FINAL

Record of Decision
for
Site 11 – Former and Current Sanitary Landfill, Operable Unit 2 (Groundwater, Sediment, and Surface Water)

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

Naval Facilities Engineering Command
Washington

September 2008

Contents

Acronyms and Abbreviations

1,1-DCE	1,1-Dichloroethene
cis-1,2-DCE	cis-1,2-Dichloroethene
ARAR	applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	constituent of concern
COPC	constituents of potential concern
CTE	central tendancy exposure
ERA	ecological risk assessment
FFA	Federal Facility Agreement
FFS	focused feasibility study
gpm	gallons per minute
HHRA	human health risk assessment
HI	hazard index
IR Program	Installation Restoration Program
IRA	interim removal action
LCS	leachate collection system
LTM	long-term monitoring
LUC	land use control
MCL	Maximum Contaminant Level
MDE	Maryland Department of the Environment
µg/L	micrograms per liter
NAS	Naval Air Station
Navy	United States Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	operation and maintenance
OU	operable unit
PCB	polycholoinated bipheynl
PCE	perchloroethylene
PRAP	Proposed Remedial Action Plan
RAB	Restoration Advisory Board
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation

RME	Reasonable Maximum Exposure
ROD	Record of Decision
SVOC	semi-volatile organic compound
TAL	Target Analyte List
TCE	Trichloroethylene
USEPA	United States Environmental Protection Agency
VC	vinyl chloride
VOC	volatile organic compound

SECTION 1

Declaration

1.1 Site Name and Location

This Record of Decision (ROD) was prepared for Installation Restoration Program (IR Program) Site 11, Former and Current Sanitary Landfill, Operable Unit (OU) 2, at Naval Air Station (NAS) Patuxent River in St. Mary's County, Maryland. NAS Patuxent River was placed on the National Priorities List (NPL) on June 30, 1994 (USEPA ID: MD7170024536). This ROD addresses groundwater, sediment, and surface water for Site 11 OU-2.

1.2 Statement of Basis and Purpose

This ROD presents the selected remedy for Site 11 OU-2 at NAS Patuxent River, which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). In accordance with Section 113(k) of CERCLA, this decision is based on information contained in the Administrative Record for Site 11 OU-2.

The United States Department of the Navy (Navy) and the United States Environmental Protection Agency (USEPA) Region III jointly issue this ROD with the concurrence of the Maryland Department of the Environment (MDE) (Appendix A). The Navy provides funding for clean-up of IR Program sites at NAS Patuxent River. The Federal Facility Agreement (FFA) for NAS Patuxent River documents how the Navy intends to meet and implement CERCLA in partnership with the USEPA and in consultation with the MDE.

Site 11 is one of the sites identified in the FFA. A list and description of all IR Program sites is presented in the 2007 update of the NAS Patuxent River Site Management Plan. During the past 12 years, a total of 12 RODs have been completed for IR Program sites at NAS Patuxent River, and additional investigations and remedial actions are ongoing. This ROD documents the final decision for Site 11 OU-2, and does not include or affect any other sites or operable units at the NAS.

Public comments on the selected remedy for Site 11 OU-2 are discussed in Section 4, "Responsiveness Summary."

1.3 Assessment of the Site

The response actions selected in this ROD are necessary to protect the public health, welfare or the environment from actual or threatened releases of hazardous substances from the site.

1.4 Description of the Selected Remedy

Site 11 is one of the sites at NAS Patuxent River where comprehensive environmental investigations and cleanup activities are currently being performed under the FFA. This ROD addresses groundwater, surface water and sediment associated with Site 11. Based on the results of the Site 11 OU-2 investigations and risk assessments, the Navy, the USEPA, and the MDE concur that further action is necessary to address the presence of chemicals and metals in groundwater exceeding regulatory limits. Chemicals and metals detected in surface water and sediment samples were relatively low in concentration and sporadic in frequency. Based on the risk assessments, remedial action is not necessary for surface water and sediment.

The Selected Remedy for shallow groundwater at Site 11 was chosen based on an evaluation of site conditions, site-related risks, ARARs, and remedial action objectives (RAOs). The Selected Remedy, Land Use Controls (LUCs) and Long-Term Monitoring (LTM), includes the following major components:

- Revision to the current LUCs in place for Site 11 OU-1. The revisions would be implemented to limit exposure to groundwater beneath and in the immediate vicinity of the landfills until constituents currently detected at the landfill perimeter at concentrations exceeding the Federal Maximum Contaminant Levels (MCLs) decrease to less than these regulatory criteria.
- LTM of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and Target Analyte List (TAL) metals. Groundwater monitoring would be conducted every 15 months, with every fourth sampling event including analysis of pesticides and polychlorinated biphenyls (PCBs) as well as VOCs, SVOCs, and total and dissolved metals. The data will be used to evaluate the protectiveness of the remedy for the Five-Year review. If contaminant concentrations remain the same or increase, additional remedial action will be evaluated to achieve the RAOs.

A LTM work plan will be developed with detailed instructions and actions for implementing the remedy.

1.5 Statutory Determinations

The Selected Remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, and is cost-effective. Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site at concentrations that do not allow for unlimited use and unrestricted exposure, a statutory review will be conducted within 5 years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment. Subsequently, five-year reviews will be conducted as required by CERCLA §121(c), as amended, and the NCP, Part 300.430(f)(4)(ii) of the Code of Federal Regulations.

1.6 Data Certification Checklist

The following information is included in Section 2 - Decision Summary. Additional information can be found in the Administrative Record file for Site 11.

- Chemicals of concern (COCs) (Section 2.5)
- Baseline risk represented by the COCs (Section 2.7)
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of the media evaluated in the risk assessments (Section 2.6)
- Estimated capital costs, annual operation and maintenance (O&M), and total present-worth costs; discount rate; and the number of years over which the remedy cost estimates are projected (Appendix D)
- Key factors that led to selecting the remedy (i.e., a description of how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) (Section 2.10)
- Selected Remedy (Section 2.12)

1.7 Authorizing Signatures

The Navy and the USEPA selected this remedy with the concurrence of the MDE.

Concur and recommend for immediate implementation:

Andrew T. Macyko — 29 September 2008

Captain Andrew Macyko,
United States Navy Commanding Officer
Naval Air Station Patuxent River

Date

James J. Burke — 10/15/08

James J. Burke, Director
Hazardous Site Cleanup Division
United States Environmental Protection Agency, Region III

Date

SECTION 2

Decision Summary

This ROD describes the Selected Remedy for OU-2 at Site 11. The public meeting for Site 11 was held on August 13, 2008. The Preferred Alternative, as detailed in the August 2008 Proposed Remedial Action Plan (PRAP), was presented at the meeting (CH2M HILL, 2008c). The Decision Summary describes the process by which the Selected Remedy was chosen. Community and state acceptance of the alternatives is discussed in Section 4 of this ROD.

2.1 Site Name, Location, and Description

NAS Patuxent River is located in St. Mary's County, in southern Maryland, at the confluence of the Patuxent River and the Chesapeake Bay, as shown in Figure 1. Site 11 consists of an area historically known as the Former Sanitary Landfill and Current Sanitary Landfill at the southern boundary of the NAS near Hermanville Road and Maryland State Route 235 (Figure 2). Site 11 consists of two operable units: the soil for the Former Sanitary Landfill is designated OU-1, and OU-2 consists of groundwater, surface water, and sediment associated with Site 11.

The Former Sanitary Landfill, which occupies approximately 6.5 acres, was active as the main disposal area for the installation from 1974 to 1980 (Figure 3). An estimated 22,500 tons of oil-contaminated soils and liquids were reportedly disposed at the site. The Current Sanitary Landfill operated from 1980, when the Former Sanitary Landfill stopped receiving waste, until it closed on September 30, 1994. The landfills were closed in accordance with MDE requirements. An estimated 145,000 tons of municipal solid waste were disposed at the Current Sanitary Landfill, which occupies approximately 10 acres. A ROD was signed in 1996 to implement an interim remedial action (IRA) for Site 11 OU-1. The IRA consisted of a Resource Conservation and Recovery Act (RCRA) Subtitle D landfill cap, implementation of institutional controls, installation of a landfill gas collection and flare system, groundwater monitoring, modification or upgrade of the leachate collection system, and replacement of any impacted wetlands as an interim remedy. Construction of the landfill cap, which covers both the Former Sanitary Landfill and the Current Sanitary Landfill, was completed in 1997.

A Remedial Investigation (RI) was conducted for Site 11 OU-2, and the final RI report was submitted to the Tier I Partnering Team in July, 2008. The baseline human health risk assessment (HHRA) and ecological risk assessment (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. 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 in Site 11 OU-2 groundwater samples at concentrations exceeding the respective Federal MCLs in a few of the wells at the perimeter of the landfills. The MCLs for these constituents were not exceeded in wells downgradient of the landfills.

