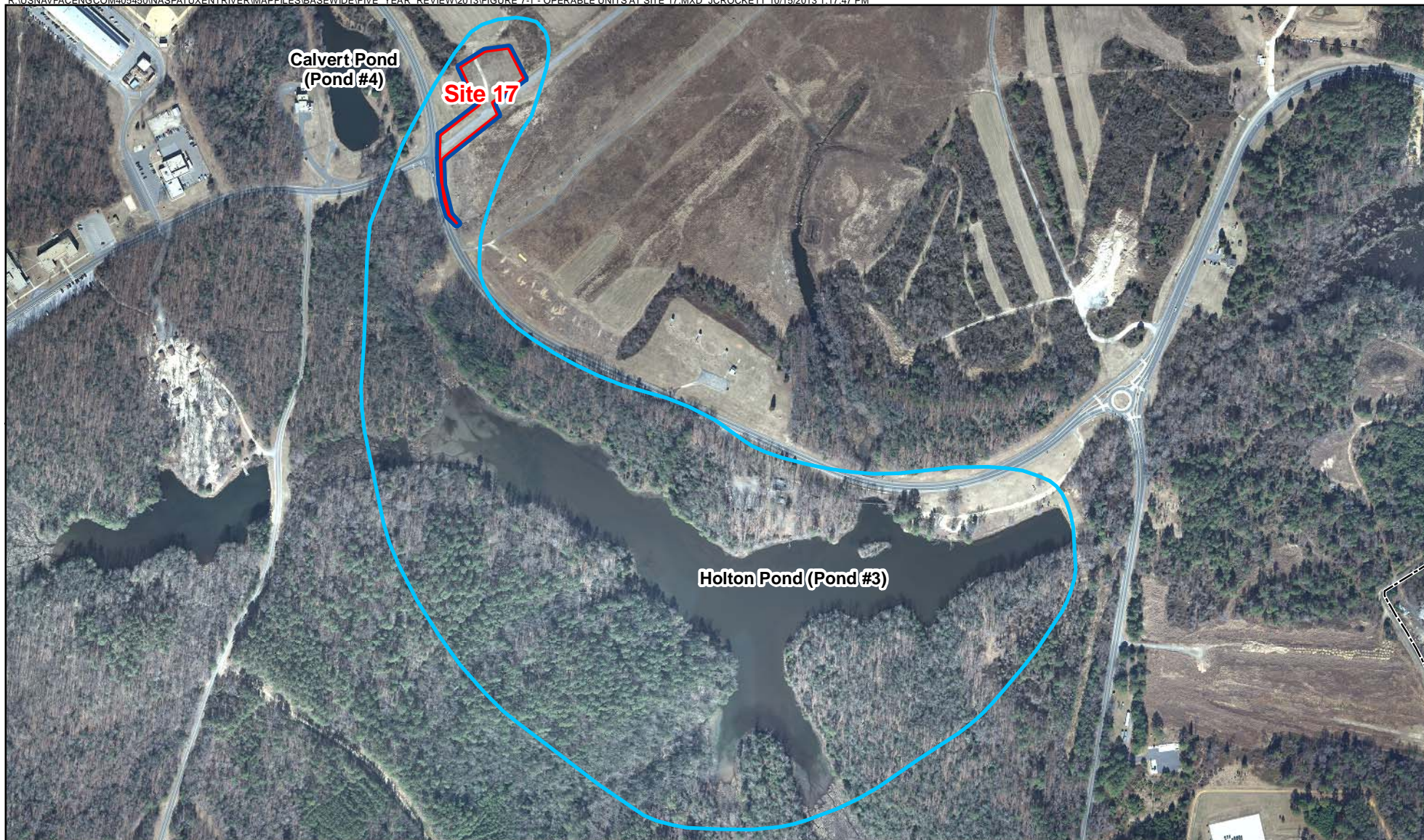
Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
No issues identified	No follow-up actions recommended	NAVFAC Washington	USEPA		N	N

7.7 Protectiveness Summary

The remedy for Site 17 OU-1 is protective of human health and the environment under current conditions, and exposure pathways that could result in unacceptable risks are being controlled. The remedy for Site 17 OU-2 is also protective of human health and the environment under current conditions, and exposure pathways that could result in unacceptable risks are being controlled.

7.8 Next Review

The next Five-Year Review for Site 17 OU-1 and OU-2 will be required in 2018.



Legend

- IR Site Boundary
- Operable Unit (OU) 1 Boundary
- Operable Unit (OU) 2 Boundary



0 300 600
Feet

2009 Aerial Photography

Figure 7-1
Operable Units at Site 17
2013 Five-Year Review Report
NAS Patuxent River
St. Mary's County, Maryland

CH2MHILL



Legend

- LUC Boundary, Site 17 OU-1
- IR Site Boundary



0 75 150
Feet

2009 Aerial Photography

Figure 7-2
Site 17 LUC Boundary
2013 Five-Year Review Report
NAS Patuxent River
St. Mary's County, Maryland

CH2MHILL

SECTION 8

Site 28 – Transformer Storage Area

Site 28, Transformer Storage Area, (Figure 8-1) is located south of Peary Road in the central portion of the station. The ROD addresses remedies for contaminated soil at Site 28. The ROD for “Excavation and Offsite Disposal” for soil and “No Action” for groundwater is currently in regulatory review and is anticipated to be signed for Site 28 in December 2013.

8.1 Site Chronology

The chronology of Site 28 is summarized as follows.

Date	Event
March 1984	IAS of NAS Patuxent River, Maryland (Hart and Associates, 1984)
1985-1987	NACIP Program Confirmation Study
1989-1990	EE/CA
1991	IRI conducted
February-March 1991	Soil removal action to meet the requirements of Toxic Substances Control Act (TSCA)
2004	Site Investigation
2007-2011	RI Fieldwork
August 2012	Final RI completed (CH2M HILL, 2012b)
November 2012	Final FS completed (CH2M HILL, 2012c)
July 2013	Final PRAP (CH2M HILL, 2013)
Anticipated December 2013	‘Excavation and Offsite Disposal’ for soil and ‘No Action’ for groundwater ROD

8.2 History and Background

Site 28 is located south of Peary Road in the central portion of the station (Figure 1-2). The site is currently grass-covered and essentially flat. Site 28 was used from the 1940s until 1973 for the storage of vintage 1940s and 1950s transformers. It has been reported that as many as 100 transformers were stored on concrete pads at the site.

Site 28 was included in the IAS conducted at NAS Patuxent River in 1984. The study recommended that a confirmation study be performed for Site 28 because of the potential for PCB-contaminated oils to have leaked from transformers into soil adjacent to the storage pad.

Soil samples were collected during the confirmation studies conducted at Site 28 between 1985 and 1987. Pesticides were detected in soil samples. PCBs were detected in all surface soil samples and two of the subsurface soil samples. Based on the sampling results, it was confirmed that a hazard to human health and the environment was present at Site 28.

Site 28 was included in the RFA conducted at NAS Patuxent River in 1988-1989 (A.T. Kearney, Inc., and Earth Technology Corporation, 1989). Stains were observed on the concrete pads during the RFA site visit. An EE/CA report was prepared in 1989-1990 for a removal action at Site 28. The EE/CA report summarized the results of pre-response activities and developed, evaluated, and recommended potential response action alternatives. The remedial alternative recommended by the EE/CA for Site 28 was the excavation and disposal of contaminated soil

in an offsite RCRA-compliant landfill. A PCB soil cleanup action level of 50 parts per million (ppm) was set by MDE for Site 28.

An IRI was conducted at Site 28 in 1991. A fuel odor was detected in the soil during borehole drilling, and PCBs were detected in one groundwater sample.

A soil removal action was performed at Site 28 in February and March 1991. A total of 2,300 tons of contaminated soil were excavated from the site and transported to a landfill cell in Model City, New York, that met the requirements of the TSCA. Samples collected after the removal of the contaminated soil confirmed that a PCB soil cleanup action level of 10 ppm was achieved for Site 28. The excavation was backfilled with well-graded and contaminant-free fill, compacted, and covered with a layer of topsoil.

More recently, constituents in soil and groundwater at Site 28 were characterized during RI sampling activities conducted between 2007 and 2011. The Final RI (CH2M Hill, 2012b) was completed in August 2012 followed by the Final FS (CH2M Hill, 2012c) in November 2012. The ROD for "Excavation and Offsite Disposal" for soil and "No Action" for groundwater is anticipated to be signed for Site 28 in December 2013.

8.2.1 Land and Resource Use

Currently, Site 28 is a grassy area that is not in use. Potential future site use will likely be the same as current site use, or could change to residential use if Site 28 is developed in the future.

8.2.2 Contamination

Constituents in soil at Site 28 were characterized during RI sampling activities conducted between 2007 and 2011. A summary of key RI activities and findings is presented as follows:

- Surface soil, subsurface soil, and groundwater samples were collected at Site 28 and analyzed for VOCs, SVOCs including PAHs, PCBs, pesticides, and metals. At least one constituent from each analyte group was detected in each medium.
- Findings of the HHRA indicate that Aroclor-1260 in surface soil and combined surface and subsurface soil at the site pose a risk to future residents and industrial workers. Findings of the ERA also indicate that risks from Aroclor-1260 are possible to upper and lower trophic level receptor populations.
- Aroclor-1260 was the only site-related constituent released to surface soil and subsurface soil as a result of historical activities at Site 28. The sources of PCBs at Site 28 (transformers and affected soil around the former storage area) have been removed.
- The distribution of PCBs in surface and subsurface soil in the downgradient drainage area of Site 28 is consistent with overland flow patterns from the former transformer storage location via a culvert to the wetland area north of Peary Road.
- Hexavalent chromium will be analyzed in soil during the presumptive remedy at Site 28 to determine if the chromium is in the hexavalent form.
- VOCs and SVOCs detected in groundwater are attributable to the underground storage tank (UST) sites (former Sites 565/566 and active Site 612) adjacent to Site 28 and are not related site activities at Site 28. Constituents detected in the groundwater are exempted from inclusion in the CERCLA program, and cannot be further addressed through a CERCLA action. Based on these risk management decisions made by the Tier 1 Partnering Team, there are no site-related COCs identified in groundwater.

8.2.3 Basis for Taking Remedial Action

The basis for taking action for Site 28 is to address concentrations of PCBs in soils that exceed the project action level (PAL). Based on the results of the HHRA and ERA performed during the RI, remedial action is necessary to address PCBs in the soils by hypothetical future residents at Site 28. The Site 28 FS (CH2M Hill, 2012c) established a PAL of 1,000 µg/kg or 1 ppm for total PCB concentrations for Site 28 soil for the protection of human health and ecological receptors. These potential risks would prohibit future unrestricted land use for the site (CH2M HILL, 2012c).

8.3 Remedial Actions

8.3.1 Remedy Selection

The ROD for Site 28 is anticipated to be signed in the December 2013. The remedy selected in the ROD is excavation and off-site disposal for soil and “No Action” for groundwater. The selection of “No Action” for groundwater, despite the fact that the HHRA identified potential carcinogenic risks and non-carcinogenic hazards to future residential and industrial receptors from potable use of groundwater, is appropriate because the contaminants found in groundwater are attributable to petroleum from the former UST sites in the vicinity of Site 28, and are not mixed with contaminants from site-related activities. Therefore, these petroleum contaminants are excluded from CERCLA and are not to be addressed under a CERCLA action (NAVFAC Washington, 2013a). Implementation of the remedial action is scheduled to begin in early 2014. The RAO for Site 28 is to:

- Prevent or minimize exposure to PCBs in soil at concentrations that exceed the acceptable risk level for unrestricted land use

8.3.2 Remedy Implementation

The remedial action for Site 28 is anticipated to begin in early 2014 and be completed in mid-2014. The remedial action for Site 28 will consist of the following elements:

- Site preparation including installation of erosion controls and vegetation clearing
- Construction activities, including excavation of soil exceeding PAL for soil and culvert removal and replacement
- Confirmation soil sampling, hexavalent chromium sampling, characterization of excavated soil for waste classification as hazardous or nonhazardous, offsite disposal of soil to an appropriate landfill, and site restoration.

There are currently no O&M costs to report for Site 28. Once the remedy is implemented, there will be no O&M required; subsequently, there will not be any O&M costs in the future.

8.4 Progress Since Last Five-Year Review

The progress to report for Site 28 since the 2008 Five-Year Review period is that a ROD with “Excavation and Offsite Disposal” for soil and “No Action” for groundwater is anticipated to be signed in December 2013. This is the first Five-Year Review for Site 28, and subsequent reviews will not be necessary because waste will not be left on site and the site will be removed from the ER Program.

8.5 Technical Assessment

A technical assessment of the remedy for Site 28 is not applicable at this time because the remedy has not been implemented as of preparation of this 2013 Five-Year Review.

8.6 Protectiveness Summary

The remedy for Site 28 will be protective of human health and the environment under current conditions, and exposure pathways that could result in unacceptable risks will be controlled or eliminated once the remedy has been implemented. If the remedy works as designed, the remedy will also be protective of human health and the environment under future conditions, and is expected to result in unrestricted use when the remedial action is completed.

8.7 Next Review

After the remedy has been completed, Site 28 will be removed from the ER Program. Future Five-Year Review of Site 28 will not be required.



Site 28

Legend
□ IR Site Boundary



0 50 100
Feet

2009 Aerial Photography

Figure 8-1
Site 28
2013 Five Year Review Report
NAS Patuxent River
St. Mary's County, Maryland

CH2MHILL

SECTION 9

Site 39, Waste PCE Storage Area (Building 503)

An action ROD was issued for Site 39 in October 2007. The ROD addresses concentrations of chlorinated VOCs in groundwater that exceed MCLs. The RD was initiated in August 2008, which resulted in selection of 3-D Microemulsion (3DME) for injection and the RD and remedial action activities were completed in August 2009.

9.1 Site Chronology

The chronology for Site 39 is summarized as follows.

Date	Event
1988	Removal of three USTs
1997	SSI
2001-2005	RI phases
2007	FS
October 23, 2007	ROD signed
August 2009	Remedial action implemented
2009 – 2012	3-Yr Performance Monitoring
February 2012	Final LUC Remedial Design completed

9.2 Background

Site 39 is located in the center of NAS Patuxent River, north of Calvert Pond along Tate Road (Figure 9-1). Building 503 is the only building at the site; the former boiler building has been demolished. Building 503 is surrounded by paved areas for parking, landscaped areas, and forested areas. The land surface near the site gently slopes southward toward Calvert Pond, and surface water from the site drains toward a small intermittent stream that flows to the south through a culvert under Tate Road and discharges into the headwaters of Calvert Pond. Calvert Pond ultimately discharges into Holton Pond which discharges to Pine Hill Run. Pine Hill Run flows to the Chesapeake Bay (CH2M HILL, 2007d).

PCE leaked from the former USTs into groundwater. PCE and its associated degradation products have adversely impacted groundwater quality in the shallow water table aquifer. However, the degradation process has stalled and several chlorinated VOCs are present in groundwater at concentrations exceeding MCLs.

9.2.1 Site History

Building 503 was formerly used as a laundry and dry cleaning facility from the 1940s until 1989. The facility cleaning system used PCE that was stored in three USTs located near the southwestern corner of Building 503. PCE released from the leaking USTs and subsurface piping along the building's northwestern side has impacted shallow groundwater. The laundry equipment and plumbing were removed from the building interior in the late 1980s. The USTs were also removed from the site in 1988. Presently, the building is used for storage and is not occupied (CH2M HILL, 2007d).

9.2.2 Land and Resource Use

The site is no longer used as a dry cleaning facility. Site 39 is currently used for equipment storage, and is not occupied on a regular basis (NAVFAC Washington, 2007b). The Navy does not currently intend to build at Site 39, and there are no foreseeable changes to the current industrial land use at the site (CH2M HILL, 2007d).

9.2.3 Contamination

The source of contamination at Site 39 was the former USTs on the southwestern side of Building 503 used to store PCE for dry cleaning operations, and subsurface piping on the northwestern side of Building 503. The USTs have been removed from the site. The subsurface piping was connected to a wash drain and a series of floor drains that collected any liquids spilled onto the floor of the former laundry facility (CH2M HILL, 2007d). There are no continuing sources of PCE or other chlorinated VOCs present at the site.

Spills or leaks of PCE or other liquids migrated vertically downward through the soil column from the point of release (that is, a UST or underground pipe), resulting in chlorinated VOCs migrating into shallow groundwater. Impacts to shallow groundwater were identified in two localized areas near Building 503: one near the subsurface pipe on the northwestern side of Building 503 (Area A), and the other near the former location of the USTs on the southern side of Building 503 (Area B) (Figure 9-1).

The primary groundwater contaminants identified at Site 39 are chlorinated VOCs, specifically PCE, TCE, cis-1,2-dichloroethene (DCE), and VC, in shallow groundwater. Concentrations of these chemicals contribute to potential human health risks calculated for future use of shallow groundwater by residents based on an assumption of future unrestricted (that is, residential) land use. TCE, cis-1,2-DCE, and VC are breakdown products produced by the natural degradation of PCE. PCE was used as a cleaning agent for laundry and dry cleaning operations performed at Building 503.

UST removal and limited site investigation was conducted at Site 39 in 1988. In 1997, Site 39 was included in a screening investigation with four other NAS Patuxent River sites to collect data and assess the need for additional investigation of each site (CH2M HILL, 1999b). The RI was completed in 2007.

A baseline performance monitoring event conducted in March 2009 to assess the baseline site conditions prior to injection, verify the extent of the VOC plumes, and to verify that natural attenuation processes were occurring at Site 39. The March 2009 sampling results showed an incomplete delineation of the South Plume. In addition, the sampling results showed significantly different constituent concentrations for Area A compared to the RI findings. As a result, the Tier I Partnering Team agreed to conduct a supplemental sampling event at Site 39 to confirm the results of the March 2009 baseline performance monitoring event and to augment the data set with additional sampling locations and analyses. The supplemental sampling was conducted in June 2009.

Based on the pre-remediation data collection and baseline performance monitoring events conducted in March 2009, and confirmed by the groundwater data collected in June 2009, the extent of contamination at Site 39 had changed since completion of the RI. Area A naturally attenuated to levels less than MCLs for the COCs since the last sampling event, conducted in December 2005 for the RI. The plume in Area B migrated downgradient and naturally attenuated to levels slightly exceeding MCLs. Therefore, the target area for the injection of 3DMe was reduced. Area A was not actively treated using 3DMe injection. Area B was reduced to include only the area south of Tate Road. From August to October 2009, 3DMe was injected using direct-push technology (DPT) within the treatment zone of Area B.

9.2.4 Basis for Taking Remedial Action

Based on the long-term monitoring events, the extent of contamination at Site 39 has changed slightly since the initial 2009 injection. COC concentrations in Area A appear to fluctuate, with an overall increase in concentrations although the areal extent does not appear to have changed significantly. The plume extent in Area B appears to have decreased, however COC concentrations are still above MCLs in some wells. These potential risks would prohibit future unrestricted land use for the site (CH2M HILL, 2007d).

The results of the baseline and the 6-month post-injection sampling indicated that the downgradient extent of the South plume had not been adequately characterized. Therefore, the impact of the groundwater contamination on the nearest stream was unknown and posed a concern. To address this concern, the 9-month post-injection sampling event included pore water sampling. The results of the pore water sampling indicated that the groundwater contamination had reached the nearest stream, as demonstrated by the detection of the degradation products of PCE and TCE. Vinyl chloride was detected at 5.2 mg/l in one location. However, these

results may reflect the condition of the groundwater before it was affected by biostimulation. Given the average groundwater velocity at the site (53 feet/year) and that the pore water sample locations were 80 to 110 feet downgradient of the injection area, at 9 month after the injection it is likely that the influence of the biostimulation may not have reached the downgradient. Therefore these detections are likely remnants of downgradient migration of contamination prior to treatment.

9.3 Remedial Actions

9.3.1 Remedy Selection

The ROD for Site 39 was by the Navy and USEPA on October 23, 2007 (NAVFAC Washington, 2007b). The following RAOs were identified to develop remedial alternatives for shallow groundwater at Site 39:

- Reduce and eliminate future potential risk from ingestion of shallow groundwater contaminated with PCE and its degradation products
- Achieve significant and measurable reductions in contaminant concentrations throughout the areas of impacted groundwater when compared to baseline conditions
- Achieve federal MCLs within a reasonable time period, currently estimated to be 3 to 6 years
- Prevent future use of shallow groundwater as a potable water source until acceptable risk levels are achieved
- Prevent inhalation of vapors containing PCE and its degradation products in buildings at the site until acceptable risk levels are achieved for the chlorinated VOCs detected in shallow groundwater

A performance-based remedy approach will be used to determine when the RAOs are achieved. After initial cleanup criteria (federal MCLs) are met, the cumulative risk level will be calculated to ensure the cumulative risks are within the acceptable risk range (CH2M HILL, 2007e).

The selected remedy, consisting of In-Situ Bioremediation, Monitoring, and ICs, includes the following major components:

- Pre-design investigation to obtain detailed data to support the RD
- Baseline groundwater monitoring to establish existing conditions prior to implementing the remedy, and to assess the presence of microorganisms and the potential need for chemical additives to support In-Situ Bioremediation
- Initial injection of an appropriate compound into shallow groundwater to enhance natural biodegradation of PCE and its degradation products in two localized areas (Areas A and B)
- Post-injection performance monitoring of VOC concentrations and other natural attenuation parameters to evaluate the effectiveness and progress of the remedial action
- Potential injection of additional compounds and/or potential microorganisms or other stabilizing chemicals, as needed, based on evaluation of the performance monitoring results to attain cleanup criteria
- Implementation of ICs to restrict groundwater use until risk levels are acceptable and cleanup criteria are achieved

In accordance with USEPA guidance, the Navy will prepare and submit to the USEPA and the MDE a Basis of Design document containing design specifications for the Selected Remedy and ICs. Subsequently, a remedial action work plan will be developed with detailed instructions and actions for implementing the remedy. The Navy will also submit a closeout report after RAOs are met and ICs are no longer necessary.

9.3.2 Remedy Implementation

From August to October 2009, 3DMe was injected using DPT at 36 injection locations within the treatment zone of Area B. The 3DMe substrate was delivered as a microemulsion solution into the subsurface with a dilution rate of

approximately 50:1 volume of water per volume of substrate. Because of the low alkalinity of the groundwater, a sodium bicarbonate buffer was mixed into the 3DMe at a concentration of 500 milligrams per liter (mg/L).

The injection points were positioned at a spacing of approximately 10 to 15 feet on center to provide adequate coverage for injection of 3DMe in the area of the surficial aquifer with the greatest concentrations of total VOCs. This injection point spacing assumed a radius of influence of 5 to 15 feet. The injection target interval was between 4 and 17 feet bgs, with the exception of 16 injection points within the vicinity of monitoring wells PX-S39-MW-02 and PX-S39-MW-05. The injection target interval for these points was 4 to 12 feet bgs because of a shallow clay layer.

Long-term performance monitoring has occurred at Site 39, including 13-month, 18-month, 21-month, 24-month, 27-month, 29-month, 32-month, 34-month, and 38-month long-term performance monitoring sampling events.

9.4 Progress Since last Five-Year Review

This is the second Five-Year Review for Site 39. Since the 2008 Five-Year Review, the remedial action began in March 2009 with the pre-remediation data collection. In August 2009, the remedy was implemented which included an injection of 3DMe.

Based on the long-term monitoring events, the extent of contamination at Site 39 has changed slightly since the initial 2009 injection. COC concentrations in Area A appear to fluctuate, with an overall increase in concentrations although the areal extent does not appear to have changed significantly. The plume extent in Area B appears to have decreased, however COC concentrations are still above MCLs in some wells.