2.2 Site History and Enforcement Activities

OU-1 was previously investigated during an Interim RI conducted in 1991 (CH2M HILL, 1994) and a remedy was implemented. Although the RI and Feasibility Study for OU-1 had not yet been completed to evaluate the entire site, a ROD for OU-1 was signed in 1996 that required construction of a RCRA Subtitle D landfill cap, implementation of LUCs, installation of a landfill gas collection and flare system, groundwater monitoring, modification or upgrade of the leachate collection system, and replacement of any impacted wetlands as an interim remedy. The LUCs eliminate landfill access to unauthorized persons, limit future development, and require permits, supervision, and health and safety precautions for any activities conducted on or near the landfills. Thus, residential land use is not feasible for Site 11. Construction of the landfill cap, which covers both the Former and Current Sanitary Landfill, was completed in 1997.

2.2.1 Summary of Previous Investigations

Several environmental investigations and studies have been performed at Site 11 to date. These investigations are summarized in the Table 1 below and are cited in this report:

TABLE 1
Summary of Previous Site 11 Investigations
Site 11 OU-2 Record of Decision, NAS Patuxent River

Year/Activity	Key Findings
1984 – Initial Assessment Study (Hart & Associates, 1984)	Solvents and metals originating from waste deposited in the former landfill from 1974 to 1980 were the primary constituents of concern.
1986 – Groundwater Monitoring Plan & Water Quality Report (Beavin Company, 1986a)	Provided a summary of existing monitoring well construction information, water level elevations, and water quality data from previous sampling events.
1986 – Sanitary Landfill Utilization Groundwater Monitoring Plan & Water Quality Report (Beavin Company, 1986b)	Provides the details of the leachate collection system installed along the perimeter of the current and former landfills.
1987 – Confirmation Study Report (CH2M HILL, 1987)	Verified presence of impacted site media based on the 1984 Initial Assessment Study.
1989 – RCRA Facility Assessment Phase II Report (A.T. Kearney, Inc., 1989)	Identified the Former Sanitary Landfill as Solid Waste Management Unit 47 and provided detail on the types of waste deposited in the landfill between 1974 and 1980.
1990 – Hydrogeological Investigation of the Current and Former Sanitary Landfills (CH2M HILL, 1990)	Results of the investigation suggested some contamination may be reaching groundwater and surface water downgradient of the landfills.
1994 – Interim Remedial Investigation (CH2M HILL, 1994)	Concentrations of metals were elevated in comparison to concentrations in the upgradient monitoring well, and surface water samples revealed the presence of tricholoroethylene and tetrachloroethylene exceeding MCLs.
1995 – Gore-Sober TM Screening Survey (W.L. Gore & Associates, 1995)	Chemicals detected in landfill gases included fuel-related hydrocarbons, polycyclic aromatic hydrocarbons, and volatile organic compounds.

TABLE 1
Summary of Previous Site 11 Investigations
Site 11 OU-2 Record of Decision, NAS Patuxent River

Year/Activity	Key Findings
1996 – Record of Decision for Former Sanitary Landfill (CH2M HILL, 1996)	Selected the interim remedial action for Site 11 OU-1, which included construction of a RCRA Subtitle D landfill cap, implementation of LUCs, landfill gas collection and flare system, groundwater and landfill gas monitoring, and modification or upgrade of existing leachate collection system.
1997 – Draft Remedial Investigation for OU-2 (CH2M HILL, 1997)	Initial fieldwork for remedial investigation of Site 11 OU-2.
2000 – Naval Air Station Patuxent River Site 11 Trend Analysis Results (CH2M HILL, 2000)	Trend analysis indicated that several volatile organic compounds were detected in monitoring wells, with the highest concentrations detected in a monitoring well located upgradient of the landfill. Total and dissolved metals concentrations also exceeded the screening criteria for all Site 11 wells.
2008 – Remedial Investigation for Site 11 OU-2: Groundwater, Surface Water, and Sediment (CH2M HILL, 2008b)	There are no unacceptable risks to human health or the environment based upon current and anticipated future use of Site 11 OU-2. There are no unacceptable risks from OU-2 beyond the landfill cap. However, three constituents (benzene, bis[2-ethylhexyl]phthalate, and thallium) were detected in Site 11 OU-2 groundwater samples at concentrations exceeding the respective MCLs at the perimeter of the landfills. There were no MCL exceedances in wells downgradient of the landfills.

2.2.2 Enforcement Activities

No enforcement actions have occurred in association with Site 11 OU-2. The Navy has owned this property since the early 1940s and is identified as the responsible party.

2.3 Community Participation

Community participation at NAS Patuxent River is facilitated by a Restoration Advisory Board (RAB), public meetings, public information repositories, and public notices. The Community Relations Plan for NAS Patuxent River (CH2M HILL, 2008a) provides detailed information on community participation for the IR Program.

The PRAP and final technical reports concerning Site 11 OU-2 are available to the public in the Administrative Record and information repositories maintained at:

NAS Patuxent River Library
22269 Cedar Point Road, Building 407
Patuxent River, MD 20629

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

In accordance with Sections 113 and 117 of CERCLA, the Navy provided a public comment period from August 11, 2008 to September 9, 2008, for the Site 11 OU-2 PRAP (CH2M HILL, 2008c) in an effort to present the PRAP to a broader community audience than those already involved at the site. A public meeting was held to present the PRAP for Site 11 on August

13, 2008, at NAS Patuxent River in the Frank Knox Employee Development Building, Building 2189, Room 100. Public notice of the meeting and availability of documents was published in local newspapers, specifically *The Enterprise* for St. Mary's County on August 6, 2007; *The Recorder* for Calvert County on August 6, 2007; and *The Tester*, which is the NAS Patuxent River newspaper, on August 7, 2007. A copy of the PRAP public notice and the transcript of the public meeting are provided in Appendix B.

2.4 Scope and Role of Response Action

NAS Patuxent River was listed on the NPL on June 30, 1994. As a result, 46 sites were identified at the NAS for inclusion in the IR Program.

Site 11 was identified through the CERCLA process as a result of site screening performed under the 2000 FFA between the Navy and the USEPA. A list and description of all IR Program sites is presented in the 2007 update to the NAS Patuxent River Site Management Plan. During the past 11 years, a total of 12 RODs have been completed for IR Program sites at NAS Patuxent River in accordance with the priorities established in the Site Management Plan.

As of the date of this ROD, remedy decisions and associated remedies have been implemented for 12 IR Program sites at NAS Patuxent River. The designation, media, and remedial action for each site are listed below.

- Sites 1/ 12 Groundwater and Soil (OU 1): soil cover, shoreline stabilization, land use restrictions, long-term monitoring and maintenance, vegetation cover, wetland mitigation, and erosion control structures (February 2000 ROD)
- Sites 1/12 Surface Water and Sediment (OU 2): removal of lead contaminated soil and sediment (September 2005 ROD)
- Sites 6/6a Soil (OU 1): concrete cap and land use restrictions (September 1999 ROD and 2004 ROD Amendment)
- Site 11 Soil (OU 1): RCRA Subtitle D landfill cap, landfill gas collection and flare system, groundwater and landfill gas monitoring, and land use restrictions (July 1996 ROD)
- Site 17 Soil (OU 1): excavation and off-site treatment and disposal of soil, and land use restrictions (December 1998 ROD and June 2001 ROD Amendment)
- Site 17 Groundwater, Surface Water, and Sediment (OU 2): sediment removal action for Holton Pond (September 2006 ROD)
- Site 24 Soil, Groundwater, Sediment, and Surface Water: no further remedial action (October 2007 ROD)
- Site 27 Groundwater and Soil: no remedial action (September 2003 ROD)
- Site 29 Groundwater and Soil: no remedial action (October 2007 ROD)
- Site 39 Groundwater: in-situ bioremediation, monitoring, and institutional controls (October 2007 ROD)

- Site 41 Groundwater and Soil: no further remedial action (September 2005 ROD)
- Site 46 Groundwater and Soil: no remedial action (September 2004 ROD)

Site 11 OU-2, the subject of this ROD, addresses the groundwater, surface water and sediment at the site. Although there have been no unacceptable risks identified for Site 11 OU-2 media (groundwater, surface water, sediment) based on the HHRA and ERA findings, three constituents (benzene, bis[2-ethylhexyl]phthalate, and thallium) are present in groundwater at the perimeter of the landfills at concentrations which exceed the respective MCLs for drinking water (as specified in the Safe Drinking Water Act).

2.5 Site Characteristics

2.5.1 Site Overview

Site 11 consists of the area historically known as the Former Sanitary Landfill and Current Sanitary Landfill at the southern boundary of the NAS near Hermanville Road and Maryland State Route 235 (Figure 2). Site 11 is located in an open area bordered on the north, east and south by forested land. A small stream corridor is located on the western side between the landfills and Site 34, which was formerly used as a borrow pit and for disposal of construction debris and soil. Another stream corridor is located on the eastern side of the landfills.

The topography at Site 11 varies with an approximate range of 100 to 70 ft above mean sea level. The land surface adjacent to the landfills gently slopes downward in elevation toward the north; surface runoff flows eastward and westward (Figure 3). Surface runoff from the landfills flows north, east, and west down steep slopes of the landfill cover from the landfill into the adjacent streams.

2.5.2 Surface and Subsurface Features

Site 11 is occupied primarily by the Former and Current Sanitary Landfill and associated structures (i.e. leachate collection system, gas collection and flare system). No areas of cultural, architectural, or archaeological importance have been identified.

Site Geology and Hydrogeology

Site 11 is underlain by heterogeneous sediments due to a varied depositional environment when the sediments were deposited. These sediments are part of the lowland deposits and underlying upland deposits of the Atlantic Coastal Plain. Because of this heterogeneous nature, distinct stratigraphic units are not consistent across the site. The most consistent stratigraphic marker at the site is a color change between the stratigraphic units. The uppermost material is a yellow-orange to brown fine-to-coarse grained sand with clay and gravel. This unit overlies a blue-gray heterogeneous sand, silt, and clay. Previous investigations have subdivided this unit into a clay zone and a silty-sand zone (CH2M HILL, 1990).

The soil above the surficial aquifer is generally brown-colored fine to coarse sand with gravel, and the surficial aquifer consists predominantly of a tan to brown fine sand and silt. The surficial aquifer is unconfined at Site 11, and groundwater throughout the area occurs at a depth ranging from approximately 2 to 30 feet below ground surface.

The geology and hydrogeology of the site are discussed in more detail in the Site 11 RI report (CH2M HILL, 2008b).

2.5.3 Sampling Strategy

Environmental sampling focused on groundwater, surface water, and sediment. Samples were collected and analyzed to characterize the nature and extent of chemicals and metals present in these media to provide sufficient data for assessing potential risks to human health and the environment.

2.5.4 Sources of Contamination

The source area of constituents related to activities at Site 11 was probably the Former Sanitary Landfill. The Former Sanitary Landfill was active from 1974 to 1980, and as the main disposal area for the installation, an estimated 22,500 tons of trash and 43 tons of oil-contaminated soils and liquids were disposed at the site. The liquids reportedly consisted of petroleum lubricants, paints, paint thinners, solvents, antifreeze products, pesticides, and photographic chemicals contained in rags and absorbents. An estimated 145,000 tons of municipal solid waste were disposed at the Current Sanitary Landfill. The Current Sanitary Landfill was closed in accordance with requirements of the MDE.

2.5.5 Types of Contamination

The Selected Remedy for Site 11 addresses VOCs, SVOCs, and metals, specifically benzene, bis[2-ethylhexyl]phthalate, and thallium, detected in groundwater at the perimeter of the landfill at concentrations that exceed MCLs.

2.5.6 Location of Contamination and Routes of Migration

A conceptual site model qualitatively defines various contaminant sources, release mechanisms, persistence of contaminants, contaminant migration pathways and receptors identified for a site, and is used to evaluate the potential for exposure of human or ecological receptors to constituents of potential concern (COPCs). The conceptual site model is presented in Figure 4a and Figure 4b.

Leachate Collection System

Leachate generation rates from the landfills have ranged from 8.3 gallons per minute (gpm) to 17.4 gpm (CH2M HILL, 2006). A significant portion of the leachate discharging from the leachate collection system (LCS) is likely groundwater infiltrating into the LCS and not truly landfill leachate. This conclusion is based on analytical results for liquid samples collected from the leachate collection system which do not indicate the presence of constituents and characteristics typically observed for landfill leachate.

The LCS installed at the Former and Current Sanitary Landfills (Figure 4a) actually consists of two separate collection systems. In 1980, a deep LCS was installed around the perimeter of the Current Sanitary Landfill and all but the southern (most upgradient portion) of the Former Sanitary Landfill Area. The 1980 LCS is located on top of the Current Sanitary Landfill bottom liner and is designed to collect leachate accumulating on the liner within the landfill waste. Ten manholes were installed during the construction of the 1980 LCS. In 1997, a second LCS was installed at a more shallow depth along the eastern, northern, and

western sides of the Current Sanitary Landfill during the construction of the RCRA Subtitle D cap over both landfills.

The combined leachate from both systems enters MH-6, where a pH adjustment treatment system increases the leachate pH above 6.0 by adding caustic (sodium hydroxide). The untreated leachate pH ranges from 3.5 to 6.0 with an average of 5.0. The METCOM permit limitations require pH to be no less than 6.0 or more than 10.0 for the liquids discharged to the METCOM wastewater treatment facility. Final monitoring of pH and flow is conducted at MH-6A prior to discharge to the METCOM facility.

Landfill Gas System

The landfill gas collection system consists of 14 horizontal extraction wells routed to a candlestick flare via a header pipeline that runs along the center line of the landfill (Figure 4a). In addition, six monitoring probes were installed on the perimeter of the landfill to monitor landfill gas migration. The system was constructed so that VOC emissions do not exceed 450 pounds per hour and 3,000 pounds per day (CH2M HILL, 2005).

Extent of Contamination

Analytical results for the most recent sampling events (i.e., 2003-2004) were used to assess the nature and extent of constituents detected in groundwater at Site 11 because these results are most representative of current site conditions. Groundwater samples collected prior to 2003 are referred to as "historical" samples in the following discussion.

VOCs

Three VOCs (acetone, carbon disulfide, and chloroform) were detected at concentrations less than the respective MCLs in the low parts per billion (5.9 micrograms per liter [µg/L] or less) for groundwater samples collected from the three monitoring wells located downgradient of the landfill in April 2004.

Numerous VOCs were detected in groundwater samples collected from six monitoring wells located at the perimeter of the landfill in June 2003. However, with the exception of benzene, all VOC concentrations were less than the respective MCL. The maximum concentrations of PCE (1.6 J µg/L) and TCE (1.7 J µg/L) were detected in samples from the well located upgradient of the Site 11 landfill. PCE degradation products 1,1-Dichloroethene (1,1-DCE), cis-1,2-Dichloroethene (cis-1,2-DCE), vinyl chloride (VC), ethane, and ethene were detected in all but three perimeter monitoring wells. One or more chlorinated organic compounds (chlorobenzene, chloroethane, chloroform, chloromethane, 1,1,2,2-tetrachloroethane, 1,2-dichloropropane, and 1,4-dichlorobenzene) were detected in all the perimeter monitoring wells. Benzene was detected in 6 of 13 groundwater samples, with the maximum concentration of 7.8 J[1] µg/L, which exceeds the MCL of 5 µg/L. MTBE was detected in 5 of 13 groundwater samples, with a maximum concentration of 0.61 J µg/L. Dichlorodifluoromethane (Freon-12) was detected in 3 of 13 groundwater samples, with a maximum concentration of 220 µg/L.

VOCs historically have been detected in the majority of wells, and although benzene, PCE, TCE, and VC have exceeded MCLs in the past, recently detected concentrations of VOCs

[1] "J" is a qualifier indicating that the constituent was detected in the sample, but the actual concentration may be higher or lower than reported.

(i.e., in 2003-2004) have been generally less (i.e., 5 µg/L or less) than what was historically detected.

SVOCs

SVOCs were not detected in groundwater samples collected from the monitoring wells located downgradient of the landfill in April 2004. Only two SVOCs were detected in groundwater samples collected from the monitoring wells located at the perimeter of the landfill in June 2003: diethylphthalate (7.2 L[2] µg/L) and bis(2-ethylhexyl)phthalate (42 µg/L). Historical groundwater samples have shown only sporadic detections of bis(2-ethylhexyl) phthalate at low concentrations, with a historical maximum concentration of 3 J µg/L in December 1998. Prior to the 2004 sampling event, only 4 of 24 groundwater samples at Site 11 had detected bis(2-ethylhexyl)phthalate concentrations exceeding the MCL, and 3 of these 4 groundwater samples had bis(2-ethylhexyl)phthalate at concentrations of 7 µg/L or less.

SVOCs have been detected only sporadically in groundwater samples collected for the long-term monitoring program for Site 11 OU-1. However, SVOCs had been consistently detected at low concentrations (i.e., less than 10 µg/L) in historical groundwater samples.

Pesticides and PCBs

Pesticides were not detected in groundwater samples collected from the monitoring wells located downgradient of the landfill in April 2004. Only one pesticide, dieldrin (0.035 J µg/L), was detected in groundwater samples collected from the monitoring wells located at the perimeter of the landfill in June 2003.

Pesticides have been detected only sporadically and at low concentrations (1 µg/L) in historical groundwater samples collected from Site 11 wells prior to 2003.

PCBs have not been detected in any recent or historical Site 11 groundwater samples.

Metals

Based on total (i.e., unfiltered) concentrations, 22 metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc) were detected in groundwater samples collected from the monitoring wells located at the landfill perimeter and downgradient of the landfill. All of these metals, except for antimony, also were detected in the dissolved phase in filtered samples. All of the detected metals may occur naturally, so the presence of these metals in groundwater samples may not necessarily be associated with the landfills. The concentrations of metals detected in groundwater downgradient of the landfills are comparable to levels found at other "No Action' sites (Sites 27, 29, and 46) previously closed at the NAS.

Current and Potential Future Surface and Subsurface Routes of Exposure and Receptors

Human exposures to site-related groundwater, sediment, and surface water were evaluated as part of the HHRA (CH2M HILL, 2008b). The following receptor scenarios were assessed during the HHRA conducted in 2008 to support the Site 11 RI:

[2] "L" is a qualifier indicating that the constituent was detected in the sample, but the actual concentration may be lower than reported.