The proposed additional injection area will include two injection locations, one in Area A and one in Area B. For Area A, COC exceedances have been detected in wells PX-S39-MW-07 and PX-S39-MW-14 during the past year. Increasing concentrations of PCE at well PX-S39-MW-07 suggest the presence of a small residual source zone in this area that slowly leaches PCE into groundwater. In addition, small amounts of PCE may be leaching from the former sanitary sewer or washwater lines, or bedding around these lines, which run from Area A to the creek on the southwest side of Tate Road. These lines are located just upgradient of wells PX-S39-MW-07 and PX-S39-MW-14, which show PCE exceedances in groundwater in Area A. For these reasons, the planned direct-push technology (DPT) injection locations are focused around the vicinity of these two wells and the former underground lines. The target vertical injection interval for Area A corresponds to the depth of the screened interval of monitoring wells PX-S39-MW-07 and PX-S39-MW-14 (approximately 4 to 16 ft bgs).

For Area B, COC exceedances have been detected in wells PX-S39-MW-2, PX-S39-MW-5, and PX-S39-MW-17. The planned DPT injections are focused on the area around these wells. Historically, concentrations north of Tate Road have also exceeded MCLs. Because of the concern for a continuous source underneath of Tate Road, DPT injection is also proposed in this area. The target vertical injection interval for Area B is similar to that conducted during the previous injection event, approximately 4 to 12 ft bgs for the 11 DPT locations closest to Tate Road and between approximately 4 to 17 ft bgs for the 4 DPT points furthest south from Tate Road. The target vertical injection interval for the 3 DPT locations in area north of Tate Road is approximately 5 to 15 ft bgs.

9.4.1 Land Use Restrictions

Since the last Five-Year Review period, LUCs (CH2M HILL, 2012d) have been implemented to limit future development and construction activities that might interfere with required monitoring at the site and could result in exposure to contaminated groundwater at Site 39 and to prevent the potable use of and limit exposure to groundwater beneath and in the immediate vicinity of Site 39 until the detected constituents exceeding the Federal Maximum Contaminant Levels (MCLs) decrease to acceptable risk levels. Figure 9-2 shows the LUC boundary applicable to Site 39. The LUC implementation actions include annual site inspections, submittal of an annual LUC inspection report to the USEPA and MDE, and CERCLA Five-Year Reviews of the Site 39 LUCs.

9.5 Technical Assessment

Question A: Is the remedy functioning as intended by the decision document?

The remedy for Site 39 is functioning as intended. The in-situ bioremediation has been effective at reducing COC concentrations. However, another injection has been recommended where MCL exceedances remain. LUCs have been implemented to restrict groundwater use (CH2M HILL, 2012d). O&M activities for Site 39 include groundwater LTM. There are no opportunities for optimization.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, remediation action objectives used at the time of the remedy selection still valid?

The exposure assumptions, cleanup levels, and RAOs are still valid for Site 39.

Question C: Has any other information come to light that could question the protectiveness of the remedy?

No additional information has been identified during this review that would call into question the protectiveness of the remedies for Site 39.

9.6 Technical Assessment Summary

9.6.1 Issues

TABLE 9-1
Site 39 Issues Identified

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
PCE concentrations at Area A in groundwater continue to fluctuate, with an overall increase in concentrations.	Y	Y
In Area B, MCL exceedances continue	Y	Y

9.6.2 Recommendations and Follow-up Actions

TABLE 9-2
Site 39 Recommendations and Follow-up Actions

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
Increasing PCE concentrations at Area A	Substrate injection to optimize subsurface conditions	NAVFAC Washington	USEPA	2016	Y	Y
COC exceedances in Area B	Substrate injection to optimize subsurface conditions	NAVFAC Washington	USEPA	2016	Y	Y

9.7 Protectiveness Summary




The remedy, including LUCs, for Site 39 is protective of human health and the environment under current conditions, and exposure pathways that could result in unacceptable risks are being controlled.

9.8 Next Review

The next Five-Year Review for Site 39 will be required in 2018.



Legend

-  Monitoring Well
-  IR Site Boundary
-  Localized Area Boundary

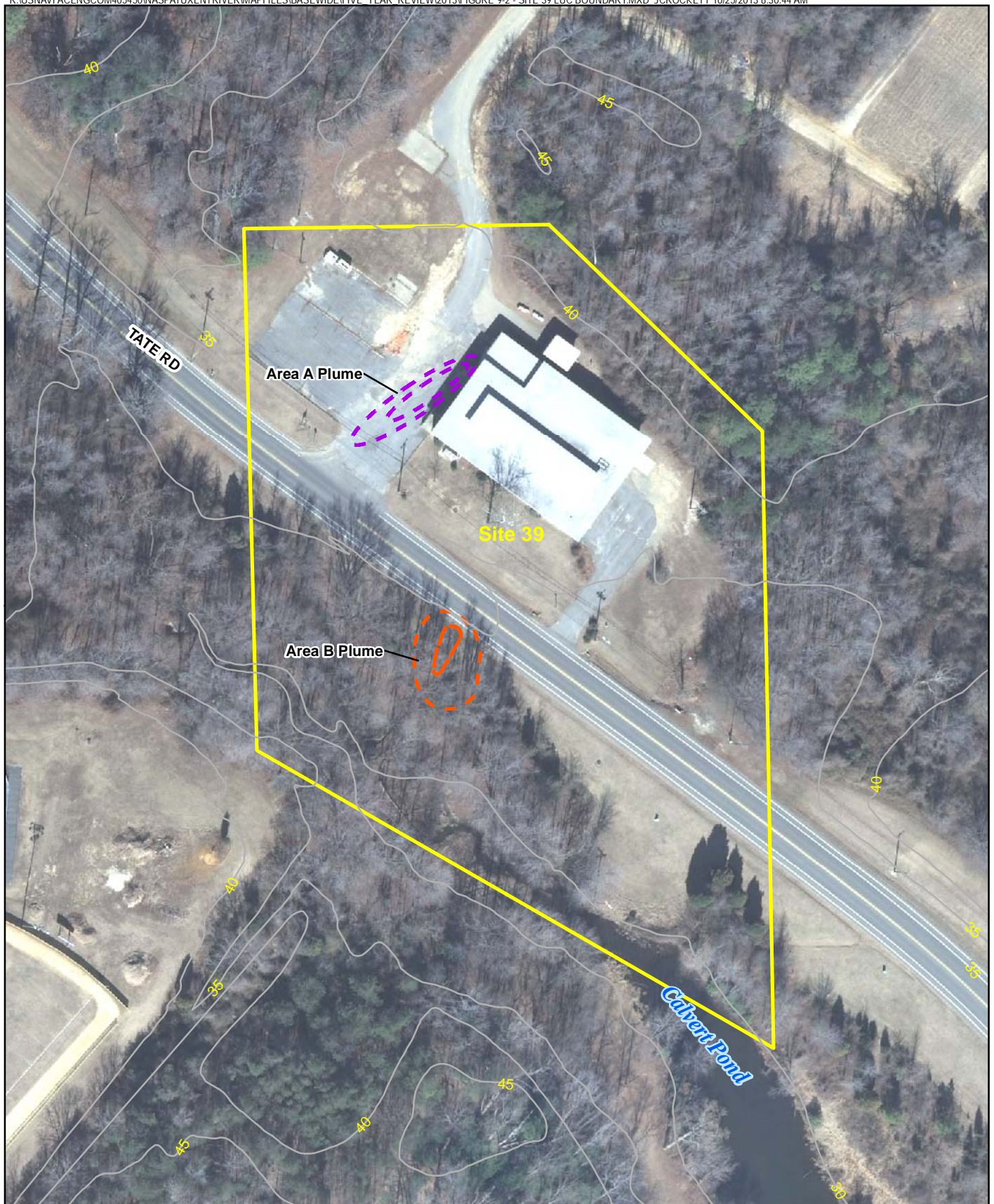


0 100 200
Feet

2009 Aerial Photography

Figure 9-1
Site 39
2013 Five-Year Review Report
NAS Patuxent River
St. Mary's County, Maryland

CH2MHILL



Legend

- Elevation Contours (5 ft Interval)
- Inferred Plume 'B' Extent (TCE, PCE concentrations in ug/L based on July 2012 data)
- Inferred Plume 'A' Extent (TCE, PCE concentrations in ug/L based on July 2012 data)
- Land Use Control Boundary

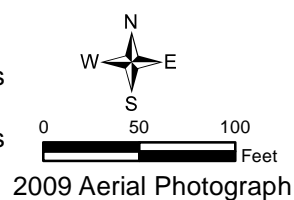


Figure 9-2
Site 39 LUC Boundary
2013 Five-Year Review Report
NAS Patuxent River
St. Mary's County, Maryland

CH2MHILL

SECTION 10

Interim Remedial Action Sites

There are two sites (Sites 3 and 4) at NAS Patuxent River that have interim remedial actions completed or in progress, but that do not have a ROD, with the exception of Sites 4, OU-2, OU-3, OU-4, and OU-6. The history of these sites, discussion of the chronological events, and discussion of the remedial actions, rationale, and implementation, are presented herein as part of the base-wide Five-Year Review for completeness to document the current status of the NAS Patuxent River ER sites that are being addressed by the CERCLA process.

10.1 Site 3, Disposal Site near Goose Creek

Site 3 occupies approximately 21.9 acres and is located west of the southern edge of Goose Creek in the northeastern quadrant of the facility. The site was used for approximately 6 months during 1959 and 1960 as the main solid waste disposal site for the station. Waste reportedly disposed at the site included cardboard, plastic, paper, landscaping debris, hospital wastes, cesspool and sewage sludge, demolition and construction debris, POL products, paints, antifreeze, solvents, pesticides, asbestos, and photographic laboratory wastes. It is also reported that the liquid wastes were occasionally burned (flushed) at the site.

Site 3 was included in the IAS conducted for NAS Patuxent River in 1984. A confirmation study was not recommended for Site 3 because relatively minor quantities of waste had been disposed and the liquids had been flashed. An SSI was completed in 1999. The investigation indicated the fill area appears to be contained and stable. Only trace quantities of VOCs and pesticides were detected in in-situ groundwater samples, and elevated levels of pesticides were detected in sediment samples.

Site 3 is not in use. An Expanded Site Investigation (ESI) was initiated in 2006 to provide additional data necessary to definitively determine the need for an RI. As a result of Navy, USEPA, and MDE review of the draft ESI report, a decision was made to proceed directly to generation of an RI report. The draft RI report was submitted to USEPA and MDE in July 2009. As a result of USEPA and MDE comments, the Navy decided to collect additional data to fill some data gaps, and to prepare an EE/CA report to support an NTCRA prior to completing the RI. The supplemental RI investigation to fill the data gaps was completed in April 2012 and the EE/CA was completed in June 2012 (CH2M Hill, 2012e). An action memorandum was signed by the Navy in August 2012 and the NTCRA began in October 2012 and is currently in progress.

Site 3 Chronology

Date	Event
March 1984	IAS of NAS Patuxent River, Maryland (Hart and Associates, 1984)
1999	SSI
2006	ESI initiated
2011-2012	Supplemental RI Investigation
2012	Draft RI completed
June 2012	EE/CA completed
August 2012	Signed Action Memorandum
October 2012	Start of NTCRA
Anticipated 2014	NTCRA completed
Anticipated 2014	Final RI completed

10.2 Site 4, Hermanville Disposal Site

Site 4 occupies approximately 76.4 acres, and is located on the east and west sides of Shaw Road and south of Pine Hill Run near the southern boundary of the station (Figure 10-1). A portion of Site 4 is also located west of Shaw Road. Pond 3 is located northwest of the site across Shaw Road. METCOM is located east of the site. In general, the ground surface slopes gently to the north. North and northwest of the site, the elevation of the ground surface abruptly decreases to Pine Hill Run and Pond 3 (Holton Pond), respectively. Site 4 is currently used for occasional military training activities.

Between 1943 and 1960, an approximately 8-acre area in the central portion of the site was used for the disposal of an estimated 63,900 tons of solid and liquid waste generated by the station. Approximately 63,750 tons of cardboard, paper, and plastic were disposed at Site 4, along with 150 tons of waste oil, paint cans, antifreeze products, solvents, paint thinners, photographic laboratory wastes, asbestos, pesticides, hospital wastes, cesspool and sewage sludge, demolition and construction debris, and landscaping wastes. Disposal operations consisted of placing waste material in trenches that were approximately 10 feet wide, 10 feet deep, and 300 feet long. The waste material was regularly burned and covered with soil. The area west of Shaw Road reportedly was used for random dumping of soil and construction debris after Shaw Road was rerouted.

Site 4 was included in the IAS conducted for NAS Patuxent River in 1984. The study recommended that a confirmation study be performed for Site 4 because a potential existed for metals and organic constituents to migrate from the disposal trenches via groundwater to Pond 3, Pine Hill Run, and adjacent wetlands. Also, the potential was identified for constituents to accumulate in the aquatic organisms and enter the food chain.

The NACIP Program confirmation study was conducted at Site 4 between 1985 and 1987 (CH2M HILL, 1991). Metals and low concentrations of VOCs were detected in groundwater samples. An IRI was conducted at Site 4 in 1991. Low concentrations of VOCs were detected in groundwater samples. RI field work was conducted at Site 4 in 1996 and 1997. A surface geophysical survey was conducted to confirm landfill boundaries estimated from aerial photographs, and to identify potential buried debris west of Shaw Road. Test pits were excavated to confirm the geophysical survey results. Additional RI activities were conducted in 2003 and 2004. An interim remedial action was conducted in 2003-2004 to remove surface debris and wastes from the trench landfill areas. During the interim remedial action, four locations were identified with lead concentrations exceeding regulatory criteria for hazardous waste. A phosphate amendment was mixed with the soil from these areas and the soil sampled and analyzed for lead concentrations using the Toxicity Characteristic Leaching Procedure (TCLP). Once analytical results indicated that the soil was not hazardous, the material was loaded and hauled to Charles County Sanitary Landfill, Maryland. Approximately 80,170 tons of waste material were removed or excavated from both Sites 4 and 5 and disposed offsite as nonhazardous waste (Shaw Environmental, Inc., 2005).

Site 4 was divided into multiple OUs to facilitate addressing the data quality objectives developed for the RI of different areas of Site 4. In addition, site-wide groundwater for Sites 4 and 5 was designated as a separate OU. The OU designations for areas of Site 4 are as follows:

- OU-1 (designated as Area 4A in previous documents) is west of Shaw Road
- OU-2 (Area 4B in previous documents) is the southern portion of Site 4
- OU-3 (Area 4C in previous documents) is the central portion of Site 4 encompassing the former excavation areas
- OU-4 (Area 4D in previous documents) is the northern portion of Site 4
- OU-5 is Site 5 in its entirety
- OU-6 is site-wide groundwater combined for both Sites 4 and 5

The OUs designated for Sites 4 and 5 correspond to separate physical areas where different activities were conducted at various times during the site history that may have contributed to the release of different potential contaminants to the site.

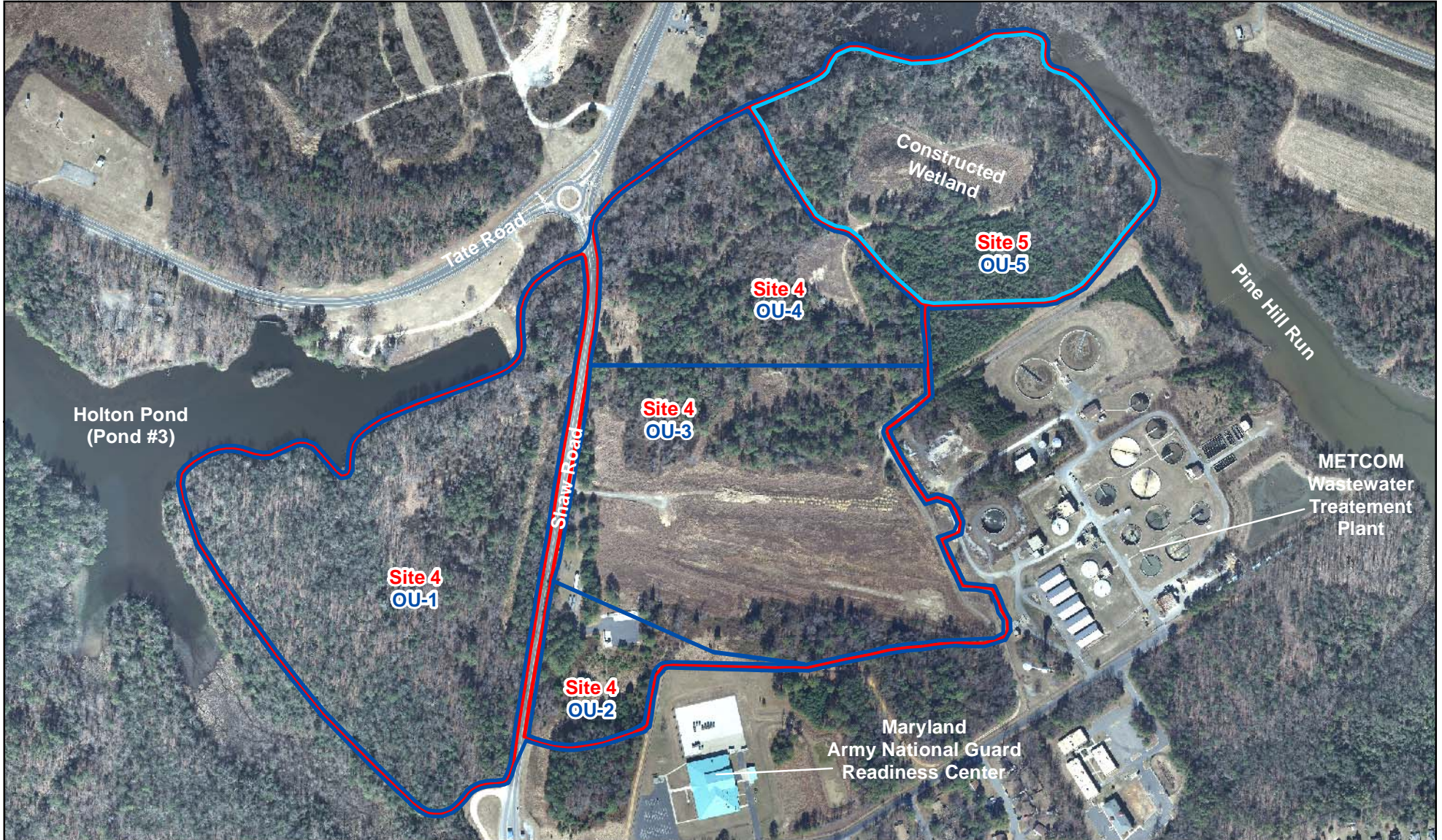
Additional data were collected in 2006 and 2007 to fill remaining data gaps and complete the RI for all the Site 4 OUs. Ecological risks associated with Site 4 were addressed as part of the Pine Hill Run watershed Baseline ERA completed in 2003. Site 4 is being addressed concurrently with Site 5, and the RI findings are presented in a single ten volume RI report being prepared to address both Sites 4 and 5, with separate volumes for each of the six individual OUs. The draft RI report for Site 4 OU-1 was completed in 2009. The ROD for Site 4 OU-2, 3, and 4 was signed in September 2009 and the ROD for Site 4 OU-6 was signed in October 2008.

For OU-1, an EE/CA report was completed in November 2010 (CH2M Hill, 2010c) for an NTCRA and the Action Memorandum was executed by the Navy in May 2011. The NTCRA for OU-1 began in October 2011 to remove waste material disposed in an unpermitted landfill but was stopped in November 2011 due to the discovery of MEC and asbestos containing material (ACM). After approval of the ESS by NOSSA and DDESB and revisions to the work plans, the NTCRA was restarted in November 2012 to handle MEC and ACM during removal operations. Currently, the NTCRA is moving forward with procedures in place for handling MEC and ACM. The final RI for OU-1 (Area 4A) is currently on hold pending completion of the NTCRA. The NTCRA was completed in November 2013. A 'no further action' ROD for OU-1 is anticipated in 2014.

The site chronology is summarized as follows.

Site 4 Chronology

Date	Event
March 1984	IAS of NAS Patuxent River, Maryland (Hart and Associates, 1984)
1985 and 1987	NACIP Program Confirmation Studies
1991	Final Confirmation Study (CH2M HILL, 1991)
1994	IRI
1995	Parcels A and B Investigation
1996 – 1997	Initial RI Field Activities
March 2003	RI activities conducted to fill data gaps identified by a detailed historical aerial photograph review
April 2003	Jurisdictional wetland delineation completed
June 2003	EE/CA completed for OU-3 and OU-4
June 2003-November 2004	NTCRA conducted for OU-3 and OU-4
2005-2006	Post-Removal Geophysical Survey Activities for OU-2, OU-3, and OU-4
2006-2007	Additional supplemental RI activities completed
October 3, 2008	'No Remedial Action' ROD for OU-6 (site-wide groundwater) signed
December 2008	Draft RI for OU-1 completed (on hold until after NTCRA complete)
September 29, 2009	'No Action' ROD for soil associated with OU-2 (Area 4B), the former fire-fighting training area, and 'No Further Action' ROD for soil associated with OU-3 (Area 4C), former disposal trenches, and OU-4 (Area 4D), surface disposal area.
November 2010	OU-1 (Area 4A) EE/CA completed
May 2011	OU-1 (Area 4A) Signed Action Memorandum
November 2011	OU-1 (Area 4A) Start of NTCRA



Legend

- IR Site Boundary
- Operable Unit (OU) 1, 2, 3, 4, 6 Boundary
- Operable Unit (OU) 5 Boundary



0 250 500
Feet

2009 Aerial Photography

Figure 10-1
Operable Units at Site 4
2013 Five Year Review Report
NAS Patuxent River
St. Mary's County, Maryland

SECTION 11

Administrative Closure – No Action and Desktop Evaluation Sites

There is one site (Site 44) at NAS Patuxent River that was identified as not requiring any action via a Site Investigation Report since the 2008 Five-Year Review Report. The history of these sites and discussion of the chronological events are presented herein as part of the base-wide Five-Year Review for completeness to document the NAS Patuxent River ER sites that have been removed from the ER Program. Reviews of these sites will not be needed in subsequent Five-Year Review reports.

The following is a summary of the NAS Patuxent River ER Sites that have been closed (Table 11-1). The sites are highlighted according to the Five-Year Review Report in which their closure was first documented. Site 44 which was closed since the 2008 Five-Year Review is briefly discussed in the remainder of this section.