- Current and future trespasser/visitor (adult and adolescent)
- Potential future residents (child, adult and lifetime)
- Potential future construction worker

Ecological receptor exposures to sediment and surface water were evaluated (CH2M HILL, 2008b). The following ecological receptors and attributes were assessed during the ERA conducted in 2008 to support the Site 11 RI:

- Lower trophic level receptors (water column biota and benthic invertebrates)
- Upper trophic level receptors via the food chain (mink).

2.6 Current and Potential Future Site and Resource Uses

Current receptors at the site could include site workers and visitors or trespassers. No base housing or office facilities are located near Site 11. The Navy does not currently intend to build at Site 11, and there are no foreseeable changes to the current industrial use of the site. Although potential future site use is unlikely to change from current industrial use, a conservative evaluation of potential risks to future residents, industrial workers, trespassers/ visitors, and construction workers was performed to evaluate unrestricted land use.

2.7 Summary of Site Risks

The human health and ecological risks associated with exposure to site-related groundwater, sediment, and surface water were evaluated as part of the 2008 RI for Site 11 (CH2M HILL, 2008b). Summaries of these risk assessments are provided in the following subsections and Table 2. For carcinogenic risks, acceptable risks are defined as being in the range of one in 10,000 ($1x10^{-4}$) to one in one million ($1x10^{-6}$). For noncarcinogenic risks, the acceptable risk is defined as a Hazard Index (HI) of less than 1.0.

2.7.1 Human Health Risk Assessment Summary

The results of the HHRA indicated that exposure to surface water and sediment by adult and adolescent trespassers and visitors would not result in noncarcinogenic hazards or carcinogenic risks that exceed the acceptable risk range. Therefore, further evaluation of human health risk for surface water and sediment was not required and remedial action is not necessary for these media.

Under the future land use exposure scenario, the risk from groundwater was evaluated for two distinct areas of Site 11: groundwater beneath and at the perimeter of the landfills, and groundwater downgradient of the landfills (Figures 4a and 4b). For conservative reasonable maximum exposure (RME) scenarios, potable use of Site 11 groundwater in either area by hypothetical future adult (HI = 6.3 and 1.8) and child residents (HI = 15 and 4.4) would result in noncarcinogenic hazards and carcinogenic risks exceeding acceptable levels.

The central tendency exposure (CTE) scenario provides a more representative evaluation for realistic exposures. For groundwater beneath and at the perimeter of the landfills, CTE carcinogenic risks are within acceptable levels for future lifetime residents. The CTE noncarcinogenic hazard associated with potable use of shallow groundwater by future adult residents (HI = 1.4) exceeds the acceptable HI; however, the HI for each target organ is

acceptable (i.e., HI less than one). The CTE noncarcinogenic hazard (associated with ingestion of iron, manganese, and thallium) for future child residents (HI = 4.4) also exceeds the acceptable HI. However, iron and manganese are essential nutrients, and both metals were detected at concentrations that fall within the range typically associated with recommended daily allowances. Thallium was detected at a total concentration exceeding the MCL (2 µg/L) in only one sample, but not in the corresponding filtered sample, indicating thallium is associated with suspended solids in groundwater and is not migrating in the dissolved phase. Dissolved thallium was also detected at concentrations exceeding the MCL at two other locations, but was not detected in the associated unfiltered samples analyzed for the total thallium concentration.[3]

For groundwater downgradient of the landfills, the CTE carcinogenic risk associated with potable use is within the acceptable risk range for future lifetime residents, and the CTE noncarcinogenic hazard is acceptable (HI less than one) for future adult residents. The CTE noncarcinogenic hazard exceeds acceptable levels for future child resident (HI=1.3) exposure to groundwater for arsenic, vanadium, iron, and manganese. However, even though the acceptable HI of one was exceeded, the groundwater is not expected to pose unacceptable risk for the following reasons:

- Arsenic, vanadium, iron, and manganese all contribute to the HI of 1.3, but each one of these metals affects a different target organ and none of these metals has an HI that exceeds 1 for the respective target organ (values of 0.52, 0.41, 0.26, and 0.13, respectively);
- The dissolved arsenic concentrations were less than concentrations for total arsenic, indicating that some of the detected arsenic is associated with particulates in the groundwater;
- All total and dissolved arsenic concentrations were less than the MCL;
- Vanadium was only detected in one downgradient well and the dissolved concentration was an order of magnitude less than the concentration for total vanadium in the sample; and
- Iron and manganese are both essential nutrients and the detected concentrations fall within the range typically associated with recommended daily allowances.

Given these findings, while potable use of groundwater downgradient of Site 11 is unlikely, risk from exposure by future potential residential receptors should be within acceptable risk range.

Furthermore, the shallow unconfined aquifer at Site 11 is not and cannot be used as a potable water supply. The LUCs stipulated by the Site 11 OU-1 ROD prohibit landfill access to unauthorized persons, limit future development, and require permits, supervision, and health and safety precautions for any activities conducted on or near the landfills. Thus residential land use would not be feasible for Site 11. The landfills would need to be removed to change the LUCs.

[3] Samples with dissolved metal concentrations exceeding the associated total metal concentrations for the sample are an unexpected occurrence. Typically, total metal concentrations are greater than dissolved metal concentrations. The cause of this unexpected result is not clear.

TABLE 2
Human Health Risk Assessment Summary
Site 11 OU-2, NAS Patuxent River

Risk Scenario	Surface Water		Sediment		Pathway Totals		Groundwater Beneath and at Perimeter of Landfills		Pathway Totals		Groundwater Downgradient of Landfills		Pathway Totals	
	Risk	**HI**	**Risk**	**HI**	**Risk**	**HI**	**Risk**	**HI**	**Risk**	**HI**	**Risk**	**HI**	**Risk**	**HI**
Current/Future Trespasser/Visitor (Adult)	RME = $6.0x10^{-7}$	RME = 0.035	RME = $4.4x10^{-7}$	RME = 0.0028	RME = $1.0x10^{-6}$	RME = 0.037	NA	NA	NA	NA	NA	NA	NA	NA
Current/Future Trespasser/Visitor (Adolescent)	RME = $2.0x10^{-7}$	RME = 0.03	RME = $2.1x10^{-7}$	RME = 0.0036	RME = $4.0x10^{-7}$	RME = 0.033	NA	NA	NA	NA	NA	NA	NA	NA
Future Resident (Adult)	NA	NA	NA	NA	NA	NA	(a)	RME = 6.3 CTE = 1.4	(a)	RME = 6.3 CTE = 1.4	(a)	RME = 1.8 CTE = 0.4	(a)	RME = 1.8 CTE = 0.4
Future Resident (Child)	NA	NA	NA	NA	NA	NA	(a)	RME = 15 CTE = 4.4	(a)	RME = 15 CTE = 4.4	(a)	RME = 4.4 CTE = 1.3	(a)	RME = 4.4 CTE = 1.3
Future Resident (Child/Adult - Lifetime)	NA	NA	NA	NA	NA	NA	RME = $1.9x10^{-4}$ CTE = $3.4x10^{-5}$	(b)	RME = $1.9x10^{-4}$ CTE = $3.4x10^{-5}$	(b)	RME = $1.9x10^{-4}$ CTE = $2.9x10^{-5}$	(b)	RME = $1.9x10^{-4}$ CTE = $2.9x10^{-5}$	(b)
Future Construction Worker	NA	NA	NA	NA	NA	NA	RME = $2.4x10^{-7}$	RME = 0.37	RME = $2.4x10^{-7}$	RME = 0.37	RME = $1.5x10^{-7}$	RME = 0.055	RME = $1.5x10^{-7}$	RME = 0.055

Risk - carcinogenic risk. The range of acceptable carcinogenic risk is $1x10^{-6}$ to $1x10^{-4}$

HI - hazard index. A hazard index of less than 1.0 indicates acceptable noncarcinogenic risk

NA - not analyzed

(a) Carcinogenic risks were calculated for a lifetime child/adult resident, following USEPA guidance

(b) Noncarcinogenic hazards were calculated for future resident child and future resident adult, separately, following USEPA guidance.

RME - Reasonable Maximum Exposure. This represents the maximum level of exposure to contaminants present at a site that is reasonably expected to occur.

CTE - Central Tendency Exposure. This represents the average, rather than upper limit, exposure that could reasonably be expected to occur at a site. The CTE scenario is probably more representative of the actual risk to a majority of potential receptors.

2.7.2 Ecological Risk Summary

The comparison of the Site 11 data to the data and evaluations presented in the Pine Hill Run Screening-Level Ecological Risk Assessment (CH2M HILL, 2001) does not affect the conclusions of the watershed-level assessment with regard to direct or food web exposures. Results indicate that constituents in the set of Site 11 surface water and sediment samples evaluated do not pose a risk to receptors exposed to media associated with OU-2. Consequently, no further action is warranted for ecological receptors at Site 11 OU-2.