TABLE 11-1

Summary of all NAS Patuxent River ER Sites that have been closed as of the 2013 Five-Year Review Period

NAS Patuxent River ER Site	Closure Document	Document Date
<u>Site 5 OU-5</u>	<u>'No Further Action' ROD</u>	April 8, 2013
<u>Site 5 OU-6</u>	<u>'No Action' ROD</u>	October 3, 2008
<u>Site 6/6A OU-2</u>	<u>'No Further Action' ROD</u>	October 3, 2008
<i>Site 13</i>	<i>Desktop Evaluation (DE) decision document</i>	<i>May 21, 2002</i>
Site 14	Preliminary assessment/Site Investigation Report	February 2006
Site 15	USEPA letter indicating no further investigation required	December 5, 2003
Site 16	DE decision document	May 11, 2005
Site 18	DE decision document	October 27, 2005
Site 19	DE decision document	May 11, 2005
Site 20	DE decision document for no further action under CERCLA	December 6, 2005
Site 22	DE decision document	May 11, 2005
Site 24	'No Further Action' ROD (NAVFAC Washington, 2007a)	October 2, 2007
Site 25	DE decision document	April 4, 2006
<i>Site 27</i>	<i>'No Action' ROD</i>	<i>September 29, 2003</i>
Site 29	'No Action' ROD	October 2, 2007
Site 30	DE decision document	February 7, 2006
<i>Site 35</i>	<i>DE decision document</i>	<i>December 2003</i>
<i>Site 36</i>	<i>DE decision document</i>	<i>June 2002</i>
<i>Site 37</i>	<i>DE decision document</i>	<i>November 2002</i>
<i>Site 38</i>	<i>DE decision document</i>	<i>August 20, 2002</i>
Site 40	DE decision document	February 7, 2006
Site 41	'No Further Action' ROD (NAVFAC Washington, 2005b)	September 26, 2005
Site 43	Site Investigation Report	September 2008
<u>Site 44</u>	<u>Site Investigation Report</u>	<u>March 2011</u>
Site 45	DE decision document	March 17, 2004

TABLE 11-1

Summary of all NAS Patuxent River ER Sites that have been closed as of the 2013 Five-Year Review Period

NAS Patuxent River ER Site	Closure Document	Document Date
Site 46	'No Further Action' ROD	September 23, 2004
Site 47	ESI Report recommended no further action	March 1, 2006
Site 48	Final Closeout Report	April 2005
Site 49	Final Closeout Report	April 2005
Site 50	Final Closeout Report	April 2005
Site 52	DE decision document	July 12, 2005
Site 53	<i>DE decision document</i>	<i>June 2002</i>

Notes:

Underlined font indicates site closeout was first documented in the 2013 Five-Year Review

Bold font indicates site-closeout was first documented in the 2008 Five-Year Review Report*Italics indicate site-closeout was first documented in the 2003 Five-Year Review Report*

11.1 Site 5 OU-5 and OU-6, Disposal Site Near Pine Hill Run

To manage remedial action priorities at Site 5, it was divided into two OUs – OU-5 and OU-6. OU-5 consists of Site 5 in its entirety, and OU-6 consists of the groundwater for both Sites 4 and 5. In April 2013, the Navy and USEPA signed a ROD for “No Further Action” for OU-5 soil and “No Action” for OU-5 sediment and surface water (NAVFAC Washington, 2013b). A “No Remedial Action” ROD was signed by the Navy and USEPA for Sites 4 and 5 OU-6 in October 2008 (NAVFAC Washington, 2008c).

Site 5 consists of approximately 10 acres along Pine Hill Run, northeast of Site 4, and adjacent to the larger Hermanville Disposal Site portion of Site 4. Site 5 is located near the southern boundary of the NAS, north of Gate 3 and east of Holton Pond (Pond 3). The north end of Site 5 borders the estuary portion of Pine Hill Run. Based on historical aerial photographs, from 1957 through 1965 Site 5 was used as a disposal area for rubble, demolition wastes, bulk metal parts, and empty drums. According to the IAS report, a large amount of debris originating from the construction of NAS runways in the early 1940s was placed in this location. Surface debris, consisting primarily of construction debris, was visible at Site 5 prior to conducting the NTCRAs completed in 2003-2004 and 2011-2012.

Although Site 5 was included in the 1984 IAS conducted for NAS Patuxent River, a confirmation study was not recommended because of the largely inert nature of the material disposed at the site. However, the site was designated in the FFA as one of the sites requiring completion of an RI/FS. The initial RI field work was conducted at Site 5 in 1996 and 1997. RI activities continued in 2003-2004, and were completed in 2006. An interim remedial action was conducted in 2003-2004 to remove surface debris from Site 5. Approximately 4,964 tons were removed from the ground surface at Site 5 and disposed off-site as nonhazardous waste (Shaw Environmental, Inc., 2005).

The RI and interim remedial action for Site 5 were conducted concurrently with the RI and interim remedial action for Site 4. As a result of grouping investigation and remedial activities together for Sites 4 and 5, Site 5 was designated as a separate OU in its entirety, specifically OU-5. In addition, groundwater for Sites 4 and 5 was combined into a separate OU designated as OU-6.

Portions of Site 5 are currently used for seasonal recreational activities such as hiking. The site is currently not developed. Potential future site use will likely be the same as current site use, or could change to residential use if Site 5 is developed in the future.

Site 5 OU-5 and OU-6 Chronology

Date	Event
March 1984	IAS of NAS Patuxent River, Maryland (Hart and Associates, 1984)
1985	Confirmation Study
1994	Interim Remedial Investigation
1995	Parcels A and B Investigation
2002	Commencement of RI/FS activities (currently ongoing)
March 2003	RI activities conducted to fill data gaps identified by a detailed historical aerial photograph review
April 2003	Jurisdictional wetland delineation completed
June 2003	Engineering Evaluation/Cost Analysis (EE/CA) completed
June 2003-November 2004	Non-time-critical removal action (NTCRA) conducted
April 2005	Munitions and explosives of concern (MEC) geophysical screening
2006	Additional supplemental RI activities completed
October 3, 2008	'No Remedial Action' ROD for OU-6 (site-wide groundwater) signed
April 2011	NTCRA at Site 5 OU-5 (soil, sediment, surface water) began, but stopped when MEC was found
December 2011	The Site 5 OU-5 NTCRA was resumed when an Explosives Safety Submission (ESS) was completed and approved by the Naval Ordnance Safety and Security Activity (NOSSA) and the Department of Defense Explosive Safety Board (DDESB)
August 2012	NTCRA completed and Removal Closeout Report completed
April 8, 2013	ROD signed for 'No Further Action' for soil and 'No Action' for sediment and surface water (Site 5 entirety)

11.2 Site 6/6A OU-2, Bohnyard Site

To manage remedial action priorities at Site 6/6A and meet station needs, Site 6/6A was divided into two OUs – OU-1 and OU-2. OU-1 consists of soil in the area adjacent to the Fuel Farm where drums and tanks historically were stored at Site 6, and the area to the east referred to as Site 6A. OU-2 consists of groundwater, and both surface water and sediment downgradient of Sites 6 and 6A. The RD and remedial action schedule for OU-1 was implemented prior to that of OU-2.

The future land use of Site 6A changed from industrial to unrestricted land use due to planned future use of the site and vicinity for construction of an aircraft hangar and associated structures, including an office building and parking lot (NAVFAC Washington, 2004). To address the emerging future reuse of Site 6A, a post-ROD investigation was conducted in 2003 to specifically address potential risk for exposure pathways and receptors not evaluated by the original HHRA. The post-ROD investigation did not identify unacceptable risks for soil based on unrestricted land use. Consequently, a ROD Amendment for OU-1 was signed by the Navy and USEPA for Site 6A soil in September 2004. The ROD for OU-2 was signed by the Navy and USEPA in October 2008 (NAVFAC Washington, 2008a).

Site 6 is located south of Bohne Road in the northwestern quadrant of the station, adjacent to the Fuel Farm and east of the intersection of Bohne Road and the taxiway. For purposes of the ER Program, Site 6 consists of two discrete areas referred to as Site 6 and 6A, as shown on Figure 11-1. Site 6 is approximately 10 acres in size and comprises the western portion of the ER site where a fuel truck parking area was constructed. Site 6A, approximately 4 acres in size, refers to the portion of Site 6 to the east of the fuel truck parking area that was previously used as an equipment and materials storage area (the Bohnyard) (NAVFAC Engineering Field Activity Chesapeake, 1999; CH2M HILL, 2007b).

Site 6

Between 1943 and 1949, the area was used for the disposal of approximately 6,000 tons (107,000 cubic feet [ft³]) of fly-ash and bottom-ash material generated by the NAS coal-fired power plant. This material reportedly covered the area in a 6-inch-thick layer of ash. Between 1949 and approximately 1955, the area was used as the Defense Property Disposal Office (DPDO) storage yard. Beginning approximately 1955, an estimated 8 tons of liquid wastes were stored at the site in drums and a partially buried 10,000-gallon tank. Many of the drums stored at the site reportedly leaked. The drums were removed prior to inception of the ER Program, and the tank was removed in 1992. In October 1989, an approximately 6-inch layer of sludge from the St. Mary's County Wastewater Treatment Plant was spread over the site. Liquid wastes stored at Site 6 included POL wastes, solvents, paint thinners, paints, and oil-water separator sludge. Scrap metal and faulty or unused vehicles and equipment were also stored at Site 6 (CH2M HILL, 2007b).

Site 6A

Historical aerial photographs from 1952 indicated that drums were also stored on Site 6A. The materials stored in the drums (solvents, paints, pesticides, oil-water separator sludge, and paint thinner) at Site 6 may have been contained in the drums stored at Site 6A (NAVFAC Engineering Field Activity Chesapeake, 1999).

Site 6 is currently used as a parking area for aircraft refueling trucks in accordance with the OU-1 ROD. The parking area serves as a cover for the contaminated soil. Site 6A is currently used as a storage area for equipment and other materials. Land use restrictions have been implemented for Site 6 as part of the OU-1 ROD to prevent intrusive activities where the soil cover/cap was installed, limit future land development to industrial uses for the site, and prohibit use of groundwater beneath the site (CH2M HILL, 2007b).

A ROD Amendment for Site 6A OU-1 was issued September 2004 because changes in future land use for Site 6A were identified, specifically the construction of a new aircraft hangar, aircraft apron, office building and parking lots. Due to this proposed change in land use, the previously selected remedy was no longer consistent with the Navy's originally intended land use plan, and as a result, additional receptors and exposure pathways needed to be evaluated to address potential human health risks.

In response to the change in future land use, additional samples were collected and analyzed to better characterize conditions for Site 6A OU1, and to evaluate potential risks associated with the new land use. The risk assessment results indicated there were no unacceptable risks to human health or the environment associated with surface or subsurface soils at Site 6A. Therefore, it was concluded that a "No Remedial Action" determination was appropriate for Site 6A OU-1, and that the site was suitable for UU/UE at that time and in the future (CH2M HILL, 2007b). At this time, the planned future land use for Site 6/6A and vicinity (aircraft parking area, aircraft hangar and apron, office building, and parking lots) is not anticipated to change.

The sources of potential contamination at Site 6 are primarily related to former storage of liquid wastes in drums and the partially buried 10,000-gallon waste oil tank, historical disposal of fly ash and bottom ash, and the placement of wastewater treatment plant sludge. Contaminants identified at Site 6/6A are briefly summarized below.

Since VOCs, including trichloroethene (TCE) and some of its degradation products were detected in soil samples during the OU-1 investigation, an RI was conducted for OU-2 with consisted of groundwater, and both surface water and sediment downgradient of Sites 6 and 6A. The maximum concentrations of most contaminants were detected within the boundary of Site 6, primarily in shallow soil samples (0 to 2 feet below ground surface). Several metals were detected at concentrations exceeding background concentrations. PCBs and polycyclic aromatic hydrocarbons (PAHs) were also detected in soil and sediment in an area downgradient of Site 6 that historically received and currently receives precipitation runoff from Site 6. No risk was found in groundwater; however, concentrations of PCBs and PAHs in soil and sediment had the potential for adverse impacts to ecological receptors further downgradient within the watershed. Therefore, a NTCRA was conducted in 2008 for soil and sediment downgradient of Site 6/6A addressed potential risks to ecological receptors in the Gardiner's Pond/Supply Pond. Groundwater at Sites 6/6A OU-2 was not part of the remedy and no action was required. At

the completion of the NTCRA, no risk to groundwater, surface soil, and sediment was concluded as part of the OU-2 RI. A no further action ROD for OU-2 was signed in October 2008.

Site 6/6A Chronology

Date	Event
March 1984	IAS of NAS Patuxent River, Maryland (Hart and Associates, 1984)
1984	Confirmation study conducted at Site 6. Soil, groundwater, surface water, and sediment samples collected.
1989	RFA conducted by USEPA to assess historical waste handling and disposal practices at Site 6 and other areas of the NAS. Site 6 was identified in the RFA as a location of potential contamination (A.T. Kearney, Inc., and Earth Technology Corporation, 1989)
1991	IRI completed.
October 1992	Installation Restoration Activities included removal, cleaning, and scraping of 10,000-gallon waste oil tank. Contents of tank removed and disposed offsite; no offsite soil disposal associated with tank removal
1995	EE/CA (Halliburton NUS Corporation, 1995); soil and groundwater samples collected and EE/CA report prepared to evaluate response options for contaminated soil at Site 6
1996	Preliminary ERA prepared to assess potential risks to ecological receptors from contaminants for Site 6
1996	Site 6A identified
1997	Pre-design OU-1 Investigation. Additional surface and subsurface soil sampling to provide additional information regarding nature and extent of contamination and to evaluate characteristics of the Bohneyard soil
1998	Baseline HHRA conducted
1999	Focused Feasibility Study (FFS) prepared to: 1) provide basis for soil remedial action; 2) evaluate and screen remedial technologies; and 3) develop remedial action alternatives
1999	Proposed Remedial Action Plan completed
September 29, 1999	OU-1 ROD signed for Site 6 soil
October 18, 1999	OU-1 Remedial Action start
May 10, 2001	OU-1 Remedial Action completion
February 2003	Post-ROD investigation work plan approved
September 23, 2004	OU-1 ROD Amendment approved for Site 6A soil
May 2004	OU-2 RI started
January 2008	OU-2 EE/CA completed for NTCRA to address soil and sediment
April 22, 2008	OU-2 NTCRA started for soil and sediment removal
May 30, 2008	OU-2 NTCRA completed for soil and sediment removal
July 2008	OU-2 RI completed
October 2008	OU-2 ROD signed for downgradient soil and sediment, surface water and groundwater
July 2011	Revised Final LUC Remedial Design for OU-1 completed

11.3 Site 44, Fill Area

Site 44 is located on the eastern portion of the NAS, and consists of approximately 17 acres of wooded area adjacent to Navy housing. The area may have been used as a fill area from 1957 until 1965.

A Site Investigation was conducted in April 2010 and consisted of the collection and laboratory analyses of surface soil, subsurface soil, surface water, sediment, and groundwater samples. The results of the Site Investigation showed that most of the organic compounds identified in the various media were sporadically or infrequently detected and that there was no apparent trend in the spatial distribution of detected constituents. Furthermore, the ranges of detected constituents were not indicative of a source area and did not warrant further investigation with respect to characterizing the nature and extent of the constituents. Therefore, Site 44 has been closed and removed from the ER Program.

Site 44 Chronology

Date	Event
1988-1989	RFA conducted at NAS Patuxent River (A.T. Kearney, Inc., and Earth Technology Corporation, 1989)
2010	Site Investigation conducted
2011	Site Investigation Report completed, recommending no further action

Other Sites

The remaining ER sites at NAS Patuxent River that have not had remedial actions and do not have a ROD are presented in this section. Information on the site chronology, background and anticipated schedule is presented for each of the remaining sites in the ER Program.

12.1 Site 2, Disposal Site near Pond 1

Site 2 is located on the southern and northeastern shores of Pond 1 in the northwestern quadrant of the station. The area around Pond 1 is wooded and rises steeply from the surface of the pond. Pond 1 occupies the former site of a wetland that was located at the bottom of a ravine.

The site was used in 1942 and 1943 during the construction of the station for the disposal of construction debris, miscellaneous station wastes, and 55-gallon drums containing various types of oils. An unknown quantity of waste was disposed at the site. In 1950, Pond 1 was created when the wetland was cleaned out using draglines and subsequently dammed. During the construction of Pond 1, partially buried 55-gallon drums were found in the vicinity of what is now the southern shore of the pond. Leachate from partially buried drums was observed during the excavation of the pond.

Site 2 was included in the IAS study conducted at NAS Patuxent River in 1984. A confirmation study was recommended for Site 2 because of the potential for the residual organic contamination present in the soil and groundwater to migrate into Pond 1 and accumulate in the bottom sediments and/or fish tissue. Pond 1 is stocked for recreational fishing, so a potential exists for organic contaminants to enter the food chain.

An NACIP Program confirmation study was conducted at Site 2 between 1985 and 1987 (CH2M HILL, 1987). No VOCs or elevated concentrations of inorganic constituents were detected in surface water samples collected at Site 2. Elevated concentrations of metals and low levels of organic compounds were detected in sediment samples, and low concentrations of SVOCs and pesticides were detected in sediment and fish samples. The pesticides detected at Site 2 may be the result of historical widespread use of pesticides at NAS Patuxent River to control insects.

An IRI was conducted at Site 2 in 1991. Low concentrations of metals, one PCB compound and several pesticides were detected in sediment samples. Low concentrations of metals and one pesticide were detected in fish samples.

In April 2011, a magnetometer survey was conducted at Site 2 as part of the RI scoping and the magnetic anomalies were investigated in August 2011. The anomalies that could not be attributed to known sources (such as metallic debris) will be further investigated or removed to extent practical as part of the RI. RI fieldwork was completed in October 2012 and the RI report is in progress.

Site 2 is not in use. The RI for Site 2 is currently in progress. An ecological investigation of the watershed that contains Site 2 has been completed. The ATSDR conducted a public health assessment at NAS Patuxent River in 1995 and 1996 (ATSDR, 1997). ATSDR concluded that until additional data were available for a risk assessment, fish consumption from Pond 1 should be limited to 19 meals per year for 7 years.

Site 2 Chronology

Date	Event
March 1984	IAS of NAS Patuxent River, Maryland (Hart and Associates, 1984)
1985-1987	NACIP Program Confirmation Study (CH2M HILL, 1987)
1991	Installation restoration activities conducted
1995-1996	Public Health assessment conducted by ATSDR
2011	Magnetometer survey and anomaly investigation
2011-2012	RI fieldwork completed
2013	RI reporting in progress

12.2 Site 9, Former Drum Disposal Area (Building 665)

Site 9 is located on the northern embankment of the Supply Pond in the northwestern quadrant of the facility. The Supply Pond (Site 8 in the IAS report) is located between Building 665 and Bonnie Road, and discharges via Beaver Pond to the Patuxent River. The site is heavily vegetated with scrub grasses, briars, and trees.

Site 9 covers approximately 5 acres and was used for disposal of drums, aluminum pipe, trashcans, sheet metal, and tires. Over 100 drums were disposed at the site. Most of the drums were empty, although some reportedly contained an asphalt-like material. Many of the drums were partially buried.

Site 9 was included in the 1984 IAS conducted at NAS Patuxent River. A confirmation study was not recommended for Site 9 because the materials deposited at this site consisted of construction-derived material (primarily hardened asphaltic materials) that are neither toxic nor mobile.

At the direction of EFA CHES (predecessor to NAVFAC Washington), a limited confirmation study of Site 9 was conducted in April 1984 because of the unknown contents of the drums and the proximity of the site to the Supply Pond. A drum inventory was completed, and two drum samples and seven soil samples were collected at the site. Approximately 180 drums were inventoried at the site. A general cleanup in 1984 removed nearly all surface debris.

Groundwater, surface water, and sediment samples were collected in and near the Supply Pond in June 1988 as part of site characterization activities for the Fuel Farm (formerly ER Site 7). VOCs were detected in groundwater samples, oil and grease and metals were detected in surface water samples, and elevated concentrations of metals were detected in sediment samples.

An SSI was conducted for Site 9 in 1993. VOCs were detected in groundwater samples at concentrations above the respective federal MCL for drinking water. Low concentrations of VOCs, SVOCs, pesticides, and metals were detected in soil and sediment samples, and elevated concentrations of metals also were detected in surface water samples.

Site 9 is not in use. A work plan for the initial phase (Phase I) of the RI was completed in January 2011. Phase I fieldwork and a wetland delineation of Supply Pond were completed in March 2011. A work plan amendment for Phase II of the RI was submitted for Navy chemist review in April 2012. Fieldwork for Phase II is was completed in November 2012. The RI report is currently in progress.

Site 9 Chronology

Date	Event
March 1984	IAS of NAS Patuxent River, Maryland (Hart and Associates, 1984)
April 1984	Limited Confirmation Study of drums and surface debris
June 1998	Groundwater, surface water, and sediment samples were collected in and near the Supply Pond as part of site characterization activities for the Fuel Farm (formerly ER Site 7)
1993	SSI
2011-2012	Phase I and Phase II fieldwork for RI completed
2013	RI reporting in progress

12.3 Site 21, Sludge Drying Beds

Site 21 is west of and behind Building 600, the former wastewater treatment plant located in the south-central portion of the station. From the mid-1940s until 1970, eight bays were used to dry sludge generated by the sewage treatment plant. An estimated 300 yd³ of sewer sludge were generated per year. The dried sludge, consisting of 25 percent solids, was removed annually and disposed at the station landfill in operation at the time.

Site 21 was included in the IAS conducted at NAS Patuxent River in 1984. A confirmation study was not recommended for Site 21 because the sludge had been removed from the site and no evidence of contamination was observed.

Site 21 was included in the RFA conducted at NAS Patuxent River in 1998-1999. No documented releases were recorded in the files reviewed as part of the RFA for Site 21. No evidence of a release was observed at the site during the RFA site visit (A.T. Kearney, Inc., and Earth Technology Corporation, 1989).

The sludge drying beds at Site 21 are no longer in use. The treatment plant was shut down in 1970 and dismantled in 1986. Since then, the site has been allowed to revegetate. An RI is currently in progress to characterize the site and the draft RI report is currently in regulatory review.

Site 21 Chronology

Date	Event
March 1984	IAS of NAS Patuxent River, Maryland (Hart and Associates, 1984)
1998-1999	RFA conducted at NAS Patuxent River (A.T. Kearney, Inc., and Earth Technology Corporation, 1989)
2012-2014	RI

12.4 Site 23, DPDO Salvage Yard Site (includes former Site 42, Former Coal Storage Area)

Site 23 is located on the western side of Building 604, approximately 220 feet east of the West Patuxent River seaplane basin and 400 feet south of the Patuxent River, in the northwestern quadrant of the station. A shallow stream runs into the Patuxent River west of the site. A fence restricts access to the site.

Site 23 has experienced two distinctly different uses, first as a coal storage area, then as a salvage yard. The site was most likely used for storage of coal from the 1940s until the late 1950s. Subsequently, the area was used between 1961 and 1971 as a salvage yard. Wastes stored at the site included excess and waste chemicals, electronic equipment, cars, tires, aircraft parts, medical equipment, kitchen equipment, machinery, electrical control panels, trailers, oil, shell casings, printed circuit boards, plastic-coated wire, cable, file cabinets, and automobile batteries. Liquids spilled at the site may have included POL products, solvents, paints, and sulfuric acid. The site was covered with asphalt in 1971.

Site 23 was included in the IAS conducted at NAS Patuxent River in 1984. A confirmation study was recommended for Site 23 because of the potential for contaminants to migrate via groundwater or surface water into the Patuxent River.

An NACIP Program confirmation study was conducted at Site 23 between 1985 and 1987 (CH2M HILL, 1987). Low concentrations of lead were detected in two of the soil samples. VOCs and zinc were detected in groundwater at concentrations slightly above detection limits. Additional sampling was recommended for Site 23 to confirm that no hazard to human health or the environment is present.

Site 23 was included in the RFA conducted at NAS Patuxent River in 1988-1989 (A.T. Kearney, Inc., and Earth Technology Corporation, 1989). Soil staining and stressed vegetation were observed along much of the perimeter of the site during the RFA site visit. The asphalt pavement covering the site was severely cracked and stained in several areas. A groundwater sample was collected from the onsite monitoring well during IRI activities in September 1991. VOCs and trace metals were not detected in the groundwater sample.

The DPDO Salvage Yard was closed in 1998, and the Defense Reutilization Marketing Office (DRMO) now occupies Site 23. Portions of the yard where asphalt pavement had deteriorated have been repaved. As Site 23 covers the entire area associated with Site 42, the concerns for Site 42 have been incorporated into Site 23 for investigation purposes. The RI is currently in progress to characterize the site and scheduled for completion in 2014.

Site 23 Chronology

Date	Event
March 1984	IAS of NAS Patuxent River, Maryland (Hart and Associates, 1984)
1985-1987	NACIP Program confirmation study (CH2M HILL, 1987)
1998-1999	RFA conducted at NAS Patuxent River (A.T. Kearney, Inc., and Earth Technology Corporation, 1989)
2012-2014	RI

12.5 Site 31, Tire Shop (Building 307)

Site 31 is located at Building 307, the active Aircraft Intermediate Maintenance Department (AIMD), in the northwestern quadrant of the station. A drainage ditch leads from the building to the West Patuxent River seaplane basin.

The AIMD shop is responsible for cleaning aircraft tires, repairing fiberglass radomes, painting aircraft ground-handling equipment, and testing structural parts for signs of failure. The site has been used as a tire shop since 1943. Tires were cleaned in large vats containing solvent and a cleaning compound, then placed on the floor and rinsed with water. The rinsate contained organic and inorganic compounds from the brake linings. Before 1970, the rinsate drained from the building into an open ditch that discharges to the West Patuxent River seaplane basin. In 1970, the site drainage and shop floor drains were connected to a 24-inch storm drain that discharges directly to the West Patuxent River seaplane basin. An estimated 180 gallons of water were discharged each day. The quantity of water generated at Site 31 was less than the quantity generated during similar operations at Building 110/111 (Site 15).

Site 31 was included in the IAS conducted at NAS Patuxent River in 1984. No visible evidence of contamination was observed in the drainage ditch during the site visit. A confirmation study was recommended for Site 31 if the confirmation study for Site 15 confirmed a hazard to aquatic life. Site 31 was included in the RFA conducted at NAS Patuxent River in 1988-1989. No visible evidence of a release was observed at Site 31 during the RFA site visit (A.T. Kearney, Inc., and Earth Technology Corporation, 1989).

An SSI was completed at Site 31 in 1999. Concentrations of PAHs, pesticides, and metals in West Patuxent Basin sediment slightly exceeded ecological screening levels used for the SSI, and concentrations of one PAH and three

metals in soil exceeded human health screening criteria. VOCs in groundwater also exceeded MCLs for drinking water.

Site 31 is in use. To address concerns with the 1999 SSI, an ESI was conducted from 2004 to 2005. Preliminary results from the ESI indicated a minimal area of contamination exists that may pose a risk to ecological receptors. Therefore, additional sampling was conducted in July 2006 to refine the extent of constituents at the site requiring remediation and complete an EE/CA for the site. As a result of this additional investigation, the railroad beds along which coal was historically transported to the former steam plant for the base was identified as the upgradient source of the PAHs in the ditch. The EE/CA report was completed in December 2006, and an Action Memorandum was issued in March 2007. An NTCRA, including confirmatory soil sampling, was performed in June 2007 to address this area. The construction closeout report was completed in May 2008.

In May 2009, additional groundwater characterization was completed to investigate the extent of VOCs in the proximity of one monitoring well with an MCL exceedance. Results indicated the presence of a VOC plume in groundwater with concentrations exceeding MCLs beyond the immediate vicinity of the well location. Based on these findings, RI fieldwork began in 2013 to fully characterize the extent of the VOC plume and to perform a vapor intrusion assessment on building 307.

Site 31 Chronology

Date	Event
March 1984	IAS of NAS Patuxent River, Maryland (Hart and Associates, 1984)
1998-1999	RFA conducted at NAS Patuxent River (A.T. Kearney, Inc., and Earth Technology Corporation, 1989)
1999	SSI
2004-2005	ESI
July 2006	Additional sampling conducted in support of the EE/CA
December 2006	EE/CA report completed
March 2007	Action Memorandum issued
June 2007	NTCRA performed to address PAHs in the ditch
May 2009	Additional groundwater characterization completed

12.6 Site 34, Drum Disposal Area

Site 34 is located near Site 11 on the southern portion of the station (Figure 1-2). An undeveloped hardwood forest is located north of the site. A fence restricts site access, and the area is routinely patrolled.

The area was formerly used as a sand and gravel borrow pit; however, the dates of operation for the borrow pit are unknown. After borrow excavation ceased, the borrow pits were used for the disposal of construction debris and soil. Site 34 is reported to have been the location of an undocumented, one-time drum disposal event. The exact locations, quantities, and contents of the suspected drums were not reported.

An SSI was conducted at Site 34 in 1993-1994. Low concentrations of SVOCs and elevated concentrations of metals were detected in subsurface soil samples. Pesticides and elevated concentrations of metals were detected in groundwater samples. Several SVOCs were detected in sediment samples, and elevated concentrations of metals were detected in surface water samples.

In 1997, contractors working at the site discovered 5-gallon plastic pails containing a mixture of commonly used solvents (chlorinated VOCs and SVOCs). The origin of the pails is unknown. An EE/CA was performed in 1997 for a soil removal action at Site 34. The recommended alternative was removal of the contaminated soil and any remaining plastic pails, with offsite disposal at an RCRA-permitted landfill. An NTCRA was conducted in 1997. During the removal action, 112 additional buried 55-gallon drums were located and removed, along with 800 yd³

of contaminated soil. The contaminated soil was disposed offsite at a RCRA-permitted Subtitle D landfill. The drums were handled as hazardous waste based on the flammability and elevated concentrations of solvents in drum contents.

Site 34 is not in use. An anomaly excavation was conducted in July 2011 to remove anomalies detected by geophysical survey completed in March 2010. Construction debris discovered at the anomaly locations was removed and stockpiled at the site. The RI fieldwork was divided into two phases and was completed in March 2012. The continuation of the anomaly investigation to remove subsurface debris remaining in the ground is currently in progress. The RI report is on hold until completion of the anomaly investigation and is anticipated to be completed in 2014.

The site chronology is summarized as follows.

Site 34 Chronology

Date	Event
March 1984	IAS of NAS Patuxent River, Maryland (Hart and Associates, 1984)
1993/1994	SSI conducted
1997	EE/CA performed
1997	NTCRA conducted
2004	Site 34 monitoring wells sampled during RI fieldwork conducted for Site 11 OU-2
2010	Geophysical survey completed
2011-2014	RI Fieldwork and continuation of anomaly investigation

12.7 Site 42, Coal Disposal Area (Building 604)

Site 42 is located adjacent to Building 604 in the northwestern quadrant of the station, and based on review of historical aerial photographs, is co-located with Site 23. This area was used as a storage area for coal used in a former boiler at Building 604. The site is approximately 500 ft² in area, and is located upslope of the Patuxent River. Drainage across the site appears to flow through a ditch which likely discharges to the river. Vegetation at the site is sparse.

Site 42 was included in the RFA conducted at NAS Patuxent River in 1988-1989. Crushed coal, slag, and fly-ash material covered the site at the time of the RFA site visit (A.T. Kearney, Inc., and Earth Technology Corporation, 1989).

Site 42 is in use. As Site 42 is co-located with Site 23, the issues requiring investigation will be addressed by the Site 23 investigation; consequently, Site 42 is considered to be a duplicate site and will be removed from the ER Program when Site 23 is addressed.

Site 42 Chronology

Date	Event
1988-1989	RFA conducted at NAS Patuxent River (A.T. Kearney, Inc., and Earth Technology Corporation, 1989)
2002	Site removed from ER Program

12.8 Site 55, PCBs in Soil

Site 55 is a portion of the perennial stream downgradient from Site 24. The portion of the stream to be investigated is located southeast of the intersection of Standley Road and Sears Road and adjacent to the former location of a temporary hazardous waste storage hut.

Materials containing PCBs were previously stored in the former temporary hazardous waste storage hut located upgradient from the site. Sampling associated with the RI for Site 24 identified PCB concentrations in sediment in a portion of the stream. No investigations have been conducted at Site 55.

An RI fieldwork began in 2013 and is anticipated to be completed in 2014 to fully characterize the site.

12.9 Site 56, Abandoned Hazardous Waste UST

Site 56 is the location of a former waste oil storage tank. The site is located along a slope and drainage ditch located adjacent to the eastern edge of Bohne Road and northwest of the fuel truck parking area of Site 6.

Liquids containing PCBs were previously stored in a partially buried 10,000-gallon waste oil storage tank at the boundary of Site 6. The former waste oil storage tank was excavated and scrapped in 1992.

During the remedial action performed in May 2008 for Site 6 OU-2, soil was excavated from the former location of the waste oil storage tank in an attempt to remove all surface and subsurface soil containing PCB concentrations greater than the remedial action level of 1,000 micrograms per kilogram. However, the extent of subsurface soil contamination was more extensive than anticipated. Due to funding limitations and schedule constraints for the remedial action plus the presence of an aboveground pipeline immediately adjacent to the excavation, the Navy stopped excavation after removing approximately 674 tons (449 yd³) of PCB-contaminated soil. The results for the Site 6 OU-2 remedial action post-excavation confirmatory samples indicated PCBs were still present in the floor and sidewall soils of the northern portion of the excavation at concentrations exceeding the remedial action cleanup level.

In June 2008, direct-push sampling was performed around the perimeter of the excavated area to characterize the extent of PCBs in the subsurface soil beyond the limits of excavation completed during the Site 6 OU-2 remedial action. Results indicated PCBs exceeding the cleanup level in subsurface soil extended 30 feet beyond the remedial action excavation footprint.

Based on the results of post-excavation confirmatory samples and results of subsurface samples collected in June 2008, further investigation is necessary to delineate the extent of PCB-contaminated soils. Consequently, this area was designated as a new Environmental Restoration site. An RI for Site 56 is scheduled for 2016 to further characterize the site.

SECTION 13

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Appendix A

Interview Questionnaire

Interview with Skip Simpson, NAS Patuxent River ER Manager (completed on 4-10-13)

5-Year Review Interview Questions

Sites 1 and 12 OU-1, Sites 6/6A OU-1, Site 11 OU-1 and OU-2, Site 17 OU-1 and OU-2, and Site 39 Questions:

1. Are you aware of the remedy at these sites?

Yes, he is aware of the remedy and does monthly site checks.

2. What are your overall impressions of remedy that was put in place and the ongoing operations at these sites?

It is working and the base hasn't had any problems. Base has used the checklist for approximately 10 years.

3. Are you aware of the long-term monitoring (LTM) component of the remedy (e.g., land use controls)?

Yes, Skip is aware the base has to monitor the groundwater and maintain sites including the fence, roads, and covers. The checklist is reviewed by ER manager, NEPA manager, and Base Planning personnel to make that the LUC are enforced and in place prior to any base planning, construction or excavating.

4. Are you aware of any community concerns regarding the sites or their operation and administration? If so, please give details.

No, there have been no community concerns. The base has RAB meetings 3 times a year for the community to attend and voice concerns.

5. Are you aware of any complaints, violations, or other incidents related to the sites? If so, please give details of the events and results of the responses.

No. Skip is not aware of any complaints, violations, or incidents related to the sites.

6. Have you ever performed or supervised work at the sites? If so, please describe the work and indicate if you believe that work adversely impacts the remedy and/or LTM requirements?

Yes, just yearly O&M (burning, grass cutting, road maintenance) at each site and removal of the landfill gas/flare piping at Site 11. No, this work did not impact remedy or LTM requirements.

7. Do you have any comments, suggestions or recommendations regarding the management of the sites?

No comments, no suggestions and no recommendations at this time regarding management of the sites.

8. Do you feel well informed about these sites activities and progress? If not, how would you like to be informed?

Yes, Skip feels well informed from base perspective and regulatory perspective via the partnering meetings for the ER sites.

Appendix B

Inspection Reports



CH2M HILL

15010 Conference Center Dr

Suite 200

Chantilly, VA

20151

Tel 703.376.5000

Fax 703.376.5010

November 26, 2012

David Steckler

Naval Facilities Engineering Command, Washington, Code CH2

1314 Harwood St. SE

Washington Navy Yard, Bldg. 212

Washington, DC 20374

Subject: 2011 Land-Use Control Remedial Design Sites 1/12, 6, 11, and 17
Naval Air Station Patuxent River, St. Mary's County, Maryland
Contract N62470-08-D-1000
Navy CLEAN 1000 Program
Contract Task Order JU51

Dear Mr. Steckler:

Enclosed please find one hard copy of the 2011 Annual Land Use Control (LUC) Inspection Checklist forms for Sites 1/12, 6, 11, and 17 at NAS Patuxent River. The following items were conducted for each site to confirm continued compliance with LUC requirements:

- An annual onsite inspection to visibly assess and document site conditions;
- A completed LUC inspection checklist from (attached);
- Confirmation of LUC boundaries within the base's GIS database; and
- Enforcement of LUCs through the NAVFAC Project Planning Checklist V1A form at the work permit stage;

No deficiencies were identified during the site inspections and the LUC integration and enforcement process for Sites 1/12, 6, 11, and 17 is working. All LUCs are being complied with by the Navy. If you have any questions or would like any additional copies, please feel free to call me at (703) 376-5156.

Sincerely,

CH2M HILL

A handwritten signature in dark ink, reading "Joseph W Kenderdine".

Joseph W Kenderdine

Project Manager

cc: Andy Sochanski/USEPA Region III (1 hard copy)
Rick Grills/MDE (1 hard copy)
Skip Simpson/NASPR (1 hard copy)
David Steckler/ NAVFAC Washington (1 hard copy)
John Ledbetter/CH2M HILL (1 hard copy)
Monica Marrow/Critigen/VBO (1 hard copy)

Annual Land Use Control Inspection Checklist - NAS Patuxent River

Site Information

Site(s): <u>Site 11</u>	
Operable Unit(s): <u>NONE</u>	
Environmental Media: <u>N/A</u>	
Type of cover/year constructed: <u>soil + grass</u>	
Approximate Area (acre): <u>18.5 AC</u>	
LUC Objectives: <ul style="list-style-type: none"> Prevent exposures to contaminants remaining at the site that pose potential risks exceeding acceptable risk levels Prevent intrusive activities that will disrupt the integrity of the cover or landfill on the site. 	Mitigation Actions: <ul style="list-style-type: none"> Prohibit residential use of the site; and Prohibit digging or any other intrusive activity on the cover or landfill.

Inspection Items

Notes: 1) If "Yes", substantiate in the Summary of Inspection Performed; provide description/photos in supplemental pages as needed, 2) NA – Not Applicable

No.	Inspection Item	Y/N/NA	Summary of Inspection Performed	Finding No.
1	Has the land use changed since last inspection?	N		
2	Is there any visual evidence of disturbance on the cover? If so, determine if it is natural or man-made in nature.	N		
3	If man-made, determine if site approval process has been followed.	NA		
4	Is there any evidence that fencing/signs are not functional?	N	all new signs	
5	Is there any evidence of disturbance to monitoring wells?	N	Painted in 2011	

Corrective Actions:

Finding No.	Description of Actions (Provide description in supplemental pages as needed)
	No corrective action for ER Program at this time

Inspection Certification

Inspected by:	<u>Skip Simpson</u>		
Company/Organization	<u>US NAVY</u>		
Date of Inspection:	<u>11-07-2011</u>	Date of Last Inspection:	<u>12-03-2010</u>
I certify that the conditions of the site on the inspection date were as reported above:			
Signature: <u>Skip Simpson</u>		Date: <u>11-09-2011</u>	

Annual Land Use Control Inspection Checklist - NAS Patuxent River

Site Information

Site(s):	Site 6		
Operable Unit(s):	NONE		
Environmental Media:	N/A		
Type of cover/year constructed:	soil + grass & concrete		
Approximate Area (acre):	8.5 AC		
LUC Objectives:	Mitigation Actions:		
<ul style="list-style-type: none"> Prevent exposures to contaminants remaining at the site that pose potential risks exceeding acceptable risk levels Prevent intrusive activities that will disrupt the integrity of the cover or landfill on the site. 	<ul style="list-style-type: none"> Prohibit residential use of the site; and Prohibit digging or any other intrusive activity on the cover or landfill. 		

Inspection Items

Notes: 1) If "Yes", substantiate in the Summary of Inspection Performed; provide description/photos in supplemental pages as needed, 2) NA - Not Applicable

No.	Inspection Item	Y/N/NA	Summary of Inspection Performed	Finding No.
1	Has the land use changed since last inspection?	N		
2	Is there any visual evidence of disturbance on the cover? If so, determine if it is natural or man-made in nature.	N		
3	If man-made, determine if site approval process has been followed.	N/A		
4	Is there any evidence that fencing/signs are not functional?	N	all new signs	
5	Is there any evidence of disturbance to monitoring wells?	N	Wells removed 2010	

Corrective Actions:

Finding No.	Description of Actions (Provide description in supplemental pages as needed)
	No corrective action for ER Program at this time

Inspection Certification

Inspected by:	Skip Simpson		
Company/Organization	US NAVY		
Date of Inspection:	11-07-2011	Date of Last Inspection:	12-03-2010
I certify that the conditions of the site on the inspection date were as reported above:			
Signature: Skip Simpson		Date: 11-09-2011	

Annual Land Use Control Inspection Checklist - NAS Patuxent River

Site Information

Site(s): <u>Site 17</u>	
Operable Unit(s): <u>NONE</u>	
Environmental Media: <u>N/A</u>	
Type of cover/year constructed: <u>soil & grass</u>	
Approximate Area (acre): <u>1.67 AC.</u>	
LUC Objectives: <ul style="list-style-type: none"> Prevent exposures to contaminants remaining at the site that pose potential risks exceeding acceptable risk levels Prevent intrusive activities that will disrupt the integrity of the cover or landfill on the site. 	Mitigation Actions: <ul style="list-style-type: none"> Prohibit residential use of the site; and Prohibit digging or any other intrusive activity on the cover or landfill.

Inspection Items

Notes: 1) If "Yes", substantiate in the Summary of Inspection Performed; provide description/photos in supplemental pages as needed, 2) NA - Not Applicable

No.	Inspection Item	Y/N/NA	Summary of Inspection Performed	Finding No.
1	Has the land use changed since last inspection?	N		
2	Is there any visual evidence of disturbance on the cover? If so, determine if it is natural or man-made in nature.	N		
3	If man-made, determine if site approval process has been followed.	NA		
4	Is there any evidence that fencing/signs are not functional?	N	all new signs (2)	
5	Is there any evidence of disturbance to monitoring wells?	N		

Corrective Actions:

Finding No.	Description of Actions (Provide description in supplemental pages as needed)
	No corrective action for ER Program at this time

Inspection Certification

Inspected by:	<u>Skip Simpson</u>		
Company/Organization	<u>US NAVY</u>		
Date of Inspection:	<u>11-07-2011</u>	Date of Last Inspection:	<u>12-03-2010</u>
I certify that the conditions of the site on the inspection date were as reported above:			
Signature	<u>Skip Simpson</u>		Date <u>11-09-2011</u>

Annual Land Use Control Inspection Checklist - NAS Patuxent River

Site Information

Site(s): <u>Site 1</u>	
Operable Unit(s): <u>NONE</u>	
Environmental Media: <u>N/A</u>	
Type of cover/year constructed:	<u>soil & grass</u>
Approximate Area (acre): <u>65.0 AC</u>	
LUC Objectives: <ul style="list-style-type: none"> • Prevent exposures to contaminants remaining at the site that pose potential risks exceeding acceptable risk levels • Prevent intrusive activities that will disrupt the integrity of the cover or landfill on the site. 	Mitigation Actions: <ul style="list-style-type: none"> • Prohibit residential use of the site; and • Prohibit digging or any other intrusive activity on the cover or landfill.

Inspection Items

Notes: 1) If "Yes", substantiate in the Summary of Inspection Performed; provide description/photos in supplemental pages as needed, 2) NA – Not Applicable

No.	Inspection Item	Y/N/NA	Summary of Inspection Performed	Finding No.
1	Has the land use changed since last inspection?	N		
2	Is there any visual evidence of disturbance on the cover? If so, determine if it is natural or man-made in nature.	N		
3	If man-made, determine if site approval process has been followed.	N/A		
4	Is there any evidence that fencing/signs are not functional?	N	<u>all new signs</u>	
5	Is there any evidence of disturbance to monitoring wells?	N	<u>all wells were Painted</u>	

Corrective Actions:

Finding No.	Description of Actions (Provide description in supplemental pages as needed)
	<u>No corrective action for ER Program at this time</u>

Inspection Certification

Inspected by:	<u>Skip Simpson</u>		
Company/Organization	<u>US NAVY</u>		
Date of Inspection:	<u>11-07-2011</u>	Date of Last Inspection:	<u>12-03-2010</u>
I certify that the conditions of the site on the inspection date were as reported above:			
Signature	<u>11-09-2011</u> Date		

Annual Land Use Control Inspection Checklist - NAS Patuxent River

Site Information

Site(s): <u>Site 12</u>	
Operable Unit(s): <u>NONE</u>	
Environmental Media: <u>N/A</u>	
Type of cover/year constructed:	<u>soil & grass</u>
Approximate Area (acre): <u>1.5 AC</u>	
LUC Objectives: <ul style="list-style-type: none"> • Prevent exposures to contaminants remaining at the site that pose potential risks exceeding acceptable risk levels • Prevent intrusive activities that will disrupt the integrity of the cover or landfill on the site. 	Mitigation Actions: <ul style="list-style-type: none"> • Prohibit residential use of the site; and • Prohibit digging or any other intrusive activity on the cover or landfill.

Inspection Items

Notes: 1) If "Yes", substantiate in the Summary of Inspection Performed; provide description/photos in supplemental pages as needed, 2) NA – Not Applicable

No.	Inspection Item	Y/N/NA	Summary of Inspection Performed	Finding No.
1	Has the land use changed since last inspection?	N		
2	Is there any visual evidence of disturbance on the cover? If so, determine if it is natural or man-made in nature.	N		
3	If man-made, determine if site approval process has been followed.	N/A		
4	Is there any evidence that fencing/signs are not functional?	N	<u>all new signs</u>	
5	Is there any evidence of disturbance to monitoring wells?	N		

Corrective Actions:

Finding No.	Description of Actions (Provide description in supplemental pages as needed)
	<u>No corrective action for ER Program at this time</u>

Inspection Certification

Inspected by:	<u>Skip Simpson</u>		
Company/Organization	<u>US NAVY</u>		
Date of Inspection:	<u>11-07-2011</u>	Date of Last Inspection:	<u>12-03-2010</u>
I certify that the conditions of the site on the inspection date were as reported above:			
Signature	<u>Skip Simpson</u>		Date <u>11-09-2011</u>

Annual Land Use Control Inspection Checklist - NAS Patuxent River

Site Information

Site(s):	SW 11		
Operable Unit(s):	NONE		
Environmental Media:	N/A		
Type of cover/year constructed:	Soil & grass		
Approximate Area (acre):	18.5 AC		
LUC Objectives:	Mitigation Actions:		
<ul style="list-style-type: none"> Prevent exposures to contaminants remaining at the site that pose potential risks exceeding acceptable risk levels Prevent intrusive activities that will disrupt the integrity of the cover or landfill on the site. 	<ul style="list-style-type: none"> Prohibit residential use of the site; and Prohibit digging or any other intrusive activity on the cover or landfill. 		

Inspection Items

Notes: 1) If "Yes", substantiate in the Summary of Inspection Performed; provide description/photos in supplemental pages as needed, 2) NA – Not Applicable

No.	Inspection Item	Y/N/NA	Summary of Inspection Performed	Finding No.
1	Has the land use changed since last inspection?	N		
2	Is there any visual evidence of disturbance on the cover? If so, determine if it is natural or man-made in nature.	N		
3	If man-made, determine if site approval process has been followed.	N/A		
4	Is there any evidence that fencing/signs are not functional?	N	new Sign in 2011	
5	Is there any evidence of disturbance to monitoring wells?	N	Painted in 2011	

Corrective Actions:

Finding No.	Description of Actions (Provide description in supplemental pages as needed)
	210 Corrective Action

Inspection Certification

Inspected by:	Sho Simpson		
Company/Organization	US NAVY		
Date of Inspection:	12-11-2012	Date of Last Inspection:	11-07-2011
I certify that the conditions of the site on the inspection date were as reported above:			
Signature		Date	
Chris R. Simpson		12-19-2012	

Annual Land Use Control Inspection Checklist - NAS Patuxent River

Site Information

Site(s): <u>Site 12</u>	
Operable Unit(s): <u>NONE</u>	
Environmental Media: <u>N/A</u>	
Type of cover/year constructed: <u>SMIL + grass</u>	
Approximate Area (acre): <u>1.5 AC</u>	
LUC Objectives: <ul style="list-style-type: none"> Prevent exposures to contaminants remaining at the site that pose potential risks exceeding acceptable risk levels Prevent intrusive activities that will disrupt the integrity of the cover or landfill on the site. 	Mitigation Actions: <ul style="list-style-type: none"> Prohibit residential use of the site; and Prohibit digging or any other intrusive activity on the cover or landfill.