2.8 Remedial Action Objectives

Development of the site-specific RAOs is based on eliminating or reducing the current and potential future risks to human health and the environment from constituents present at Site 11 OU-2. Guidance for developing RAOs is outlined in Section 300.430(e)(2) of the NCP.

The baseline HHRA and ERA conducted for the Site 11 OU-2 RI did not identify unacceptable risk to human health or the environment under current or future land use scenarios. The only unacceptable risk is assumed from landfill contents (OU-1) remaining on site. Due to the nature of the Former Landfill and Current Sanitary Landfill, the shallow unconfined aquifer at Site 11 is not and cannot be used as a potable water supply, and the current LUCs as a result of the Site 11 OU-1 ROD restrict landfill access. However, the Site 11 OU-1 ROD did not specifically address the groundwater beneath or in the vicinity of the landfills. Based on MCL exceedances for several constituents detected in groundwater at the perimeter of the landfill, the following RAOs have been identified for Site 11 OU-2:

- Ensure that groundwater with constituents exceeding MCLs is not used for potable supply; and
- Ensure that constituents in groundwater migrating from the landfills remain at concentrations that do not pose unacceptable risks in the future since landfill wastes remain in place for OU-1.

2.9 Description of Alternatives

Three remedial alternatives were developed to achieve the RAOs and address concentrations of VOCs, SVOCs and metals detected in shallow groundwater at Site 11. The remedial alternatives are summarized below and discussed in detail in the Focused Feasibility Study (FFS) for Site 11 (CH2M HILL, 2008d).

2.9.1 Alternative 1: No Action

Alternative 1 involves no action for Site 11 OU-2. The NCP requires that the no action alternative be retained throughout the FFS process as a basis for comparison to other alternatives. Under this alternative, the existing LUCs would remain in place for OU-1 (the soil of the Former Sanitary Landfill) and no action would occur to address the groundwater for OU-2 (Figure 3). Natural attenuation would most likely occur to reduce the concentrations of the constituents, but the concentrations would not be monitored over time and the degree to which attenuation occurs would be unknown.

2.9.2 Alternative 2: Land Use Controls

Alternative 2 consists of LUCs in the form of revisions to the LUCs currently in place for Site 11 OU-1. The existing LUCs would be expanded to include LUCs implemented to limit exposure to groundwater until the concentrations of constituents that currently exceed MCLs at the perimeter of the landfill decrease to less than MCLs. Similar to Alternative 1, natural attenuation is likely to occur and eventually reduce the concentrations of the constituents, but the concentrations would not be monitored over time and the degree to which attenuation occurs would be unknown.

2.9.3 Alternative 3: Land Use Controls and Long-Term Monitoring

Alternative 3 combines Alternative 2 with long-term groundwater monitoring. The long-term groundwater monitoring would consist of monitoring concentrations of VOCs, SVOCs and total and dissolved metals detected in Site 11 groundwater with reviews every 5 years for as long as monitoring is necessary. Each 5-year period would consist of groundwater sampling every 15 months for four monitoring events. The 15-month frequency would allow for monitoring of seasonal variations in groundwater quality. For the fourth event for each 5-year monitoring period, groundwater samples would also be analyzed for pesticides and PCBs. Water level measurements would be obtained from the monitoring well network prior to the start of the groundwater sampling events. Field measurements (i.e., pH, specific conductivity, dissolved oxygen, turbidity, and oxidation/reduction potential) would also be monitored as general indictors of groundwater quality. There were no human health or ecological risks associated with surface water and sediment. Consequently, this alternative does not include any remedial action or monitoring for these media.

These monitoring requirements were assumed for the FFS (CH2M HILL, 2008d) cost estimating purpose, and the detailed monitoring requirements would be presented in a long-term monitoring plan prepared after the ROD is signed. As with the previous alternatives, natural attenuation would most likely occur to reduce the concentrations of the constituents. However, under Alternative 3, groundwater concentrations would be monitored over time and the degree to which attenuation occurs would be known and documented.

The 5-year monitoring period would be synchronized with the Five-Year Review period to evaluate the effectiveness of the OU-1 and OU-2 remedies to protect human health and the environment. The data collected for the Five-Year Review would be used to evaluate and optimize the monitoring program as appropriate based on review of the groundwater data. Modifications to the monitoring program would be proposed in a report for USEPA and MDE to review. After each 5-year period of long-term monitoring has been completed, the constituent concentrations in the groundwater at Site 11 OU-2 would be reevaluated to determine if additional future groundwater monitoring is necessary. If contaminant concentrations remain the same or increase, additional remedial action will be evaluated to achieve the RAOs.

2.10 Comparative Analysis of Alternatives

The NCP outlines the approach for comparing remedial alternatives. Evaluation of the alternatives uses nine evaluation criteria. These consist of "threshold," "primary balancing,"

and "modifying" criteria. Threshold and primary balancing criteria are technical criteria based on environmental protection, cost, and engineering feasibility. To be considered for remedy selection, an alternative must meet the two threshold criteria:

- Overall protection of human health and the environment
- Compliance with ARARs

The primary balancing criteria are then considered to determine which alternative provides the best combination of attributes. The primary balancing criteria are:

- Long-term effectiveness and permanence
- Reduction in toxicity, mobility, or volume of contaminants through treatment
- Short-term effectiveness
- Implementability
- Cost

The Preferred Alternative is then evaluated further against two modifying criteria:

- Acceptance by the state
- Acceptance by the community

The remedial alternatives presented above in Section 2.9 were evaluated against the nine criteria identified in the NCP. The results of this evaluation are summarized below. The FS provides a more detailed analysis and evaluation of the first seven criteria. The purpose of the comparative analysis is to identify the relative advantages and disadvantages of each alternative.

2.10.1 Threshold Criteria

Overall Protection of Human Health and the Environment

Although unacceptable risks to human health or ecological receptors were not identified by the RI, Alternative 1 does not meet the RAOs for Site 11 OU-2. Therefore, Alternative 1 was not considered further in this analysis. Although LUCs are currently in place for Site 11 OU-1, these LUCs are not specific to groundwater. Alternative 2 prevents human exposure to groundwater containing organic compounds and metals at concentrations that exceed Federal MCLs using LUCs. Although Alternative 2 includes LUCs that address groundwater, it does not monitor the groundwater to determine whether or not constituents detected in groundwater at the perimeter of the landfill during the RI continue to exceed MCLs in the future. Alternative 3 meets all the RAOs through the combined implementation of existing LUCs plus modifications to specifically address groundwater, and long-term groundwater monitoring.

Compliance with Applicable or Relevant and Appropriate Requirements

ARARs for shallow groundwater at Site 11 are provided in Appendix C.

Alternative 2 does not meet ARARs for long-term monitoring. Although limited groundwater monitoring was identified in the OU-1 ROD, the OU-1 remedy was an interim action, which did not include requirements for long-term groundwater monitoring or triggers for further remedial action. Furthermore, the LUCs currently in place for Site 11 OU-1 are not specific to groundwater. Alternative 3 will meet the RAOs and ARARs, and

will provide the most effective protection against future unacceptable risk assumed from landfill contents remaining on site along with monitoring those contaminants in the groundwater at the perimeter of the landfill with concentrations exceeding MCLs.

Long-Term Effectiveness and Permanence

If the current land use of Site 11 remains the same, Alternatives 2 and 3 would be effective in preventing unacceptable risk. However, if the land use changes in the future, human health and ecological risks would need to be reassessed and LUCs reevaluated.

Reduction in Toxicity, Mobility, or Volume through Treatment

None of the alternatives evaluated employ treatment to reduce toxicity, mobility or volume of contaminants.

Short-Term Effectiveness

In the short term, none of the alternatives increases risks at the landfills. Under Alternatives 2 and 3, LUCs and groundwater LTM activities pose minimal risk to site workers; however, health and safety measures must be implemented to protect worker health and safety.

Implementability

Alternatives 2 and 3, LUCs and groundwater LTM, are easily implemented.

Cost

A breakdown of estimated capital costs and O&M costs is provided in Appendix D. The cost estimates assumed a 30-year period of duration for each alternative.

There is no cost associated with Alternative 1. For Alternative 2, the total present worth costs is $45,900 (-30%/+50% = $32,130 to $68,850). These costs are associated with implementing the LUCs for OU-2 and the administrative costs associated with conducting 5-year reviews. Alternative 3 include costs for groundwater LTM for 30 years as well as costs associated with LUCs and 5-year reviews. The total present worth cost for Alternative 3 is $421,500 (-30%/+50% = $281,280 to $632,250).

2.10.2 Modifying Criteria

State of Maryland Acceptance

State representatives have reviewed the remedial alternatives and provided preliminary comments that were addressed in the FS Report and Proposed Plan. Based on a thorough review of the remedial alternatives and public comments, MDE concurs with the Selected Remedy, Alternative 3 – LUCs and Long-Term Monitoring, as described in Section 2.12.