Inspection Items

Notes: 1) If "Yes", substantiate in the Summary of Inspection Performed; provide description/photos in supplemental pages as needed, 2) NA – Not Applicable

No.	Inspection Item	Y/N/NA	Summary of Inspection Performed	Finding No.
1	Has the land use changed since last inspection?	N		
2	Is there any visual evidence of disturbance on the cover? If so, determine if it is natural or man-made in nature.	N		
3	If man-made, determine if site approval process has been followed.	N/A		
4	Is there any evidence that fencing/signs are not functional?	N	<u>all new signs</u>	
5	Is there any evidence of disturbance to monitoring wells?	N	<u>all Painted</u>	

Corrective Actions:

Finding No.	Description of Actions (Provide description in supplemental pages as needed)
	<u>No Action</u>

Inspection Certification

Inspected by:	<u>Skip Simpson</u>		
Company/Organization	<u>US NAVY</u>		
Date of Inspection:	<u>12-19-2012</u>	Date of Last Inspection:	<u>11-07-2011</u>
I certify that the conditions of the site on the inspection date were as reported above:			
<u>Skip Simpson</u> Signature		<u>12-19-2012</u> Date	

Annual Land Use Control Inspection Checklist - NAS Patuxent River

Site Information

Site(s):	Site 1
Operable Unit(s):	none
Environmental Media:	N/A
Type of cover/year constructed:	
Approximate Area (acre):	65.0 AC
LUC Objectives:	Mitigation Actions:
<ul style="list-style-type: none"> Prevent exposures to contaminants remaining at the site that pose potential risks exceeding acceptable risk levels Prevent intrusive activities that will disrupt the integrity of the cover or landfill on the site. 	<ul style="list-style-type: none"> Prohibit residential use of the site; and Prohibit digging or any other intrusive activity on the cover or landfill.

Inspection Items

Notes: 1) If "Yes", substantiate in the Summary of Inspection Performed; provide description/photos in supplemental pages as needed, 2) NA – Not Applicable

No.	Inspection Item	Y/N/NA	Summary of Inspection Performed	Finding No.
1	Has the land use changed since last inspection?	N		
2	Is there any visual evidence of disturbance on the cover? If so, determine if it is natural or man-made in nature.	N		
3	If man-made, determine if site approval process has been followed.	N/A		
4	Is there any evidence that fencing/signs are not functional?	N		
5	Is there any evidence of disturbance to monitoring wells?	N		

Corrective Actions:

Finding No.	Description of Actions (Provide description in supplemental pages as needed)
	NO ACTIONS

Inspection Certification

Inspected by:	Shirley Simpson		
Company/Organization	U.S. NAVY		
Date of Inspection:	12-19-2012	Date of Last Inspection:	11-07-2011
I certify that the conditions of the site on the inspection date were as reported above:			
Signature		Date	
Shirley Simpson		12-19-2012	

Annual Land Use Control Inspection Checklist - NAS Patuxent River

Site Information

Site(s):	Site 17
Operable Unit(s):	NONE
Environmental Media:	
Type of cover/year constructed:	Soil & grass
Approximate Area (acre):	1.6 AC
LUC Objectives:	Mitigation Actions:
<ul style="list-style-type: none"> Prevent exposures to contaminants remaining at the site that pose potential risks exceeding acceptable risk levels Prevent intrusive activities that will disrupt the integrity of the cover or landfill on the site. 	<ul style="list-style-type: none"> Prohibit residential use of the site; and Prohibit digging or any other intrusive activity on the cover or landfill.

Inspection Items

Notes: 1) If "Yes", substantiate in the Summary of Inspection Performed; provide description/photos in supplemental pages as needed, 2) NA – Not Applicable

No.	Inspection Item	Y/N/NA	Summary of Inspection Performed	Finding No.
1	Has the land use changed since last inspection?	N		
2	Is there any visual evidence of disturbance on the cover? If so, determine if it is natural or man-made in nature.	N		
3	If man-made, determine if site approval process has been followed.	NA		
4	Is there any evidence that fencing/signs are not functional?	N	2 New Signs 2011	
5	Is there any evidence of disturbance to monitoring wells?	N		

Corrective Actions:

Finding No.	Description of Actions (Provide description in supplemental pages as needed)
	no corrective actions

Inspection Certification

Inspected by:	Shirley Simpson		
Company/Organization	US NAVY		
Date of Inspection:	12-19-2012	Date of Last Inspection:	11-07-2011
I certify that the conditions of the site on the inspection date were as reported above:			
Signature		Date	
Shirley Simpson		12-19-2012	

Annual Land Use Control Inspection Checklist - NAS Patuxent River

Site Information

Site(s):	6	
Operable Unit(s):	NONE	
Environmental Media:	N/A	
Type of cover/year constructed:		concrete soil & grass
Approximate Area (acre):	8.5 AC	
LUC Objectives:	Mitigation Actions:	
<ul style="list-style-type: none"> Prevent exposures to contaminants remaining at the site that pose potential risks exceeding acceptable risk levels Prevent intrusive activities that will disrupt the integrity of the cover or landfill on the site. 	<ul style="list-style-type: none"> Prohibit residential use of the site; and Prohibit digging or any other intrusive activity on the cover or landfill. 	

Inspection Items

Notes: 1) If "Yes", substantiate in the Summary of Inspection Performed; provide description/photos in supplemental pages as needed, 2) NA – Not Applicable

No.	Inspection Item	Y/N/NA	Summary of Inspection Performed	Finding No.
1	Has the land use changed since last inspection?	N	NO DAMAGE	
2	Is there any visual evidence of disturbance on the cover? If so, determine if it is natural or man-made in nature.	N		
3	If man-made, determine if site approval process has been followed.	N/A		
4	Is there any evidence that fencing/signs are not functional?	N	NEW SIGNS 2011	
5	Is there any evidence of disturbance to monitoring wells?	N/A		

Corrective Actions:

Finding No.	Description of Actions (Provide description in supplemental pages as needed)
1	res seal cracks 50 FT.

Inspection Certification

Inspected by:	Sgt Simpson		
Company/Organization	US NAVY		
Date of Inspection:	12-19-2012	Date of Last Inspection:	11-07-2011
I certify that the conditions of the site on the inspection date were as reported above:			
Signature		Date	
Sgt Simpson		12-19-2012	



CH2M HILL
15010 Conference Center Dr
Suite 200
Chantilly, VA
20151
Tel 703.376.5000
Fax 703.376.5010

February 13, 2009

181509.SI.RP
06-JHL-0377

Stephen A. Hurff, P.E.
Naval Facilities Engineering Command, Washington, Code EV2
1314 Harwood St. SE
Washington Navy Yard, Bldg. 212
Washington, DC 20374

Subject: Submittal of Post Closure O&M Inspection Forms and Figures for Sites 1/12, 6, 11, and 17, Naval Air Station Patuxent River, St. Mary's County, Maryland
Contract N62470-08-D-1000
Navy CLEAN 1000 Program
Contract Task Order 0019

Dear Mr. Hurff:

Enclosed, please find 1 hardcopy of the subject deliverable. Additional copies of the document have been produced and distributed to the recipients listed below (the number of copies is shown in parenthesis). The pictures referenced in the Sites 1/12 and 11 inspection forms are in the attached CD. If you have any questions or would like any additional copies, please feel free to call me at (703) 376-5172.

Sincerely,

CH2M HILL

A handwritten signature in dark ink, appearing to read "John Ledbetter".

John Ledbetter, P.G.
Project Manager

cc: Andy Sochanski/EPA Region III (2 hard copies)
Tracy Maningas/NASPR (1 hard copy)
Heather Njo/MDE (1 hard copy)
CH2M HILL (2 hardcopies)

**SITE 1, FISHING POINT LANDFILL &
SITE 12, LANDFILL BEHIND THE RIFLE RANGE
POST-CLOSURE OPERATION AND MAINTENANCE
INSPECTION CHECKLIST LOG**

Inspection Type¹ BIANNUAL VISUAL

<u>Item</u>	<u>Satisfactory</u>	<u>Unsatisfactory^{2,3}</u>
1. <u>Security Control System</u>		
a. Signs (No physical disturbance, vehicular traffic on roads only)	<u>X</u>	
2. <u>Soil Cover System</u>		
a. Erosion	<u>X - NOTE 1</u>	
b. Sedimentation	<u>X</u>	
c. Settlement	<u>X</u>	
e. Diversion Berms	<u>X</u>	
f. Physical Disturbance	<u>X</u>	
3. <u>Surface Water Conveyances</u>		
a. Channels	<u>X</u>	
b. Ponded Water	<u>X</u>	
c. Outlet Structures (Culverts)	<u>X</u>	
d. Swales	<u>X</u>	
e. Sediment Basin	<u>X</u>	
4. <u>Monitoring Wells</u>		
a. GW Monitoring Wells	<u>X</u>	
b. LFG Monitoring Wells	<u>X</u>	
5. <u>Roadways</u>		
a. Erosion		<u>X - NOTE 2</u>
b. Subgrade		<u>X</u>
c. Road Surface		<u>X</u>
6. <u>Walkways/Stairways</u>		
a. Erosion		<u>X - NOTE 3</u>
b. Subgrade	<u>X</u>	
c. Walkway Surface	<u>X</u>	
7. <u>Miscellaneous</u>		
a. Benchmarks	<u>X</u>	
b. Cover Vegetation	<u>X</u>	
c. Buffer Vegetation	<u>X</u>	
d. Western Tree Vegetation	<u>X</u>	
e. Beach Erosion (Cobble beach)	<u>X</u>	
f. Landfill Gas Vents	<u>X</u>	
g. Upland Areas	<u>X</u>	
h. ROPE FENCE POST DAMAGE - SEE NOTE 3		

1. Event Type: Choose from "Biannual Visual Inspection; After Storm Event; Follow-up Repair; etc."
2. Corrective action shall be completed as soon as possible.
3. Provide a brief explanation of the unsatisfactory condition in Item 8 of the Inspection Checklist Log, provide photo documentation, and note its location on a Record Drawing.

SITE 1, FISHING POINT LANDFILL &
SITE 12, LANDFILL BEHIND THE RIFLE RANGE

POST-CLOSURE OPERATION AND MAINTENANCE
INSPECTION CHECKLIST LOG

8. Description and Photo Documentation of Unsatisfactory Items (attach additional sheets if necessary)

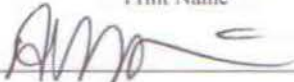
① ITEMS INSPECTED AS BEST AS THEY COULD BE. AT THE TIME OF THE VISIT, COVER VEGETATION WAS WAIST HIGH. MORE THOROUGH INSPECTION WILL REQUIRE MOWING.

② MINOR, MODERATE, + SIGNIFICANT ^{ROADWAY} EROSION OBSERVED THROUGHOUT THE SITE. SEE PICS + FIGURE

③ ROPE WALKWAY FENCE POSTS BROKEN AT SEVERAL LOCATIONS. SIGNIFICANT EROSION OBSERVED AT BEACH END OF SEVERAL WALKWAYS. SEE PICS + FIGURE

Inspected by: Dore MARTINSON
Print Name

Affiliation: _____

Signature: 

Date of Inspection: 10/28/06

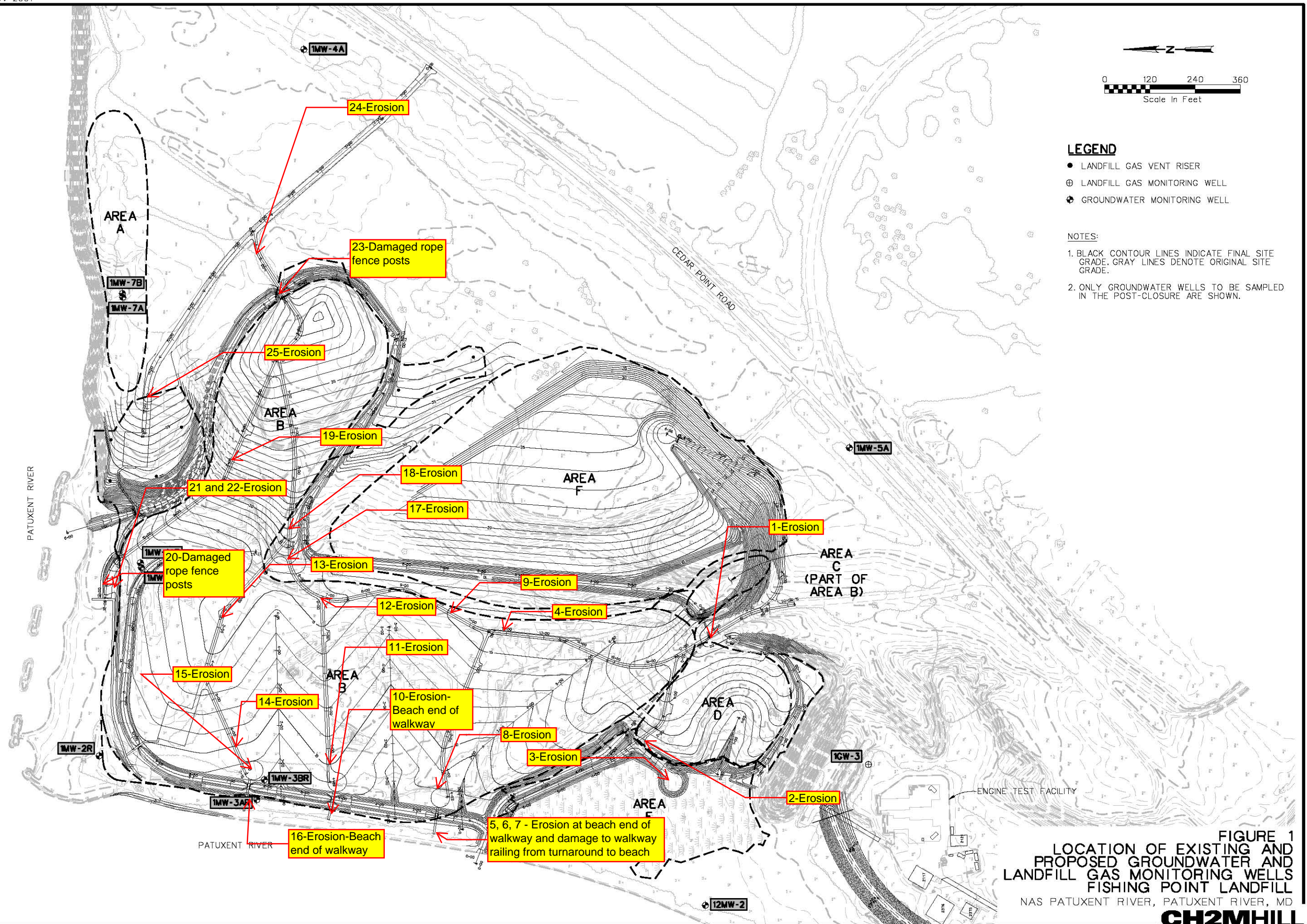


FIGURE 1
LOCATION OF EXISTING AND
PROPOSED GROUNDWATER AND
LANDFILL GAS MONITORING WELLS
FISHING POINT LANDFILL
 NAS PATUXENT RIVER, PATUXENT RIVER, MD
CH2MHILL



Photograph 1



Photograph 2



Photograph 3



Photograph 4



Photograph 5



Photograph 6



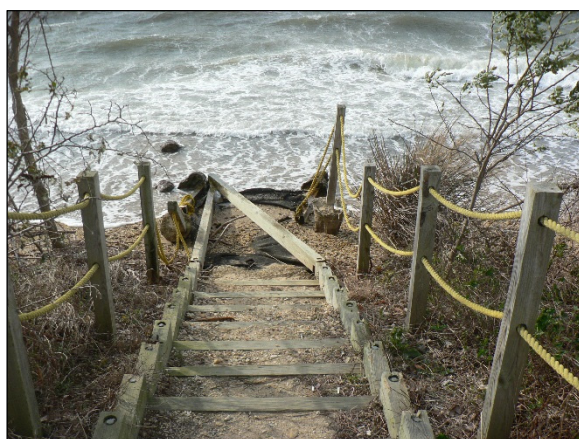
Photograph 7



Photograph 8



Photograph 9



Photograph 10



Photograph 11



Photograph 12



Photograph 13



Photograph 14



Photograph 15



Photograph 16



Photograph 17



Photograph 18



Photograph 19



Photograph 20



Photograph 21



Photograph 22



Photograph 23



Photograph 24



Photograph 25

Appendix A
POST-CLOSURE OPERATION AND MAINTENANCE INSPECTION LOG
SITES 6, BOHNEYARD COVER SYSTEM

PAGE 1 - CHECKLIST

<u>Item</u>	<u>Satisfactory</u>	<u>Unsatisfactory</u>
1. <u>Soil Cover</u>		
a. Erosion Damage	<u>X</u>	
b. Sedimentation	<u>X</u>	
c. Settlement	<u>X</u>	
e. Physical Disturbance	<u>X</u>	
f. Ponded Water	<u>X</u>	
2. <u>Concrete Cover</u>		
a. Cracks in Concrete	<u>X</u>	
b. Damaged Joint Sealant		<u>X - SEE FIGURE</u>
c. Clogged Catch Basin Grates, Inlet and Discharge Piping	<u>X</u>	
d. Damaged Containment Valve and Lock	<u>X</u>	
3. <u>Asphalt Cover</u>		
a. Cracks in Asphalt	<u>X</u>	
b. Damaged Concrete/Asphalt Interfaces	<u>X</u>	
4. <u>Detention Pond</u>		
a. Erosion Damage	<u>NA</u>	
b. Sedimentation	<u>↓</u>	
c. Ponded Water		
d. Blocked Spillway (Debris, Sedimentation, or Vegetation)	<u>↓</u>	
5. <u>Monitoring Wells</u>		
a. Protective Casing	<u>X</u>	
b. Damaged or Missing Locks	<u>X</u>	
6. <u>TANK CONTAINMENT BASINS</u>		
COVER/LINER	<u>—</u>	<u>X - SEE FIGURE</u>
SEALANT	<u>—</u>	<u>X - SEE FIGURES</u>

POST-CLOSURE OPERATION AND MAINTENANCE INSPECTION LOG
SITES 6, BOHNEYARD COVER SYSTEM

PAGE 2 - CHECKLIST

5. Notes and Comments on Unsatisfactory Items (attach additional sheets if necessary)

SITE 6A - AREA COVERED W/ DEBRIS PILES. WALKED
ENTIRE SITE. DEBRIS CONSISTS OF CONCRETE/ASPHALT,
SOIL, WOOD, SOME SCRAP METAL. NOTHING THAT
APPEARED HAZARDOUS.

Inspected by



DON MARTINSON

Date of Inspection

OCT 29, 2008

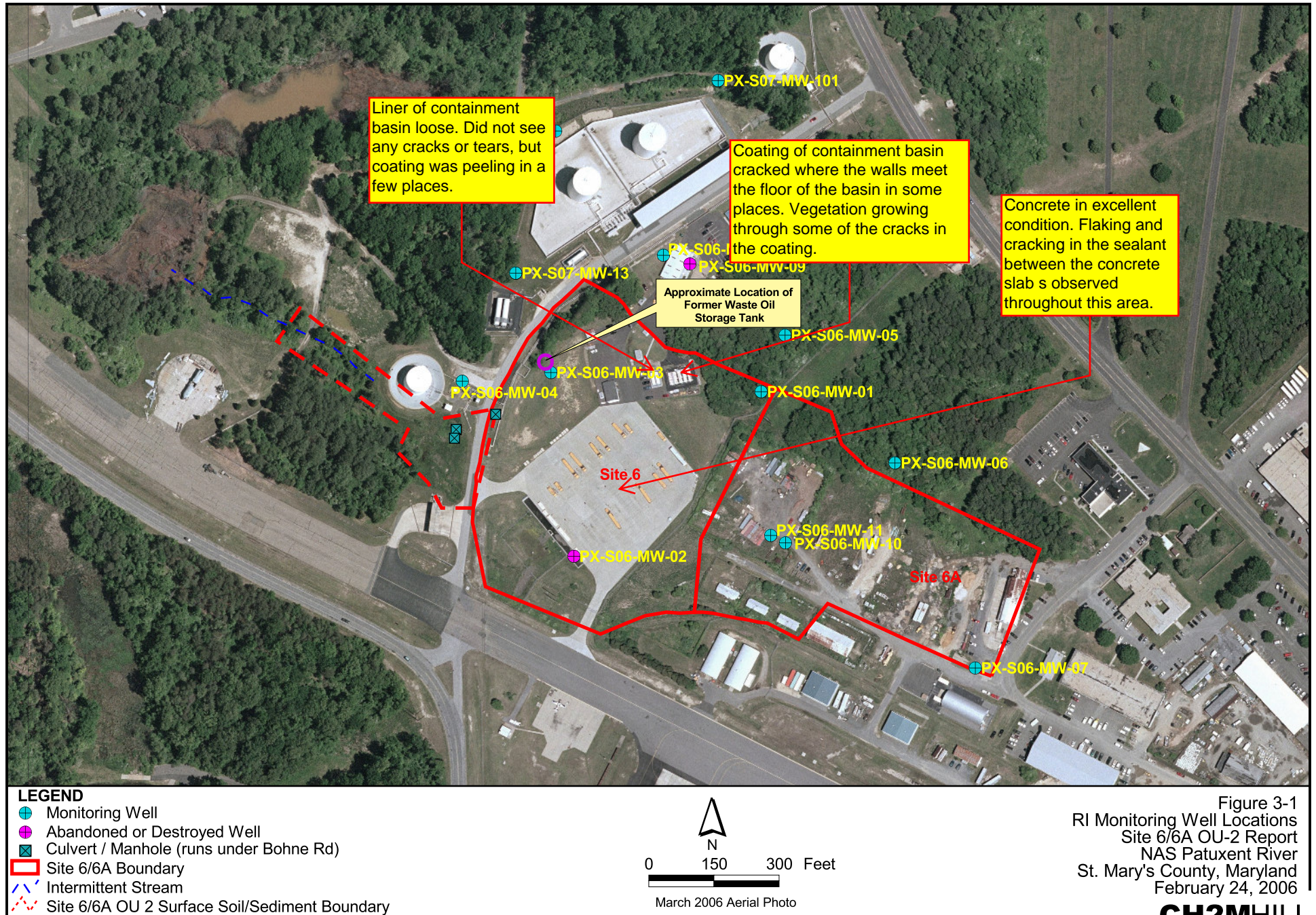


Figure 3-1
RI Monitoring Well Locations
Site 6/6A OU-2 Report
NAS Patuxent River
St. Mary's County, Maryland
February 24, 2006

SITE 11, FORMER AND CURRENT LANDFILLS

POST-CLOSURE OPERATION AND MAINTENANCE

INSPECTION CHECKLIST LOG

 Inspection Type: BIANNUAL

<u>Item</u>	<u>Satisfactory</u>	<u>Unsatisfactory^{2,3}</u>
<u>1. Security Control System</u>		
a. Signs (No physical disturbance, vehicular traffic on roads only)	<u>X</u>	
<u>2. Soil Cover System</u>		
a. Erosion	<u>X - NOT 2</u>	
b. Sedimentation	<u>X</u>	
c. Settlement	<u>X</u>	
e. Diversion Berms	<u>X</u>	
f. Physical Disturbance	<u>X</u>	
<u>3. Surface Water Conveyances</u>		
a. Channels	<u>X</u>	
b. Ponded Water	<u>X</u>	
c. Swales	<u>X</u>	
d. Sediment Basin	<u>X</u>	
<u>4. Monitoring Wells</u>		
a. GW Monitoring Wells	<u>X</u>	
b. LFG Monitoring Wells	<u>X</u>	
<u>5. Roadways</u>		
a. Erosion	<u>X</u>	
b. Subgrade		<u>X - NOT 2</u>
c. Road Surface		<u>X</u>
<u>6. Walkways/Stairways</u>		
a. Erosion	<u>NA</u>	
b. Subgrade	<u>↓</u>	
c. Walkway Surface		
<u>7. Miscellaneous</u>		
a. Benchmarks	<u>X</u>	
b. Cover Vegetation	<u>X</u>	
c. Buffer Vegetation	<u>X</u>	
d. Landfill Gas Vents	<u>X</u>	
e. Upland Areas	<u>X</u>	

1. Event Type: Choose from "Six Month Visual Inspection; After Storm Event; Follow-up Repair; etc."
2. Corrective action shall be completed as soon as possible.
3. Provide a brief explanation of the unsatisfactory condition in Item 8 of the Inspection Checklist Log, provide photo documentation, and note its location on a Record Drawing.

**SITE 11, FORMER AND CURRENT LANDFILLS
POST-CLOSURE OPERATION AND MAINTENANCE
INSPECTION CHECKLIST LOG**

8. Description and Photo Documentation of Unsatisfactory Items (attach additional sheets if necessary)

① INSPECTED AS BEST AS POSSIBLE AT TIME OF VISIT
COVER VEGETATION WAS WAIST HIGH. MORE THOROUGH
INSPECTION WILL REQUIRE MOWING.

② ROAD SURFACE ALONG SOUTH EASTERN BOUNDARY
RUTTED WITH FABRIC VISIBLE AT SEVERAL LOCATIONS.

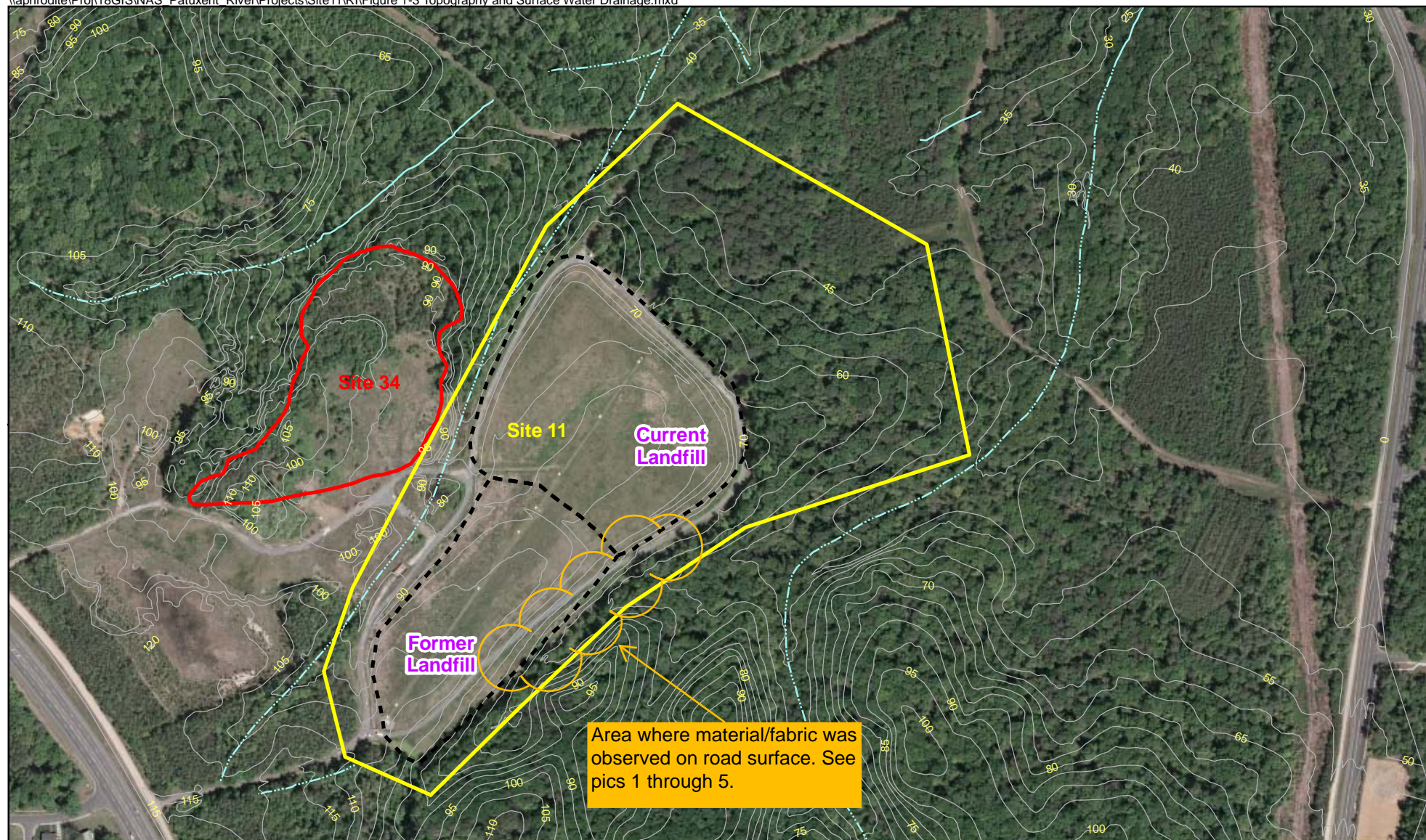
SEE PICS +
FIGURE

Inspected by: Dan MARINSON
Print Name

Affiliation: _____

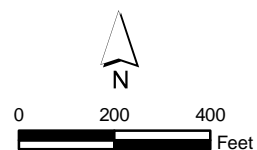
Signature: 

Date of Inspection: 10/28/08



Legend

- Landfill Boundary
- Perennial Stream
- - - Intermittent Stream
- Elevation Contours (5 ft Interval)
- Land Use Control Boundary for IR Site 11
- IR Site Boundary



Note: 2006 Aerial Photograph

Figure 1-3
Topography and Surface Water Drainage
Site 11 OU-2 Remedial Investigation
NAS Patuxent River
St. Mary's County, Maryland



Photograph 1



Photograph 2



Photograph 3

Photograph 4



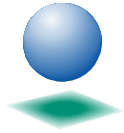
Photograph 5

<u>Item</u>	<u>Satisfactory</u>	<u>Unsatisfactory</u> ^{2,3}
1. <u>Soil Cover System</u>		
a. Erosion	<u>X</u>	<u> </u>
b. Sedimentation	<u>X</u>	<u> </u>
c. Settlement	<u>X</u>	<u> </u>
d. Physical Disturbance	<u>X</u>	<u> </u>
2. <u>Surface Water Conveyances</u>		
a. Channels	<u>X</u>	<u> </u>
b. Ponded Water	<u>X</u>	<u> </u>
4. <u>Monitoring Wells</u>		
a. GW Monitoring Wells	<u>X</u>	<u> </u>
5. <u>Miscellaneous</u>		
a. Cover Vegetation	<u>X</u>	<u> </u>
b. Buffer Trees and Vegetation	<u>X</u>	<u> </u>
6. <u>Description and Photo Documentation of Unsatisfactory Items</u> (attach additional sheets if necessary)		

Don't mARTINSON

10/28/08

- A-1



CH2MHILL

CH2M HILL

15010 Conference Center Dr

Suite 200

Chantilly, VA

20151

Tel 703.376.5000

Fax 703.376.5010

February 2, 2010

David Steckler, P.G.
Naval Facilities Engineering Command, Washington
1314 Harwood St. SE
Washington Navy Yard, Bldg. 212
Washington, DC 20374

Subject: Submittal of the **April 2009 and October 2009 Post Closure O&M Inspection Forms for Sites 1/12, 6, 11, and 17**
Naval Air Station Patuxent River, St. Mary's County, Maryland
Contract N62470-08-D-1000
Navy CLEAN 1000 Program
Contract Task Order 0019

Dear Mr. Steckler:

Enclosed, please find 2 hardcopies of *Post-Closure Operation and Maintenance Inspection Checklists for Sites 1/12, 6, 11, and 17* for **April 2009** and **October 2009**. Additional copies of the document have been produced and distributed to the recipients listed below (the number of copies is shown in parenthesis). If you have any questions or would like any additional copies, please feel free to call me at (703) 376-5172.

Sincerely,

CH2M HILL

John Ledbetter, P.G.
Project Manager

cc: Skip Simpson/NASPR (2 hard copies)
Andy Sochanski/EPA Region III (2 hard copies)
Rick Grills/MDE (1 hard copy)
CH2M HILL (2 hardcopies)

**SITE 1, FISHING POINT LANDFILL &
SITE 12, LANDFILL BEHIND THE RIFLE RANGE
POST-CLOSURE OPERATION AND MAINTENANCE
INSPECTION CHECKLIST LOG**

Inspection Type¹ Biannual Visual Inspection

<u>Item</u>	<u>Satisfactory</u>	<u>Unsatisfactory^{2,3}</u>
1. <u>Security Control System</u>		
a. Signs (No physical disturbance, vehicular traffic on roads only)	<u>X</u>	<u> </u>
2. <u>Soil Cover System</u>		
a. Erosion	<u>X</u>	<u> </u>
b. Sedimentation	<u>X</u>	<u> </u>
c. Settlement	<u>X</u>	<u> </u>
e. Diversion Berms	<u>X</u>	<u> </u>
f. Physical Disturbance	<u>X</u>	<u> </u>
3. <u>Surface Water Conveyances</u>		
a. Channels	<u>X</u>	<u> </u>
b. Ponded Water	<u>X</u>	<u> </u>
c. Outlet Structures (Culverts)	<u>X</u>	<u> </u>
d. Swales	<u>X</u>	<u> </u>
e. Sediment Basin	<u>X</u>	<u> </u>
4. <u>Monitoring Wells</u>		
a. GW Monitoring Wells	<u>X</u>	<u> </u>
b. LFG Monitoring Wells	<u>X</u>	<u> </u>
5. <u>Roadways</u>		
a. Erosion	<u>X</u>	<u> </u>
b. Subgrade	<u>X</u>	<u> </u>
c. Road Surface	<u> </u>	<u>X</u>
6. <u>Walkways/Stairways</u>		
a. Erosion	<u>X</u>	<u> </u>
b. Subgrade	<u>X</u>	<u> </u>
c. Walkway Surface	<u>X</u>	<u> </u>
7. <u>Miscellaneous</u>		
a. Benchmarks	<u>X</u>	<u> </u>
b. Cover Vegetation	<u>X</u>	<u> </u>
c. Buffer Vegetation	<u>X</u>	<u> </u>
d. Western Tree Vegetation	<u>X</u>	<u> </u>
e. Beach Erosion (Cobble beach)	<u>X</u>	<u> </u>
f. Landfill Gas Vents	<u>X</u>	<u> </u>
g. Upland Areas	<u>X</u>	<u> </u>

1. Event Type: Choose from "Biannual Visual Inspection; After Storm Event; Follow-up Repair; etc."
2. Corrective action shall be completed as soon as possible.
3. Provide a brief explanation of the unsatisfactory condition in Item 8 of the Inspection Checklist Log, provide photo documentation, and note its location on a Record Drawing.

**SITE 1, FISHING POINT LANDFILL &
SITE 12, LANDFILL BEHIND THE RIFLE RANGE
POST-CLOSURE OPERATION AND MAINTENANCE
INSPECTION CHECKLIST LOG**

8. Description and Photo Documentation of Unsatisfactory Items (attach additional sheets if necessary)

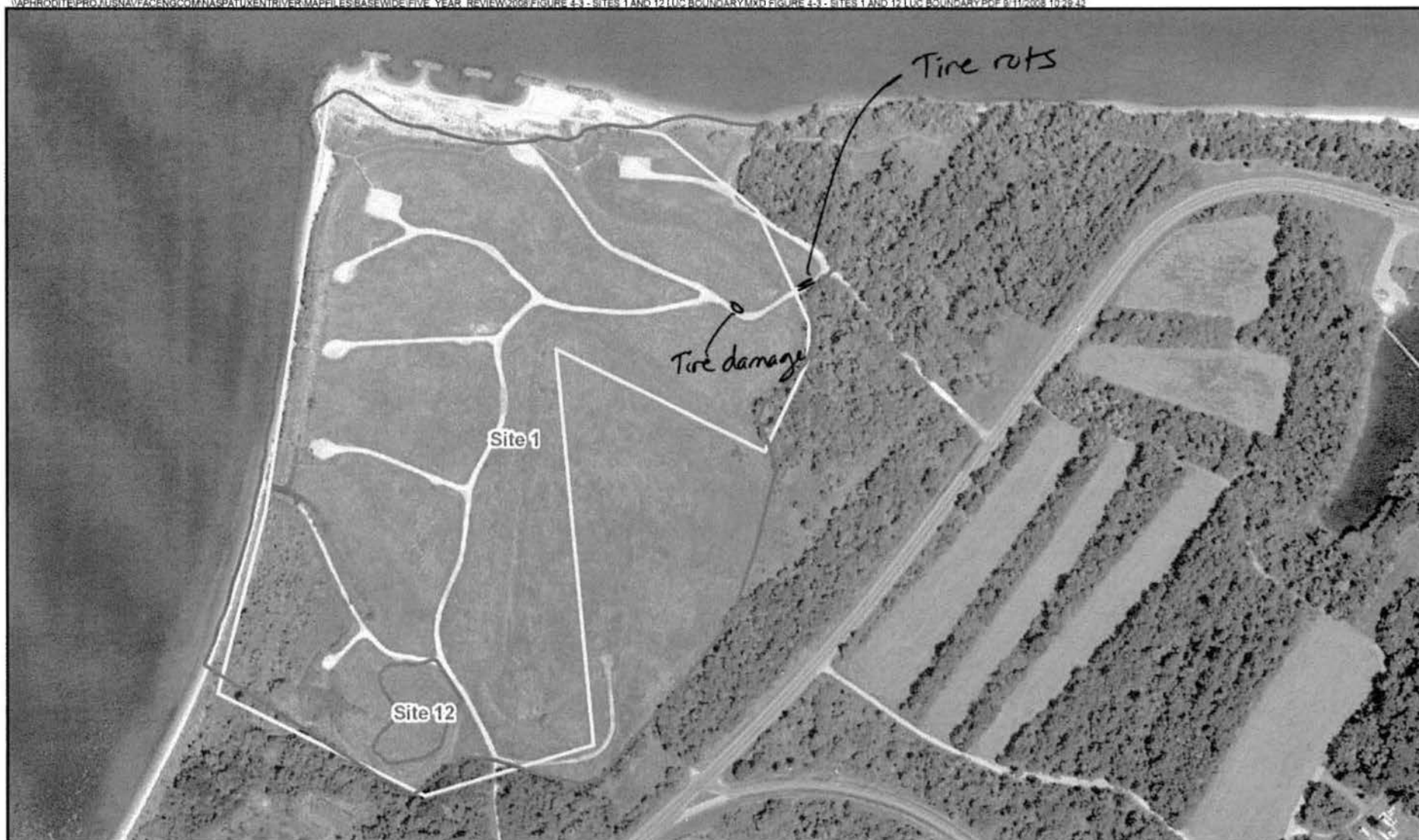
Recent damage to road from vehicle spinout on iced road, in eastern end of Site 1
recreational entrance. Tire ruts also present further east, near wooded area.

Inspected by: Amy Stattel
Print Name



Affiliation: Tetra Tech

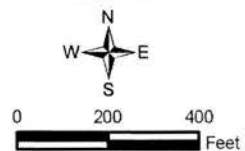
Signature: 

Date of Inspection: 12/22/10



Legend

-  LUC Boundary, Sites 1 and 12 OU-1
-  IR Site Boundary



2006 Aerial Photography

Figure 4-3
Sites 1 and 12 LUC Boundary
NAS Patuxent River
St. Mary's County, Maryland
September 11, 2008

CH2MHILL

PHOTOGRAPHIC LOG
SITE 1, SITE 12
DECEMBER 22, 2010



Site 1/12 Inspection – December 22, 2010



Main recreational entrance to Site 1 – tire damage



Close-up of tire rut, main recreational entrance to Site 1.



Tire rut on main access road to Site 1.

SITE 11, FORMER AND CURRENT LANDFILLS

POST-CLOSURE OPERATION AND MAINTENANCE INSPECTION CHECKLIST LOG

Inspection Type¹ Six Month Visual Inspection

<u>Item</u>	<u>Satisfactory</u>	<u>Unsatisfactory^{2,3}</u>
1. <u>Security Control System</u>		
a. Signs (No physical disturbance, vehicular traffic on roads only)	<u>X</u>	<u> </u>
2. <u>Soil Cover System</u>		
a. Erosion	<u> </u>	<u> </u>
b. Sedimentation	<u> </u>	<u> </u>
c. Settlement	<u> </u>	<u> </u>
e. Diversion Berms	<u> </u>	<u> </u>
f. Physical Disturbance	<u> </u>	<u> X </u>
3. <u>Surface Water Conveyances</u>		
a. Channels	<u> X </u>	<u> </u>
b. Ponded Water	<u> X </u>	<u> </u>
c. Swales	<u> </u>	<u> X </u>
d. Sediment Basin	<u> X </u>	<u> </u>
4. <u>Monitoring Wells</u>		
a. GW Monitoring Wells	<u> X </u>	<u> </u>
b. LFG Monitoring Wells	<u> X </u>	<u> </u>
5. <u>Roadways</u>		
a. Erosion	<u> X </u>	<u> </u>
b. Subgrade	<u> X </u>	<u> </u>
c. Road Surface	<u> X </u>	<u> </u>
6. <u>Walkways/Stairways</u>		
a. Erosion	<u> X </u>	<u> </u>
b. Subgrade	<u> X </u>	<u> </u>
c. Walkway Surface	<u> X </u>	<u> </u>
7. <u>Miscellaneous</u>		
a. Benchmarks	<u> X </u>	<u> </u>
b. Cover Vegetation	<u> </u>	<u> X </u>
c. Buffer Vegetation	<u> X </u>	<u> </u>
d. Landfill Gas Vents	<u> </u>	<u> X </u>
e. Upland Areas	<u> X </u>	<u> </u>
f. Leachate Collection system	<u> </u>	<u> X </u>

1. Event Type: Choose from "Six Month Visual Inspection; After Storm Event; Follow-up Repair; etc."
2. Corrective action shall be completed as soon as possible.
3. Provide a brief explanation of the unsatisfactory condition in Item 8 of the Inspection Checklist Log, provide photo documentation, and note its location on a Record Drawing.

SITE 11, FORMER AND CURRENT LANDFILLS
POST-CLOSURE OPERATION AND MAINTENANCE
INSPECTION CHECKLIST LOG

8. Description and Photo Documentation of Unsatisfactory Items (attach additional sheets if necessary)

2f.) Soil Cover system – Physical Disturbance - Numerous rodent holes and rodent activity in cap soils, as noted in attached Record drawing. Some rodent holes are located next to gas vents and threaten the subsurface structures (e.g., boots, etc.) at vents.

3c.) Surface Water conveyances – swales - Many perimeter drainage trench cleanouts are missing plastic caps. Caps should be secured and/or replaced to prevent rodent access, or siltation and buildup of vegetation. (see notes on attached record drawing).

7b.) Cover vegetation – cover grass had not been mowed and height of grass may have impeded observations of cap features. Several patches of woody vegetation noted on landfill cap, including some 2-3 year old trees on landfill's northeast slope. Mowing of each third of the cap surface recommended to occur on a rotating basis annually, so each area is covered once every 3 years, per OM Manual.

7d.) Landfill gas vents – large woody vegetation and rodent holes near vent structures should be removed/repared. Root growth and rodent activity may threaten the integrity of the subsurface structures associated with the vents (e.g., boots, etc.).

7f.) Leachate collection system – concrete collars around the manhole covers were damaged and/or cracked. Cracked concrete collars should be repaired/sealed to prevent rain infiltration and freeze/thaw conditions that can damage the leachate system manholes.

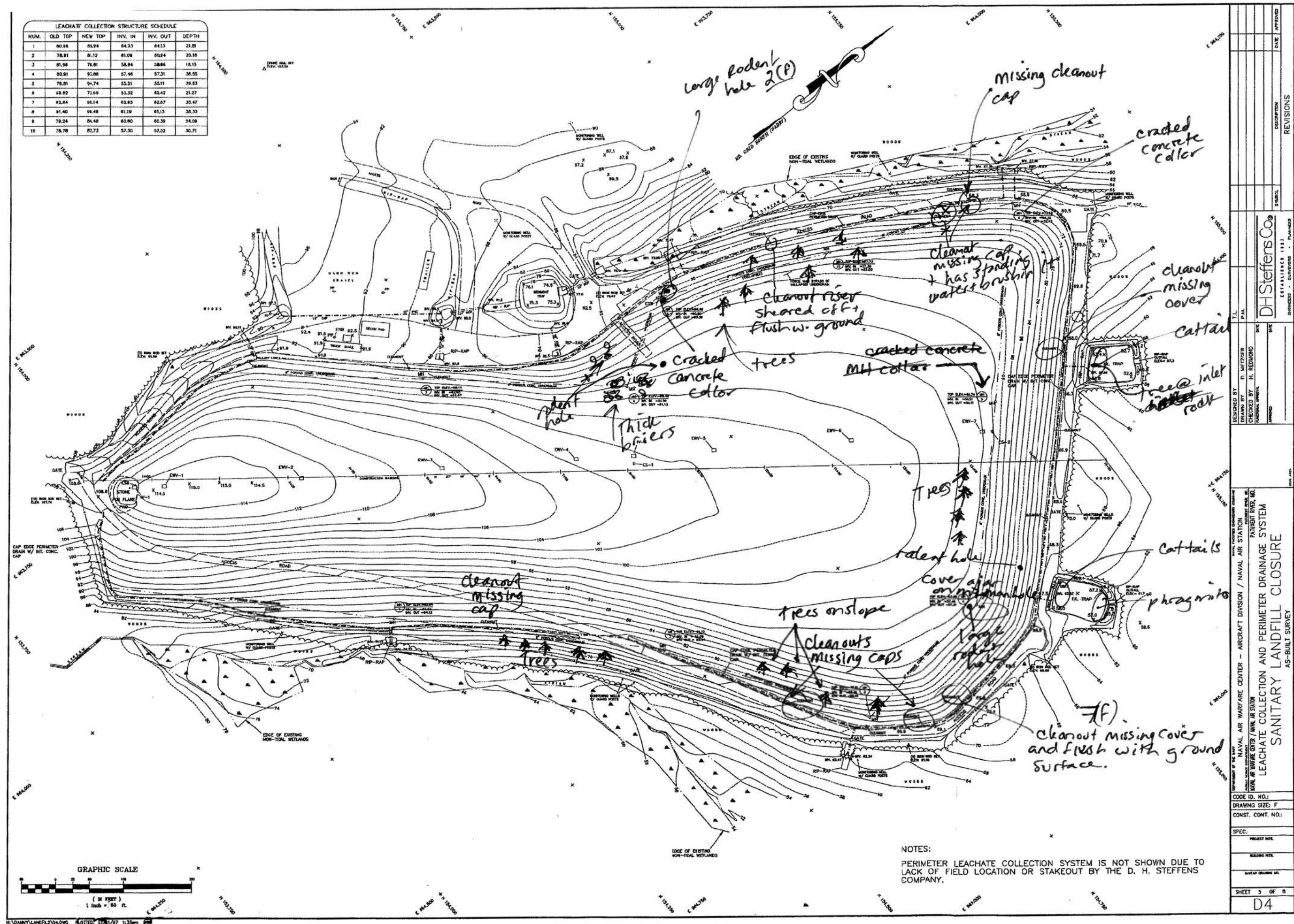
Inspected by: Amy Stattel
Print Name

Affiliation: Tetra Tech

Signature: Amy Stattel

Date of Inspection: 12-22-10

NUM.	OLD TSP	NEW TSP	INV. IN	INV. OUT	DEPTH
1	80.88	85.94	84.23	84.13	21.01
2	78.91	81.32	81.08	80.94	20.18
3	81.98	78.81	58.84	58.66	18.15
4	82.91	92.08	57.48	57.31	38.55
5	78.81	94.74	55.51	55.11	39.63
6	68.82	71.69	53.32	52.42	21.27
7	82.84	95.14	62.85	62.87	30.47
8	81.40	96.46	61.19	61.13	38.35
9	79.24	84.48	60.80	60.59	24.08
10	78.78	87.73	57.30	57.22	36.71



DESIGNED BY R. WITZGER		T.L.		
CHECKED BY H. REDGORD		P.A.L.		
PERSONAL APPROVAL		SIGNATURE		
APPROVED		DATE		
		REVISIONS		
		DESCRIPTION		
		ENGINEERS - SUPERVISOR - PLANNING		
		ESTABLISHED 1922		
		DH Steffens Co.		