Community Acceptance

Community relations to date for Site 11 OU-2 include establishing an Administrative Record, briefings to the RAB regarding investigation findings, and release of the PRAP on August 11, 2008 (CH2M HILL, 2008c) for a 30-day public review and comment period. A public meeting was held on August 13, 2008, to present the PRAP for Site 11 OU-2, and to

answer any questions on the PRAP and other relevant documents in the information repositories. RAB members and the public expressed support for the Preferred Alternative presented at the public meeting. The questions and concerns raised at the meeting were general inquiries for informational purposes only; no significant comments were received from the public. Questions and concerns received during the meeting were addressed at the meeting, and are documented in the Responsiveness Summary of this document and the public meeting transcript included as Appendix B. No written comments, concerns, or questions were received by the Navy, the USEPA, or the MDE during the public comment period for the PRAP from August 11, 2008 to September 9, 2008 (CH2M HILL, 2008c).

2.11 Principal Threat Wastes

The NCP establishes an expectation that treatment will be used to address the principal threats posed by a site whenever practicable. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be contained in a reliable manner or would present an unacceptable risk to human health or the environment should exposure occur. There are no principal threat wastes present at Site 11 OU-2.

2.12 Selected Remedy

Alternative 3, LUCs and LTM, is the remedy selected for Site 11 OU-2. This Selected Remedy is the Preferred Alternative presented in the PRAP. Based on available information and the current understanding of the conditions at the site, the Selected Remedy provides the best balance with respect to the evaluation criteria previously described.

2.12.1 Summary of the Rationale for the Selected Remedy

Alternative 3 will meet the RAOs and ARARs, and will provide the most effective protection against future unacceptable risk assumed from landfill contents remaining on site along with monitoring those constituents in the groundwater with concentrations exceeding MCLs at the landfill perimeter. In addition, after each 5-year period of long-term monitoring has been completed, the constituents in the groundwater at Site 11 OU-2 will be reevaluated to determine whether additional future groundwater monitoring is necessary. These criteria will permit the groundwater monitoring to be completed within a reasonable timeframe. If contaminant concentrations remain the same or increase, additional remedial action will be evaluated to achieve the RAOs. The state regulatory agency supports and concurs with the Selected Remedy.

2.12.2 Description of the Selected Remedy

The Selected Remedy consists of land use controls, in the form of revisions to the current LUCs currently in place for Site 11 OU-1, with long-term groundwater monitoring. The existing LUCs would be expanded to included land use controls implemented to prohibit exposure to groundwater beneath and downgradient of the landfills until the concentrations of monitored constituents are less than MCLs at the perimeter of the landfills. The long-term groundwater monitoring would consist of monitoring concentrations of VOCs, SVOCs and total and dissolved metals detected in Site 11 groundwater in 5-year increments and a

data review every 5 years. Each 5-year period would consist of groundwater sampling every 15 months for four monitoring events. For the fourth event for each 5-year monitoring period, groundwater samples would also be analyzed for pesticides and PCBs as well as VOCs, SVOCs, and total and dissolved metals. No monitoring of surface water and sediment will be conducted under this selected remedy since there are no human health or ecological risks associated with these media.

Water level measurements will be obtained from the monitoring well network prior to the start of the groundwater sampling events to monitor groundwater flow. Field measurements (i.e., pH, specific conductivity, dissolved oxygen, turbidity, and oxidation/ reduction potential) would also be monitored as general indictors of groundwater quality. Natural attenuation would most likely occur to reduce the concentrations of the constituents. Under Alternative 3, the concentrations would be monitored over time and the degree to which attenuation occurs would be known. However, natural attenuation parameters will not be monitored during the long-term groundwater monitoring.

The 5-year monitoring period would parallel the 5-Year Review period for NAS Patuxent River sites to evaluate the effectiveness of the OU-1 and OU-2 remedies to protect human health and the environment. The data collected during monitoring each 5-year period will be used to evaluate and optimize the monitoring program. Modifications to the monitoring program will be proposed in a report for USEPA and MDE to review. If contaminant concentrations remain the same or increase, additional remedial action will be evaluated to achieve the RAOs.

Prior to implementation of the Selected Remedy, the Navy will prepare a LTM work plan to present procedures for implementing the remedy. The work plan will specify the locations, chemical analyses, and frequency for long-term monitoring. The LUCs to be implemented for OU-2 will also be documented in a separate document. The documents will be submitted to the USEPA and the MDE for review prior to implementation of the Selected Remedy.

LUCs would be maintained until the concentrations of hazardous substances in the groundwater are less than concentrations that allow for unlimited use and unrestricted exposure. The LUC groundwater boundary is shown in Figure 3. The Navy shall be responsible for implementation, maintenance, periodic reporting, and enforcement of LUCs in accordance with the Remedial Design.

Although the Navy may transfer these responsibilities to another party by contract, property transfer agreement, or through other means, the Navy shall remain ultimately responsible for remedy integrity and shall: 1) perform CERCLA 121(c) 5-year reviews; 2) notify the appropriate regulators and/or local government representatives of any known LUC deficiencies or violations 3) provide access to the property to conduct any necessary responses; 4) retain the ability to change, modify, or terminate LUCs and any related deed or lease provisions; and 5) ensure that the LUC objective is met to maintain remedy protectiveness.

2.12.3 Summary of the Estimated Remedy Costs

The estimated cost for the Selected Remedy (Alternative 3) has a present worth of $421,500, with additional cost information presented in Appendix D. The information in this cost estimate is based on the best available information regarding the anticipated scope of the

remedial alternative. Changes in the cost estimate may occur as a result of new information and data collected and may be documented in the form of a memorandum in the Administrative Record file. Major changes may be documented with an Explanation of Significant Differences. This is an order-of-magnitude engineering cost estimate that is expected to be within -30 to +50 percent of the actual project costs. This present worth cost is based on a discounted rate of 5.2% and assumed time period of 30 years for the long-term monitoring.

2.12.4 Expected Outcomes of the Selected Remedy

The future land use at Site 11 is expected to remain the same as the current use. Long-Term monitoring will continue until MCLs are achieved at the perimeter of the landfill for the chemicals and metals that exceed these criteria, at which time LUCs for groundwater will no longer be necessary. Data analyses will be performed to evaluate changes in groundwater quality over time and determine whether natural attenuation is reducing concentrations of the chemicals and metal that exceed MCLs. If contaminant concentrations remain the same or increase, additional remedial action will be evaluated to achieve the RAOs.

The Selected Remedy will meet the NCP criteria and RAOs for Site 11. LUCs provide protection for potential human exposure to shallow groundwater until RAOs and MCLs are achieved.

SECTION 3

Statutory Determinations

Remedial actions must meet the statutory requirements of Section 121 of CERCLA. Remedial actions undertaken at NPL sites must achieve adequate protection of human health and the environment, comply with ARARs of both federal and state laws and regulations, be cost effective, and use, to the maximum extent practicable, permanent solutions and alternative treatment or resource recovery technologies. In addition, CERCLA includes a preference for remedies employing treatment that permanently and significantly reduces the volume, toxicity, and/or mobility of hazardous substances as the principal element. The following discussion summarizes how the Selected Remedy meets these statutory requirements.

3.1 Protection of Human Health and the Environment

The Selected Remedy, LUCs and Long-Term Monitoring, will protect human health and the environment. Although there has been no unacceptable risk identified for Site 11 OU-2, LUCs will prohibit groundwater use, thus eliminating any potential risk associated with constituents present above MCLs. Additionally, LTM will provide data to determine whether groundwater containing constituents with concentrations greater than MCLs is migrating beyond the Site boundary (Figure 3), in which case, additional remedial action will be evaluated to achieve the RAOs. The Selected Remedy poses no short term risks or cross media impacts.

3.2 Compliance with Applicable or Relevant and Appropriate Requirements

The Selected Remedy will meet all identified ARARs (Appendix C). Groundwater monitoring will be performed to document progress toward meeting ARARs, or to provide data to determine whether an alternative treatment option should be considered to meet ARARs within a reasonable timeframe.

3.3 Cost-Effectiveness

The Selected Remedy is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." The relationship of the overall effectiveness of this remedial alternative to its cost was determined to represent a reasonable value for the money to be spent.

The estimated present-worth cost of the Selected Remedy is $421,500. This cost is reasonable for the Selected Remedy.

3.4 Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies

The Navy and the USEPA, in consultation with the MDE, determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be used in a practical manner for Site 11 OU-2. Decreases in the concentration of VOCs, SVOCs and metals, will be documented through groundwater monitoring and data analyses. No principal threats or continuing sources are known to be present at Site 11 OU-2.

3.5 Preference for Treatment as a Principal Element

The Selected Remedy does not employ treatment to reduce contaminant concentrations present in the groundwater for Site 11 OU-2. The Navy, USEPA and MDE determined that the use of treatment technologies would be impractical given the low contaminant concentrations in groundwater.

3.6 Five-Year Review Requirements

Documentation of the completion of the remedial action will be submitted to the USEPA and the MDE when performance monitoring indicates that VOC, SVOC, and metal concentrations are decreasing and remaining below MCLs at the perimeter of the landfill. The Navy is required to conduct a statutory remedy review within 5 years after initiating remedial action and at 5-year intervals thereafter until such time that groundwater monitoring indicates that unrestricted use of Site 11 OU-2 does not result in unacceptable risks to human health or in constituents remaining in site groundwater at concentrations that exceed MCLs. At that time, the LUCs can be removed for groundwater and LTM can be discontinued.