PHOTOGRAPHIC LOG
SITE 11
DECEMBER 22, 2010



December 22, 2010 Site 11 Inspection



Soil Depression next to EWV-2



Woody vegetation at southeast toe of slope.



Missing cover on perimeter underdrain cleanout



TETRA TECH

GER-3014-026
SCN 40080-08-D-0498
September 9, 2011

Mr. Skip Simpson
NAS Patuxent River Project Manager
22445 Peary Road
Patuxent River, MD 20670

Subject: DRAFT Sites 1/12 Semiannual Landfill Inspection Report,
June 2, 2011 Inspection Event
Site 1 – Fishing Point Landfill and
Site 12 – Landfill Behind Rifle Range
NAS Patuxent River, Patuxent River, MD

Dear Mr. Simpson:

Enclosed for your review, please find one copy of the above-referenced document. This report, as well as the Draft Site 11 Landfill Inspection Report (June 2011), has been posted on SharePoint for your use. The Site 11 Inspection Report will be attached to the upcoming draft report for the May 2011 Site 11 groundwater monitoring, and as such, has not been included in this transmittal.

If you have any questions, please feel free to call me at (301) 528-3018.

Sincerely,

Amy Stattel
Project Manager

Cc: David Steckler, NAVFAC Washington (1 copy)
Sovereign Consulting Inc. (1 copy)
Tetra Tech Project File

**SITE 1, FISHING POINT LANDFILL &
SITE 12, LANDFILL BEHIND THE RIFLE RANGE
POST-CLOSURE OPERATION AND MAINTENANCE
INSPECTION CHECKLIST LOG**

Inspection Type¹ Biannual Visual Inspection

June 2, 2011

<u>Item</u>	<u>Satisfactory</u>	<u>Unsatisfactory^{2,3}</u>
1. <u>Security Control System</u>		
a. Signs (No physical disturbance, vehicular traffic on roads only)	<u>X</u>	<u> </u>
2. <u>Soil Cover System</u>		
a. Erosion	<u>X</u>	<u> </u>
b. Sedimentation	<u>X</u>	<u> </u>
c. Settlement	<u>X</u>	<u> </u>
e. Diversion Berms	<u>X</u>	<u> </u>
f. Physical Disturbance	<u>X</u>	<u> </u>
3. <u>Surface Water Conveyances</u>		
a. Channels	<u>X</u>	<u> </u>
b. Ponded Water	<u>X</u>	<u> </u>
c. Outlet Structures (Culverts)	<u>X</u>	<u> </u>
d. Swales	<u>X</u>	<u> </u>
e. Sediment Basin	<u>X</u>	<u> </u>
4. <u>Monitoring Wells</u>		
a. GW Monitoring Wells	<u>X</u>	<u> </u>
b. LFG Monitoring Wells	<u>X</u>	<u> </u>
5. <u>Roadways</u>		
a. Erosion	<u>X</u>	<u> </u>
b. Subgrade	<u>X</u>	<u> </u>
c. Road Surface	<u>X</u>	<u>X</u>
6. <u>Walkways/Stairways</u>		
a. Erosion	<u>X</u>	<u> </u>
b. Subgrade	<u>X</u>	<u> </u>
c. Walkway Surface	<u>X</u>	<u> </u>
7. <u>Miscellaneous</u>		
a. Benchmarks	<u>X</u>	<u> </u>
b. Cover Vegetation	<u>X</u>	<u> </u>
c. Buffer Vegetation	<u>X</u>	<u> </u>
d. Western Tree Vegetation	<u>X</u>	<u> </u>
e. Beach Erosion (Cobble beach)	<u>X</u>	<u> </u>
f. Landfill Gas Vents	<u>X</u>	<u> </u>
g. Upland Areas	<u>X</u>	<u> </u>

1. Event Type: Choose from "Biannual Visual Inspection; After Storm Event; Follow-up Repair; etc."
2. Corrective action shall be completed as soon as possible.
3. Provide a brief explanation of the unsatisfactory condition in Item 8 of the Inspection Checklist Log, provide photo documentation, and note its location on a Record Drawing.

**SITE 1, FISHING POINT LANDFILL &
SITE 12, LANDFILL BEHIND THE RIFLE RANGE**
POST-CLOSURE OPERATION AND MAINTENANCE
INSPECTION CHECKLIST LOG

8. Description and Photo Documentation of Unsatisfactory Items (attach additional sheets if necessary)

Photo 1 - Tire ruts at eastern edge of central access road.

Photo 2 - Tire rut off west edge of central access road.

Photo 3 - Storm damage to beach access timber stairs, between swales AA and BB.

Photo 4 - Tire ruts near northeast corner of Site 1, near 1MW-7A..

outside LUC boundary of Site 1 and 12

Inspected by: Amy Stattel
Print Name

Affiliation: Tetra Tech

Signature: Amy Stattel

Date of Inspection: 6-2-11

PHOTOGRAPHS
BI-ANNUAL LANDFILL CAP INSPECTION
NAS PATUXENT RIVER, MARYLAND
SITE 1/12 – LANDFILL BEHIND THE RIFLE RANGE
JUNE 2, 2011



Photo 1
Tire ruts at eastern edge of central access road.
Site 1



Photo 2
Tire rut off west edge of central access road
Site 1



Photo 3
Storm damage to beach access timber stairs
Between swales AA and BB, Site 1



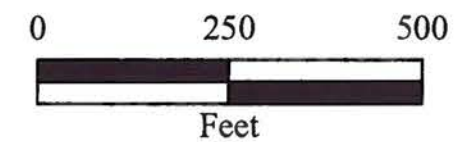
Photo 4
Tire ruts near northeast corner of Site 1, near IMW-7A,
outside LUC boundary of Site 1 and 12



- Legend**
- Monitoring Wells
 - IR Site Boundary
 - High
 - Medium
 - Installation Boundary
 - Shore Line
 - Surface Water Centerline
 - Surface Water Body
 - 5 ft Contour Interval

Observations w/photo #
from June 2, 2011
Semiannual Landfill Cap
Inspections

NOTES:
1. BASE MAP WAS RETRIEVED VIA
NAS PAX RIVER SHAREPOINT.
2. LAND-USE CONTROL BOUNDARY
COORDINATES - HORIZONTAL DATUM
IS MARYLAND STATE PLANE COORDINATE
SYSTEM (NAD 83) IN U.S. FEET.



NAVAL AIR STATION PATUXENT RIVER
ST. MARY'S COUNTY, MARYLAND
DEPARTMENT OF THE NAVY
NAVFAC- WASHINGTON

SITE 1 - FISHING POINT LANDFILL
SITE 12 - RIFLE RANGE LANDFILL



SOVEREIGN CONSULTING INC.
290 Executive Drive, Suite 300
Cranberry Twp., PA 16066
Phone: (724) 553-5084 Fax: (724) 553-5089
www.sovcon.com

Figure:
1-2

SITE 11, FORMER AND CURRENT LANDFILLS

POST-CLOSURE OPERATION AND MAINTENANCE

INSPECTION CHECKLIST LOG

Inspection Type¹ Six Month Visual Inspection June 2, 2011

<u>Item</u>	<u>Satisfactory</u>	<u>Unsatisfactory^{2,3}</u>
1. <u>Security Control System</u>		
a. Signs (No physical disturbance, vehicular traffic on roads only)	<u>X</u>	<u> </u>
2. <u>Soil Cover System</u>		
a. Erosion	<u>X</u>	<u> </u>
b. Sedimentation	<u>X</u>	<u> </u>
c. Settlement	<u>X</u>	<u> </u>
e. Diversion Berms	<u>X</u>	<u> </u>
f. Physical Disturbance	<u>X</u>	<u> </u>
3. <u>Surface Water Conveyances</u>		
a. Channels	<u>X</u>	<u> </u>
b. Ponded Water	<u>X</u>	<u> </u>
c. Swales	<u>X</u>	<u> </u>
d. Sediment Basin	<u>X</u>	<u> </u>
4. <u>Monitoring Wells</u>		
a. GW Monitoring Wells	<u>X</u>	<u> </u>
b. LFG Monitoring Wells	<u>X</u>	<u> </u>
5. <u>Roadways</u>		
a. Erosion	<u>X</u>	<u> </u>
b. Subgrade	<u>X</u>	<u> </u>
c. Road Surface	<u>X</u>	<u> </u>
6. <u>Walkways/Stairways</u>		
a. Erosion	<u>X</u>	<u> </u>
b. Subgrade	<u>X</u>	<u> </u>
c. Walkway Surface	<u>X</u>	<u> </u>
7. <u>Miscellaneous</u>		
a. Benchmarks	<u>X</u>	<u> </u>
b. Cover Vegetation	<u>X</u>	<u> </u>
c. Buffer Vegetation	<u>X</u>	<u> </u>
d. Landfill Gas Vents	<u>X</u>	<u> </u>
e. Upland Areas	<u>X</u>	<u> </u>

1. Event Type: Choose from "Six Month Visual Inspection; After Storm Event; Follow-up Repair; etc."
2. Corrective action shall be completed as soon as possible.
3. Provide a brief explanation of the unsatisfactory condition in Item 8 of the Inspection Checklist Log, provide photo documentation, and note its location on a Record Drawing.

SITE 11, FORMER AND CURRENT LANDFILLS

POST-CLOSURE OPERATION AND MAINTENANCE INSPECTION CHECKLIST LOG

8. Description and Photo Documentation of Unsatisfactory Items (attach additional sheets if necessary)

Not applicable – unsatisfactory items identified in Winter 2010-11 have been corrected; see item 9 below.

9. Other Notes:

Concrete rims and gaskets at top of manholes located on the cap were being repaired while the Tetra Tech inspector was on site June 2, 2011. This work was completed under service order 1349337. The cracks in the manhole risers and gaskets were sealed using a heavy-duty, outdoor concrete caulk. Also at the time of the June 2, 2011 inspection, the perimeter drain cleanout caps were in the process of being replaced, with only two outstanding cleanout caps left to be replaced. The replacement of the cleanout caps was performed under work order number 1336783. Also prior to the June 2, 2011 inspection, faded, stenciled signage located on manholes and vaults on the cap was re-painted. The bollards at 22 monitoring wells were also repainted with fresh yellow paint. Replacement of warning signage restricting access at the entrances to the site is planned for summer 2011.

The landfill surface was in good condition. Vegetation had been recently cut in May 2011. The past evidence of rodent activity observed at Site 11 during the December 2010 inspection was investigated by base personnel in the Spring of 2011, as part of the rodent eradication program. No active rodents were found at that time. During the current inspection, the Navy and Tetra Tech observed the rodent holes to be present, but no recent activity could be found. Since this inspection, the base has filled all former rodent holes with topsoil.

Inspected by: _____

Amy Stattel
Print Name

Affiliation: _____

Tetra Tech

Signature: _____

Amy Stattel

Date of Inspection: _____

6-2-11

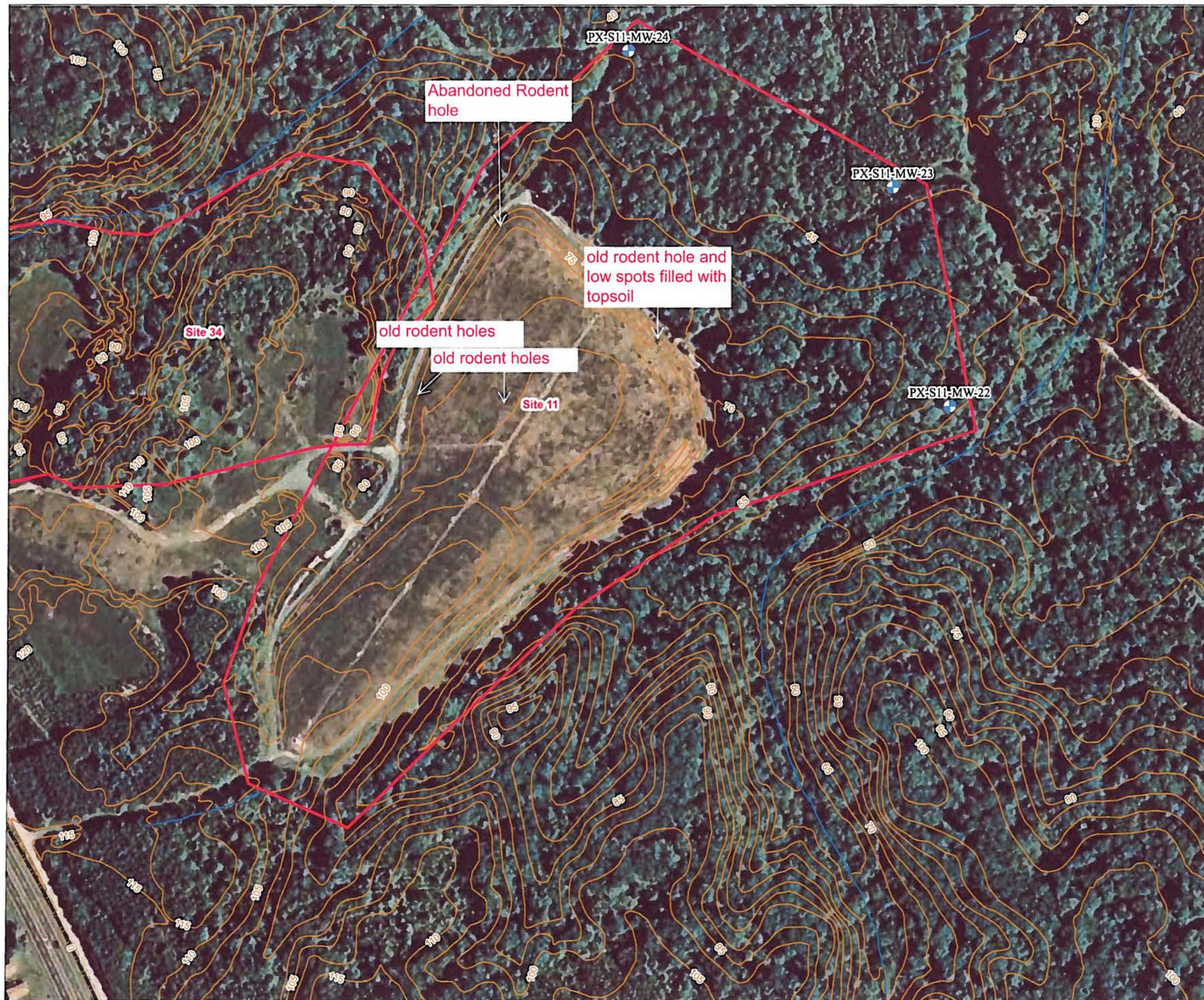
PHOTOGRAPHS
SEMI-ANNUAL LANDFILL CAP INSPECTION
NAS PATUXENT RIVER, MARYLAND
SITE 11 – CURRENT AND FORMER SANITARY LANDFILLS
JUNE 2, 2011



Photo 1
Inactive rodent hole on Northwest landfill slope
(filled subsequent to inspection date)



Photo 2
Abandoned rodent hole - northeast corner of landfill
(filled subsequent to inspection date)



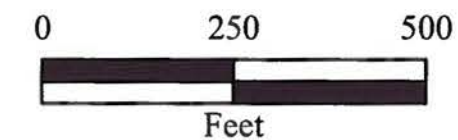
Legend

- | | |
|------------------|--------------------------|
| Monitoring Well | Installation Boundary |
| IR Site Boundary | Shore Line |
| High | Surface Water Centerline |
| Medium | Surface Water Body |
| | 5 ft Contour Interval |

observations from June 2, 2011
Semiannual Landfill Cap
Inspections

NOTES:

1. BASE MAP WAS RETRIEVED VIA NAS PAX RIVER SHAREPOINT.
2. LAND-USE CONTROL BOUNDARY COORDINATES - HORIZONTAL DATUM IS MARYLAND STATE PLANE COORDINATE SYSTEM (NAD 83) IN U.S. FEET.



NAVAL AIR STATION PATUXENT RIVER
ST. MARY'S COUNTY, MARYLAND
DEPARTMENT OF THE NAVY
NAVFAC- WASHINGTON

SITE 11 AND VICINITY



SOVEREIGN CONSULTING INC.
290 Executive Drive, Suite 300
Cranberry Twp., PA 16066
Phone: (724) 553-5084 Fax: (724) 553-5089
www.sovcon.com

Figure:

1-3

**SITE 1, FISHING POINT LANDFILL &
SITE 12, LANDFILL BEHIND THE RIFLE RANGE
POST-CLOSURE OPERATION AND MAINTENANCE
INSPECTION CHECKLIST LOG**

Inspection Type¹ SEMI ANNUAL - 6 MONTH VISUAL INSPECTION

<u>Item</u>	<u>Satisfactory</u>	<u>Unsatisfactory</u> ^{2,3}
1. <u>Security Control System</u>		
a. Signs (No physical disturbance, vehicular traffic on roads only)	<u>✓</u>	<u> </u>
2. <u>Soil Cover System</u>		
a. Erosion	<u>✓</u>	<u> </u>
b. Sedimentation	<u>✓</u>	<u> </u>
c. Settlement	<u>✓</u>	<u> </u>
e. Diversion Berms	<u>✓</u>	<u> </u>
f. Physical Disturbance	<u>✓</u>	<u> </u>
3. <u>Surface Water Conveyances</u>		
a. Channels	<u>✓</u>	<u> </u>
b. Ponded Water	<u>✓</u>	<u> </u>
c. Outlet Structures (Culverts)	<u>✓</u>	<u> </u>
d. Swales	<u>✓</u>	<u> </u>
e. Sediment Basin	<u>✓</u>	<u> </u>
4. <u>Monitoring Wells</u>		
a. GW Monitoring Wells	<u>✓</u>	<u> </u>
b. LFG Monitoring Wells	<u>NA - ? ABANDONED</u>	<u> </u>
5. <u>Roadways</u>		
a. Erosion	<u>✓</u>	<u> </u>
b. Subgrade	<u>✓</u>	<u> </u>
c. Road Surface	<u>✓</u>	<u> </u>
6. <u>Walkways/Stairways</u>		
a. Erosion	<u> </u>	<u>✓</u>
b. Subgrade	<u>✓</u>	<u> </u>
c. Walkway Surface	<u>✓</u>	<u> </u>
7. <u>Miscellaneous</u>		
a. Benchmarks	<u>NA</u>	<u> </u>
b. Cover Vegetation	<u>✓</u>	<u> </u>
c. Buffer Vegetation	<u>✓</u>	<u> </u>
d. Western Tree Vegetation	<u>✓</u>	<u> </u>
e. Beach Erosion (Cobble beach)	<u>✓</u>	<u> </u>
f. Landfill Gas Vents	<u>NA - ABANDONED ?</u>	<u> </u>
g. Upland Areas	<u>✓</u>	<u> </u>

- Event Type: Choose from "Biannual Visual Inspection; After Storm Event; Follow-up Repair; etc."
- Corrective action shall be completed as soon as possible.
- Provide a brief explanation of the unsatisfactory condition in Item 8 of the Inspection Checklist Log, provide photo documentation, and note its location on a Record Drawing.

**SITE 1, FISHING POINT LANDFILL &
SITE 12, LANDFILL BEHIND THE RIFLE RANGE
POST-CLOSURE OPERATION AND MAINTENANCE
INSPECTION CHECKLIST LOG**

8. Description and Photo Documentation of Unsatisfactory Items (attach additional sheets if necessary)

SITES 1/12 IN VERY GOOD CONDITION. ALL WOOD FENCE POSTS + ROPE FENCING IN PLACE. ROPE FENCING WORN + MISSING AT A COUPLE OF LOCATION. BASE HAS ~~WROD~~ PURCHASED NEW ROPE + PLANS TO REPLACE ALL ROPE FENCING IN THE NEAR FUTURE

ROADS WERE IN EXCELLENT CONDITION. ALL RUTTING AND STANDING WATER PREVIOUSLY NOTED REPAIRED. LARGE AREA OF SIGNIFICANT DAMAGE NOTED WAS COMPLETELY FILLED, REGRADED, + RESEEDDED. LOOKS VERY GOOD.

STILL HAVE ISSUES W/ WALKWAY STEPS LEADING DOWN TO THE WATER ALONG THE WESTERN EDGE OF SITE 1. TWO SOUTHERN MOST WALKWAY STEPS HAVE MOSTLY WASHED OUT. FRAMING LUMBER IS STILL THERE, BUT SOIL/FILL OF STEPS IS GONE.

LOOKED BACK @ PIC'S FROM PREVIOUS INSPECTIONS AND THE TWO WALKWAY STEPS PROBABLY NEED TO BE REMOVED UNLESS SOME TYPE OF STABILIZATION OF SHORELINE IS PERFORMED.

Inspected by: DOU MARTINSON
Print Name

Affiliation: CH2M HILL

Signature: 

Date of Inspection: 11/7/11

SITE 11, FORMER AND CURRENT LANDFILLS

POST-CLOSURE OPERATION AND MAINTENANCE

INSPECTION CHECKLIST LOG

Inspection Type¹ SEMI ANNUAL - 6 MONTH VISUAL INSPECTION

<u>Item</u>	<u>Satisfactory</u>	<u>Unsatisfactory^{2,3}</u>
<u>1. Security Control System</u>		
a. Signs (No physical disturbance, vehicular traffic on roads only)	<u>✓</u>	<u> </u>
<u>2. Soil Cover System</u>		
a. Erosion	<u>✓</u>	<u> </u>
b. Sedimentation	<u>✓</u>	<u> </u>
c. Settlement	<u>✓</u>	<u> </u>
e. Diversion Berms	<u>✓</u>	<u> </u>
f. Physical Disturbance	<u>✓</u>	<u> </u>
<u>3. Surface Water Conveyances</u>		
a. Channels	<u>✓</u>	<u> </u>
b. Ponded Water	<u>✓</u>	<u> </u>
c. Swales	<u>✓</u>	<u> </u>
d. Sediment Basin	<u>✓</u>	<u> </u>
<u>4. Monitoring Wells</u>		
a. GW Monitoring Wells	<u>✓</u>	<u> </u>
b. LFG Monitoring Wells	<u>✓</u>	<u> </u>
<u>5. Roadways</u>		
a. Erosion	<u>✓</u>	<u> </u>
b. Subgrade	<u>✓</u>	<u> </u>
c. Road Surface	<u>✓</u>	<u> </u>
<u>6. Walkways/Stairways</u>		
a. Erosion	<u>NA</u>	<u> </u>
b. Subgrade	<u>NA</u>	<u> </u>
c. Walkway Surface	<u>NA</u>	<u> </u>
<u>7. Miscellaneous</u>		
a. Benchmarks	<u>NA</u>	<u> </u>
b. Cover Vegetation	<u>✓</u>	<u> </u>
c. Buffer Vegetation	<u>✓</u>	<u> </u>
d. Landfill Gas Vents	<u>✓</u>	<u> </u>
e. Upland Areas	<u>✓</u>	<u> </u>

1. Event Type: Choose from "Six Month Visual Inspection; After Storm Event; Follow-up Repair; etc."
2. Corrective action shall be completed as soon as possible.
3. Provide a brief explanation of the unsatisfactory condition in Item 8 of the Inspection Checklist Log, provide photo documentation, and note its location on a Record Drawing.

SITE 11, FORMER AND CURRENT LANDFILLS

POST-CLOSURE OPERATION AND MAINTENANCE INSPECTION CHECKLIST LOG

8. Description and Photo Documentation of Unsatisfactory Items (attach additional sheets if necessary)

SITE 11 ROADS IN VERY GOOD SHAPE. GRASS ON CAP WAS ROUGHLY 12" HIGH, SO ROAD ALONG CENTER-LINE ON TOP OF LANDFILL WAS NOT VISIBLE (NOT COMPLETELY VISIBLE). AREA'S VISIBLE APPEARED TO BE IN GOOD REPAIR.

ONLY DAMAGE NOTED WAS TO GATE @ SOUTH END OF LANDFILL. BELIEVE DAMAGE CAUSED DURING MOWING. SITE IS STILL SECURE AS GATE IS FUNCTIONAL ENOUGH THAT IT CAN BE OPENED, CLOSED, AND LOCKED.

Inspected by:

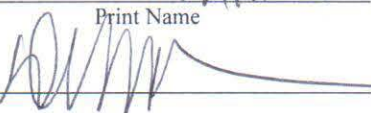
Don Martenson

Print Name

Affiliation:

CH2M Hill

Signature:



Date of Inspection:

11/7/11

**SITE 1, FISHING POINT LANDFILL &
SITE 12, LANDFILL BEHIND THE RIFLE RANGE
POST-CLOSURE OPERATION AND MAINTENANCE
INSPECTION CHECKLIST LOG**

Inspection Type¹ SEMI ANNUAL

<u>Item</u>	<u>Satisfactory</u>	<u>Unsatisfactory^{2,3}</u>
1. <u>Security Control System</u>		
a. Signs (No physical disturbance, vehicular traffic on roads only)	<u>✓</u>	<u> </u>
2. <u>Soil Cover System</u>		
a. Erosion	<u>✓</u>	<u> </u>
b. Sedimentation	<u>✓</u>	<u> </u>
c. Settlement	<u>✓</u>	<u> </u>
e. Diversion Berms	<u>✓</u>	<u> </u>
f. Physical Disturbance	<u>✓</u>	<u> </u>
3. <u>Surface Water Conveyances</u>		
a. Channels	<u>✓</u>	<u> </u>
b. Ponded Water	<u>✓</u>	<u> </u>
c. Outlet Structures (Culverts)	<u>✓</u>	<u> </u>
d. Swales	<u>✓</u>	<u> </u>
e. Sediment Basin	<u>✓</u>	<u> </u>
4. <u>Monitoring Wells</u>		
a. GW Monitoring Wells	<u>✓</u>	<u> </u>
b. LFG Monitoring Wells	<u>NA</u>	<u> </u>
5. <u>Roadways</u>		
a. Erosion	<u>✓</u>	<u> </u>
b. Subgrade	<u>✓</u>	<u> </u>
c. Road Surface	<u>✓</u>	<u> </u>
6. <u>Walkways/Stairways</u>		
a. Erosion	<u> </u>	<u>✓</u>
b. Subgrade	<u>✓</u>	<u> </u>
c. Walkway Surface	<u>✓</u>	<u> </u>
7. <u>Miscellaneous</u>		
a. Benchmarks	<u>NA</u>	<u> </u>
b. Cover Vegetation	<u>✓</u>	<u> </u>
c. Buffer Vegetation	<u>✓</u>	<u> </u>
d. Western Tree Vegetation	<u>✓</u>	<u> </u>
e. Beach Erosion (Cobble beach)	<u>✓</u>	<u> </u>
f. Landfill Gas Vents	<u>NA</u>	<u> </u>
g. Upland Areas	<u>✓</u>	<u> </u>

1. Event Type: Choose from "Biannual Visual Inspection; After Storm Event; Follow-up Repair; etc."
2. Corrective action shall be completed as soon as possible.
3. Provide a brief explanation of the unsatisfactory condition in Item 8 of the Inspection Checklist Log, provide photo documentation, and note its location on a Record Drawing.

SITE 1, FISHING POINT LANDFILL &
SITE 12, LANDFILL BEHIND THE RIFLE RANGE
**POST-CLOSURE OPERATION AND MAINTENANCE
INSPECTION CHECKLIST LOG**

8. Description and Photo Documentation of Unsatisfactory Items (attach additional sheets if necessary)

SITES 1 & 12 IN VERY GOOD SHAPE. STILL SOME ROPE
ALONG WALKWAYS DAMAGED / MISSING. ONE SECTION
OF FENCING ALONG ROAD THAT WAS DAMAGED HAS
BEEN REPAIRED.

ROADS WERE IN EXCELLENT SHAPE

STILL SIGNIFICANT ISSUES W/ WALKWAYS LEADING
DOWN TO THE RIVER SHORELINE. TOOK SEVERAL
PICS.

Inspected by: DON MARTINSON
Print Name

Affiliation: _____

Signature: 

Date of Inspection: 5/2/12



05/02/2012 08:19



05/02/2012 08:22



05/02/2012 08:24

SITE 11, FORMER AND CURRENT LANDFILLS

POST-CLOSURE OPERATION AND MAINTENANCE

INSPECTION CHECKLIST LOG

Inspection Type¹ SEMI-ANNUAL - 6 Month Visual Inspection

<u>Item</u>	<u>Satisfactory</u>	<u>Unsatisfactory^{2,3}</u>
1. <u>Security Control System</u>		
a. Signs (No physical disturbance, vehicular traffic on roads only)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. <u>Soil Cover System</u>		
a. Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b. Sedimentation	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c. Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>
e. Diversion Berms	<input checked="" type="checkbox"/>	<input type="checkbox"/>
f. Physical Disturbance	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. <u>Surface Water Conveyances</u>		
a. Channels	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b. Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c. Swales	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d. Sediment Basin	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. <u>Monitoring Wells</u>		
a. GW Monitoring Wells	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b. LFG Monitoring Wells	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. <u>Roadways</u>		
a. Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b. Subgrade	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c. Road Surface	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. <u>Walkways/Stairways</u>		
a. Erosion	<u>NA</u>	<input type="checkbox"/>
b. Subgrade	<u>NA</u>	<input type="checkbox"/>
c. Walkway Surface	<u>NA</u>	<input type="checkbox"/>
7. <u>Miscellaneous</u>		
a. Benchmarks	<u>NA</u>	<input type="checkbox"/>
b. Cover Vegetation	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c. Buffer Vegetation	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d. Landfill Gas Vents	<input checked="" type="checkbox"/>	<input type="checkbox"/>
e. Upland Areas	<input checked="" type="checkbox"/>	<input type="checkbox"/>

1. Event Type: Choose from "Six Month Visual Inspection; After Storm Event; Follow-up Repair; etc."
2. Corrective action shall be completed as soon as possible.
3. Provide a brief explanation of the unsatisfactory condition in Item 8 of the Inspection Checklist Log, provide photo documentation, and note its location on a Record Drawing.

**SITE 11, FORMER AND CURRENT LANDFILLS
POST-CLOSURE OPERATION AND MAINTENANCE
INSPECTION CHECKLIST LOG**

8. Description and Photo Documentation of Unsatisfactory Items (attach additional sheets if necessary)

THREE GROUNDHOG HOLES LOCATED JUST OFF THE ROAD, NEAR TOE OF COVER. GROUNDHOG HOLES FLAGGED:

DAMAGE TO GATE NOTED DURING LAST INSPECTION APPEARS TO HAVE BEEN REPAIRED

ROADS WERE ALL IN GOOD SHAPE. ROAD ALONG TOP OF CAP (ALONG VENT LINE) NOT VISIBLE BECAUSE GRASS WAS ROUGHLY 12" HIGH.

Inspected by: DON MARINSON
Print Name

Affiliation: CH2M HILL

Signature: 

Date of Inspection: 5/2/12

**SITE 1, FISHING POINT LANDFILL &
SITE 12, LANDFILL BEHIND THE RIFLE RANGE
POST-CLOSURE OPERATION AND MAINTENANCE
INSPECTION CHECKLIST LOG**

Inspection Type¹ Semi-Annual

Inspection Date 11-16-12

<u>Item</u>	<u>Satisfactory</u>	<u>Unsatisfactory^{2,3}</u>
1. <u>Security Control System</u>		
a. Signs (No physical disturbance, Vehicular traffic on roads only)	<u>X</u>	<u></u>
2. <u>Soil Cover System</u>		
a. Erosion	<u>X</u>	<u></u>
b. Sedimentation	<u>X</u>	<u></u>
c. Settlement	<u>X</u>	<u></u>
d. Diversion Berms	<u>X</u>	<u></u>
e. Physical Disturbance	<u>X</u>	<u></u>
3. <u>Surface Water Conveyances</u>		
a. Channels	<u>X</u>	<u></u>
b. Ponded Water	<u>X</u>	<u></u>
c. Outlet Structures (Culverts)	<u>X</u>	<u></u>
d. Swales	<u>X</u>	<u></u>
e. Sediment Basin	<u>X</u>	<u></u>
4. <u>Monitoring Wells</u>		
a. GW Monitoring Wells	<u>X</u>	<u></u>
b. LFG Monitoring Wells	<u>X</u>	<u></u>
5. <u>Roadways</u>		
a. Erosion	<u>X</u>	<u></u>
b. Subgrade	<u>X</u>	<u></u>
c. Road Surface	<u>X</u>	<u></u>
6. <u>Walkways/Stairways</u>		
d. Erosion	<u></u>	<u>X</u>
e. Subgrade	<u>X</u>	<u></u>
f. Walkway Surface	<u>X</u>	<u></u>
7. <u>Miscellaneous</u>		
a. Cover Vegetation	<u>X</u>	<u></u>
b. Buffer Vegetation	<u>X</u>	<u></u>
c. Western Tree Vegetation	<u>X</u>	<u></u>
d. Beach Erosion (Cobble beach)	<u>X</u>	<u></u>
e. Upland Areas	<u>X</u>	<u></u>

¹ Event Type: Choose from "Biannual Visual Inspection; After Storm Event; Follow-up Repair; etc."

² Corrective action shall be completed as soon as possible.

³ Provide a brief explanation of the unsatisfactory condition in Item 8 of the Inspections Checklist Log, provide photo documentation, and note its location on a Record Drawing.

**SITE 1, FISHING POINT LANDFILL &
SITE 12, LANDFILL BEHIND THE RIFLE RANGE
POST-CLOSURE OPERATION AND MAINTENANCE
INSPECTION CHECKLIST LOG**

8. Description and Photo Documentation of Unsatisfactory Items (attach additional sheets if necessary)

Very minor vehicular traffic print observed on landfill cover system. No apparent damage that would affect the integrity of the cover system was observed. See photograph.

Groundwater Monitoring Wells MW-07A and MW-07B: Rusty locks replaced during 2-27-13 site visit. See Photograph.

Landfill Gas Monitoring Wells 1-GW4, 1-GW5, 1-GW6: New locks installed during 2-27-13 site visit. See Photographs.

Erosion observed under two stairways leading down to beach along western boundary of Site 1. Stairways should probably be removed if no shoreline stabilization is performed as recommended in previous inspection. See Photographs.

Inspected by: Waseem Kunbargi
Print Name

Affiliation: Osage of Virginia

Signature: Waseem Kunbargi

Date of Inspection: 11-16-12



Minor vehicular traffic footprint on Site 1 cover observed during 11-16-12 inspection.



Erosion beneath stairway at Site 1 boundary observed during 11-16-12 inspection.



Erosion beneath stairway at Site 1 boundary observed during 11-16-12 inspection.



New lock installed on LFG monitoring well 1-GW4 during 2-27-13 site visit.



New lock installed on LFG monitoring well 1-GW5 during 2-27-13 site visit.



New lock installed on LFG monitoring well 1-GW6 during 2-27-13 site visit.



New locks installed on GW monitoring wells MW-07A and MW-07B during 2-27-13 site visit.

SITE 6, BOHNEYARD COVER SYSTEM

POST-CLOSURE OPERATION AND MAINTENANCE

INSPECTION CHECKLIST LOG

Inspection Type¹ 15 Month

<u>Item</u>	<u>Satisfactory</u>	<u>Unsatisfactory^{2,3}</u>
1. <u>Soil Cover System</u>		
a. Erosion Damage	<u>X</u>	<u> </u>
b. Sedimentation	<u>X</u>	<u> </u>
c. Settlement	<u>X</u>	<u> </u>
d. Poned Water	<u>X</u>	<u> </u>
e. Physical Disturbance	<u>X</u>	<u> </u>
2. <u>Concrete Cover</u>		
a. Cracks in Concrete	<u>X</u>	<u> </u>
b. Damaged Joint Sealant	<u>X</u>	<u> </u>
c. Clogged Catch Basins Grates, Inlet and Discharge Piping	<u>X</u>	<u> </u>
d. Swales	<u>X</u>	<u> </u>
e. Damaged Containment Valve And Lock	<u>X</u>	<u> </u>
3. <u>Asphalt Cover</u>		
a. Cracks in Asphalt	<u>X</u>	<u> </u>
b. Damaged Concrete / Asphalt	<u>X</u>	<u> </u>
4. <u>Detention Pond</u>		
a. Erosion Damage	<u>X</u>	<u> </u>
b. Sedimentation	<u>X</u>	<u> </u>
c. Poned Water	<u>X</u>	<u> </u>
d. Blocked Spillway (Debris, Sedimentation or Vegetation)	<u>X</u>	<u> </u>

¹ Event Type: Choose from "Annual Visual Inspection; After Storm Event; Follow-up Repair; etc."

² Corrective action, if required, will be implemented within 90 days of when a deficiency is first observed.

³ Provide a brief explanation of the unsatisfactory condition in Item 5 of the Inspection Checklist Log, provide photo documentation, and note its location on a Record Drawing.

**SITE 6, BOHNEYARD COVER SYSTEM
POST-CLOSURE OPERATION AND MAINTENANCE
INSPECTION CHECKLIST LOG**

5. Description and Photo Documentation of Unsatisfactory Items (attach additional sheets if necessary)

Very minor erosion observed on western portion of soil cover system. See photograph.

Very minor cracks observed on concrete cover. See photographs.

Minor cracks observed on asphalt cover. See photograph.

Minor vegetation and sedimentation observed in containment area along southwestern boundary of concrete cover. See photographs.

Inspected by: Waseem Kunbargi

Print Name

Affiliation: Osage of Virginia

Signature: Waseem Kunbargi

Date of Inspection: 11-16-12



Very minor crack on concrete cover.



Very minor crack on concrete cover.



Minor crack on asphalt cover.



Very minor erosion on soil cover along western site boundary.



Minor sedimentation in containment area.



Minor vegetation in containment area.

SITE 17, PESTICIDE SHOP SOIL COVER

POST-CLOSURE OPERATION AND MAINTENANCE INSPECTION CHECKLIST LOG

Inspection Type¹ 15 Month

<u>Item</u>	<u>Satisfactory</u>	<u>Unsatisfactory^{2,3}</u>
1. <u>Soil Cover System</u>		
a. Erosion	<u>X</u>	<u> </u>
b. Sedimentation	<u>X</u>	<u> </u>
c. Settlement	<u>X</u>	<u> </u>
d. Physical Disturbance	<u>X</u>	<u> </u>
2. <u>Surface Water Conveyances</u>		
a. Channels	<u>NA</u>	<u> </u>
b. Ponded Water	<u>NA</u>	<u> </u>
3. <u>Miscellaneous</u>		
a. Cover Vegetation	<u>X</u>	<u> </u>
b. Buffer Trees and Vegetation	<u>X</u>	<u> </u>
4. Description and Photo Documentation of Unsatisfactory Item (attach additional sheets if necessary)		

No Unsatisfactory Items Observed. No Channels or Ponded Water Observed.

Inspected by: Wassem Kumbasi
Print Name

Affiliation: Osage of Virginia

Signature: Wassem Kumbasi

Date of Inspection: 11-16-12

¹ Event Type: Choose from "Biannual Visual Inspection; After Storm Event; Follow-up Repair; etc."

² Corrective action, if required, will be implemented within 90 days of when a deficiency is first observed.

³ Provide a brief explanation of the unsatisfactory condition in Item 4 of the Inspection Checklist Log, provide photo documentation, and note its location on a Record Drawing.



View of gravel road and entrance sign at Site 17.

**SITE 11, FORMER AND CURRENT LANDFILLS
POST-CLOSURE OPERATION AND MAINTENANCE
INSPECTION CHECKLIST LOG**

Inspection Type¹ 12-19-2012

<u>Item</u>	<u>Satisfactory</u>	<u>Unsatisfactory^{2,3}</u>
1. <u>Security Control System</u>	<input checked="" type="checkbox"/>	
a. Signs (No physical disturbance, vehicular traffic on roads only)		
2. <u>Soil Cover System</u>		
a. Erosion	<input checked="" type="checkbox"/>	
b. Sedimentation	<input checked="" type="checkbox"/>	
c. Settlement	<input checked="" type="checkbox"/>	
e. Diversion Berms	<input checked="" type="checkbox"/>	
f. Physical Disturbance	<input checked="" type="checkbox"/>	
3. <u>Surface Water Conveyances</u>		
a. Channels	<input checked="" type="checkbox"/>	
b. Ponded Water	<input checked="" type="checkbox"/>	
c. Swales	<input checked="" type="checkbox"/>	
d. Sediment Basin	<input checked="" type="checkbox"/>	
4. <u>Monitoring Wells</u>		
a. GW Monitoring Wells	<input checked="" type="checkbox"/>	
b. LFG Monitoring Wells		
5. <u>Roadways</u>		
a. Erosion	<input checked="" type="checkbox"/>	
b. Subgrade	<input checked="" type="checkbox"/>	
c. Road Surface	<input checked="" type="checkbox"/>	
6. <u>Walkways/Stairways</u>		
a. Erosion	N/A	
b. Subgrade	N/A	
c. Walkway Surface	N/A	
7. <u>Miscellaneous</u>		
a. Benchmarks	<input checked="" type="checkbox"/>	
b. Cover Vegetation	<input checked="" type="checkbox"/>	
c. Buffer Vegetation	<input checked="" type="checkbox"/>	
d. Landfill Gas Vents	<input checked="" type="checkbox"/>	
e. Upland Areas	<input checked="" type="checkbox"/>	

Caught 1 ground hog and filled in holes

1. Event Type: Choose from "Six Month Visual Inspection; After Storm Event; Follow-up Repair; etc."
2. Corrective action shall be completed as soon as possible.
3. Provide a brief explanation of the unsatisfactory condition in Item 8 of the Inspection Checklist Log, provide photo documentation, and note its location on a Record Drawing.

Sho Simpson

SITE 6, BOHNEYARD COVER SYSTEM POST-CLOSURE OPERATION AND MAINTENANCE INSPECTION CHECKLIST LOG

Inspection Type¹ 12-19-2012

<u>Item</u>	<u>Satisfactory</u>	<u>Unsatisfactory^{2,3}</u>
1. <u>Soil Cover System</u>		
a. Erosion Damage	<input checked="" type="checkbox"/>	
b. Sedimentation	<input checked="" type="checkbox"/>	
c. Settlement	<input checked="" type="checkbox"/>	
d. Ponded Water	<input checked="" type="checkbox"/>	
e. Physical Disturbance	<input checked="" type="checkbox"/>	
2. <u>Concrete Cover</u>		
a. Cracks in Concrete	<u>yes Repaired</u>	<u>SO 1825424</u>
b. Damaged Joint Sealant	<u>yes Repaired</u>	<u>SO 1822144</u>
c. Clogged Catch Basins Grates, Inlet and Discharge Piping	<input checked="" type="checkbox"/>	
d. Swales	<input checked="" type="checkbox"/>	
e. Damaged Containment Valve And Lock	<input checked="" type="checkbox"/>	
3. <u>Asphalt Cover</u>		
a. Cracks in Asphalt	<input checked="" type="checkbox"/>	
b. Damaged Concrete / Asphalt	<input checked="" type="checkbox"/>	
4. <u>Detention Pond</u>		
a. Erosion Damage	<input checked="" type="checkbox"/>	
b. Sedimentation	<input checked="" type="checkbox"/>	
c. Ponded Water	<input checked="" type="checkbox"/>	
d. Blocked Spillway (Debris, Sedimentation or Vegetation)	<input checked="" type="checkbox"/>	

Shp Simpson

¹ Event Type: Choose from "Annual Visual Inspection; After Storm Event; Follow-up Repair; etc."

² Corrective action, if required, will be implemented within 90 days of when a deficiency is first observed.

³ Provide a brief explanation of the unsatisfactory condition in Item 5 of the Inspection Checklist Log, provide photo documentation, and note its location on a Record Drawing.

**SITE 1, FISHING POINT LANDFILL &
SITE 12, LANDFILL BEHIND THE RIFLE RANGE
POST-CLOSURE OPERATION AND MAINTENANCE
INSPECTION CHECKLIST LOG**

Inspection Type¹ 12-19-2012

<u>Item</u>	<u>Satisfactory</u>	<u>Unsatisfactory^{2,3}</u>
1. <u>Security Control System</u>		
a. Signs (No physical disturbance, vehicular traffic on roads only)	<input checked="" type="checkbox"/>	
2. <u>Soil Cover System</u>		
a. Erosion	<input checked="" type="checkbox"/>	
b. Sedimentation	<input checked="" type="checkbox"/>	
c. Settlement	<input checked="" type="checkbox"/>	
e. Diversion Berms	<input checked="" type="checkbox"/>	
f. Physical Disturbance	<input checked="" type="checkbox"/>	
3. <u>Surface Water Conveyances</u>		
a. Channels	<input checked="" type="checkbox"/>	
b. Ponded Water	<input checked="" type="checkbox"/>	
c. Outlet Structures (Culverts)	<input checked="" type="checkbox"/>	
d. Swales	<input checked="" type="checkbox"/>	
e. Sediment Basin	<input checked="" type="checkbox"/>	
4. <u>Monitoring Wells</u>		
a. GW Monitoring Wells	<input checked="" type="checkbox"/>	
b. LFG Monitoring Wells		
5. <u>Roadways</u>		
a. Erosion	<input checked="" type="checkbox"/>	
b. Subgrade	<input checked="" type="checkbox"/>	
c. Road Surface	<input checked="" type="checkbox"/>	
6. <u>Walkways/Stairways</u>		
a. Erosion	<u>Base</u>	<input checked="" type="checkbox"/>
b. Subgrade	<u>Base</u>	<input checked="" type="checkbox"/>
c. Walkway Surface	<input checked="" type="checkbox"/>	
7. <u>Miscellaneous</u>		
a. Benchmarks	<u>N/A</u>	
b. Cover Vegetation	<input checked="" type="checkbox"/>	
c. Buffer Vegetation	<input checked="" type="checkbox"/>	
d. Western Tree Vegetation	<input checked="" type="checkbox"/>	
e. Beach Erosion (Cobble beach)	<u>yes Base</u>	
f. Landfill Gas Vents	<input checked="" type="checkbox"/>	
g. Upland Areas	<input checked="" type="checkbox"/>	

1. Event Type: Choose from "Biannual Visual Inspection; After Storm Event; Follow-up Repair; etc."
2. Corrective action shall be completed as soon as possible.
3. Provide a brief explanation of the unsatisfactory condition in Item 8 of the Inspection Checklist Log, provide photo documentation, and note its location on a Record Drawing.

POST-CLOSURE OPERATION AND MAINTENANCE INSPECTION CHECKLIST LOG

3 Provide a brief explanation of the unsatisfactory condition in Item 4 of the Inspection Checklist Log, provide photo documentation, and note its location on a Record Drawing.