3.7 Documentation of Significant Changes

The Public Meeting for Site 11 was held on August 13, 2008. The Selected Remedy is the Preferred Alternative from the PRAP. No changes were made to the Preferred Alternative identified in the PRAP (CH2M HILL, 2008c).

SECTION 4

Responsiveness Summary

The Responsiveness Summary presents stakeholder concerns about the site and selected remedy, and explains how those concerns were addressed and factored into the remedy selection process. This Responsiveness Summary was prepared after the 30-day public comment period (August 11 to September 9, 2008) and public meeting (August 13, 2008), in accordance with USEPA guidance (USEPA, 2002).

4.1 Stakeholder Comments and Lead Agency Responses

The PRAP for Site 11 OU-2 was presented at a public meeting held on August 13, 2008, at the Frank Knox Employee Development Building, Building 2189, Room 100, at NAS Patuxent River. A transcript of the public meeting is provided in Appendix B.

Community members did not express any dissatisfaction with the selection of "LUCs and LTM" for Site 11 OU-2. Questions received during the meeting were addressed at the meeting and are documented in the meeting transcript (Appendix B) as part of this Responsiveness Summary.

4.2 Technical and Legal Issues

No technical or legal issues have been identified for Site 11 OU-2 with respect to this ROD.

SECTION 5

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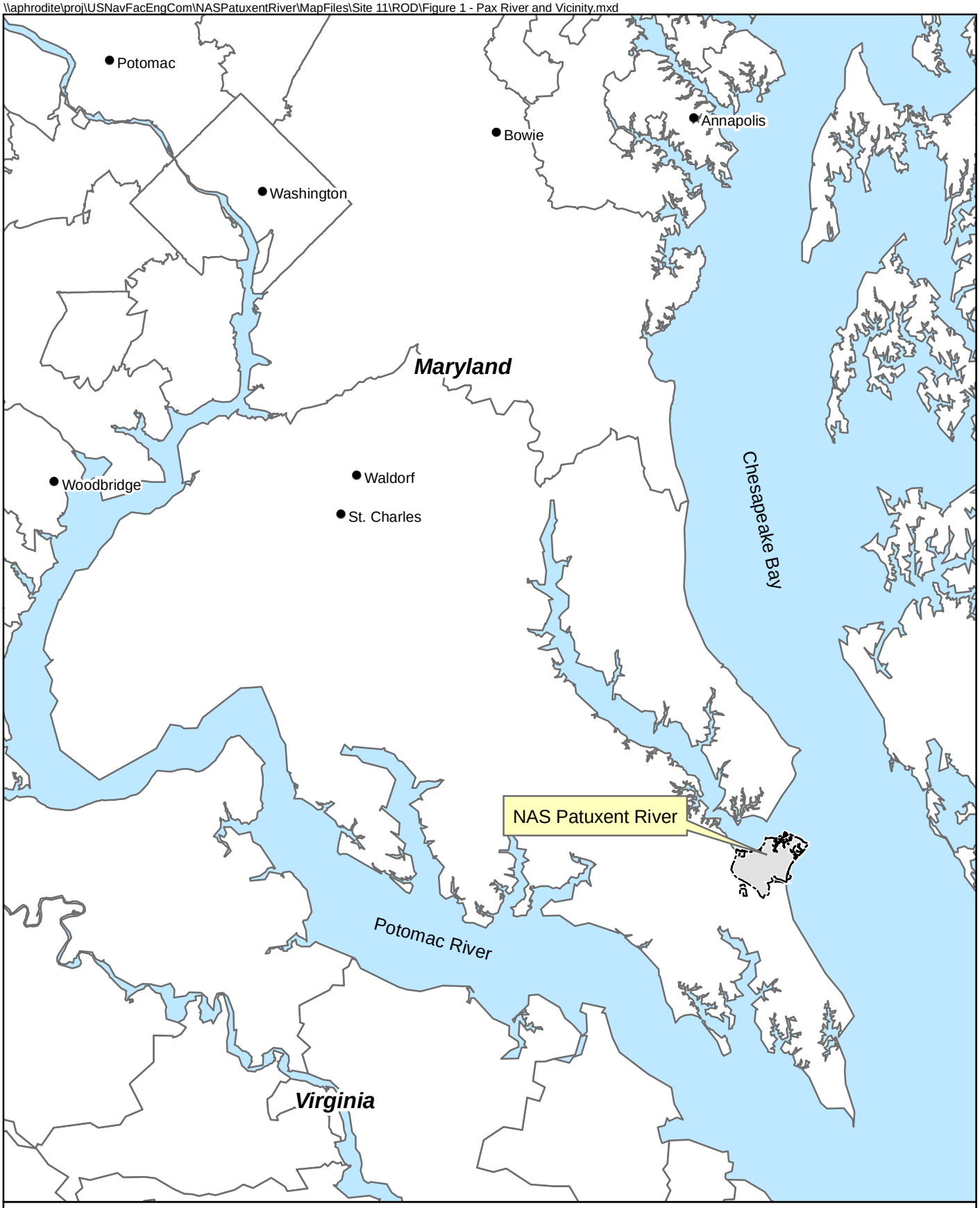
Figures

\\aphrodite\proj\USNavFacEngCom\NASPatuxentRiver\MapFiles\Site 11\ROD\Figure 1 - Pax River and Vicinity.mxd



Legend
- Cities
- Installation Boundary

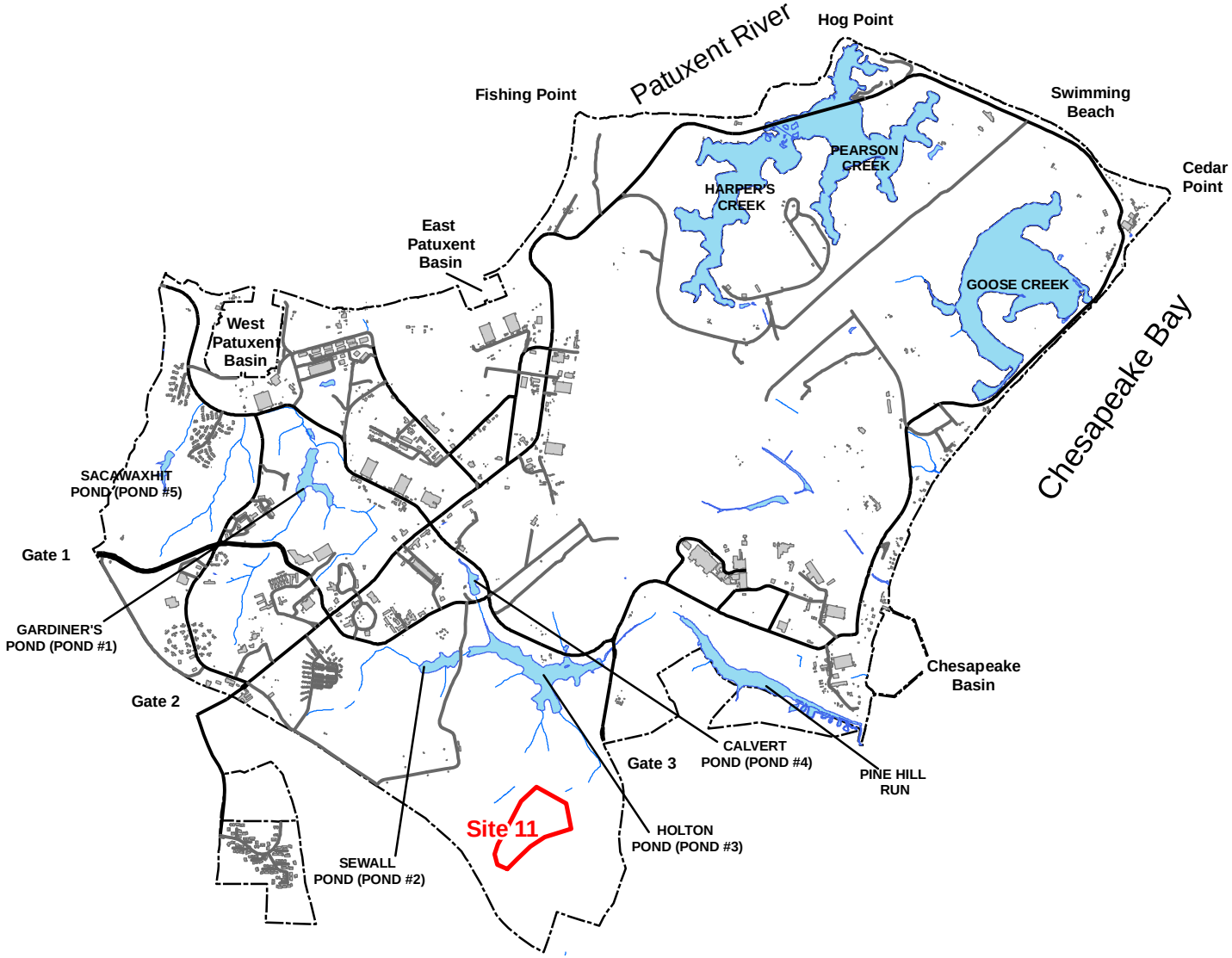
N

0 22,500 45,000
Feet

Figure 1
Naval Air Station Patuxent River and Vicinity
Site 11 OU-2 Record of Decision
NAS Patuxent River
St. Mary's County, Maryland

CH2MHILL

\\aphrodite\Proj\USNavFacEngCom\NASPatuxentRiver\MapFiles\Site11\OU2\ROD\Figure 2 - Facility Map.mxd



Legend

- Stream
- Primary Road
- Secondary Road
- Permanent Water Body
- Installation Boundary
- Buildings
- IR Site Boundary

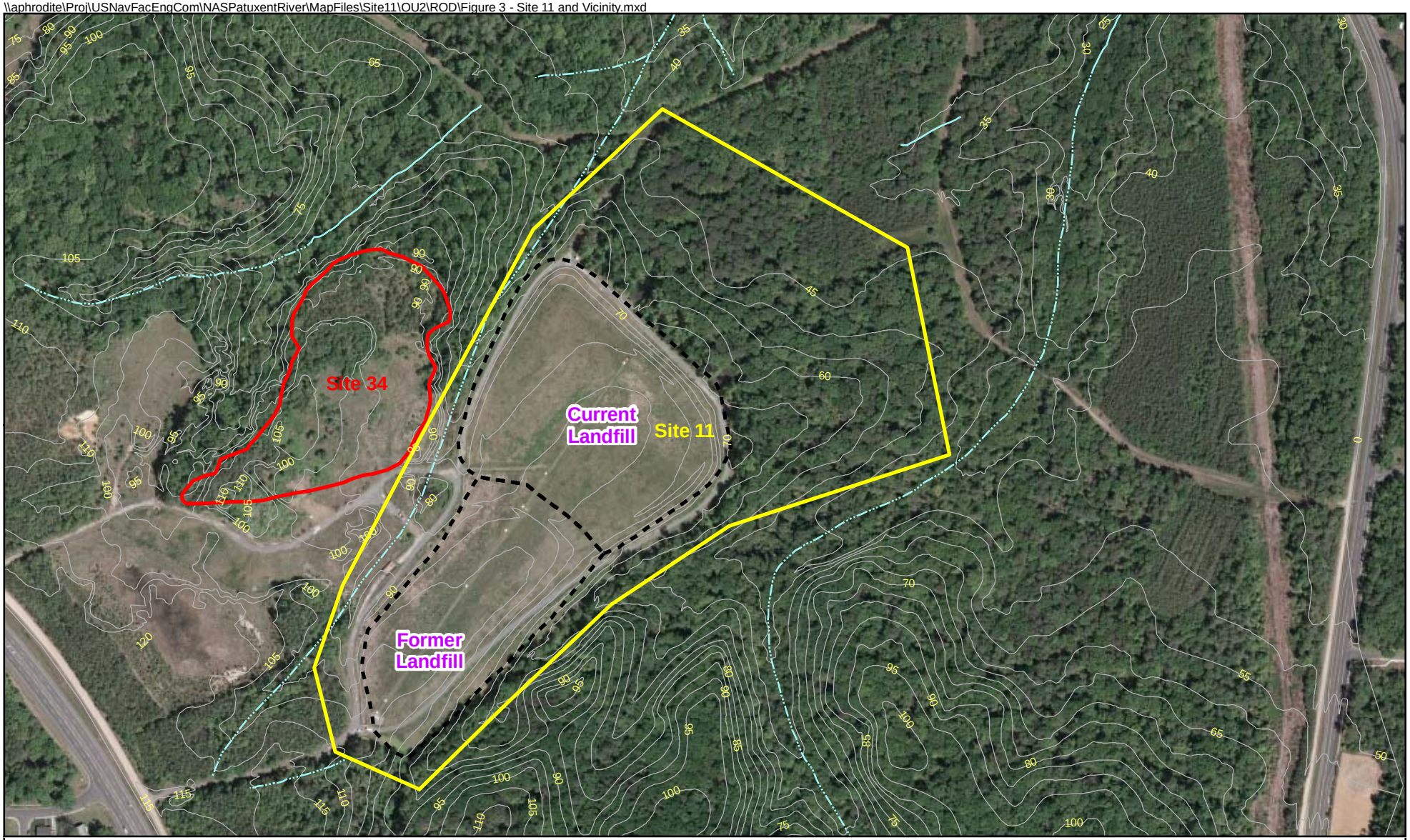
N

0 2,000 4,000 Feet

Figure 2
Facility Map
Site 11 OU-2 Record of Decision
NAS Patuxent River
St. Mary's County, Maryland

CH2MHILL

\\aphrodite\Proj\USNavFacEngCom\NASPatuxentRiver\MapFiles\Site11\OU2\ROD\Figure 3 - Site 11 and Vicinity.mxd



Legend

- Landfill Boundary
- Perennial Stream
- Intermittent Stream
- Elevation Contours (5 ft Interval)
- Site 11 OU-2 Boundary/LUC Boundary
- IR Site Boundary

N

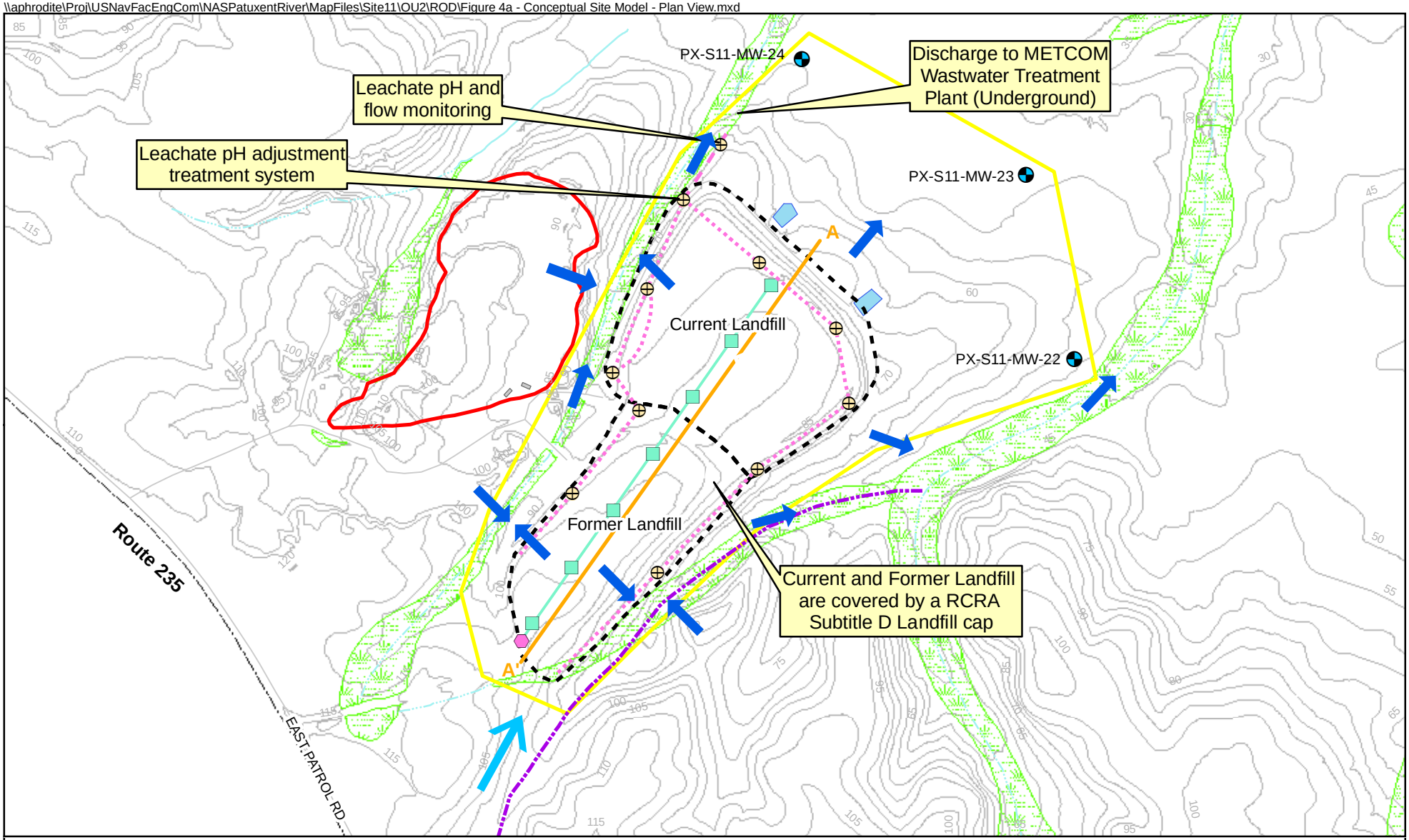
0 200 400 Feet

Note: 2006 Aerial Photograph

Figure 3
Site 11 and Vicinity
Site 11 OU-2 Record of Decision
NAS Patuxent River
St. Mary's County, Maryland

CH2MHILL

\\aphrodite\Proj\USNavFacEngCom\NASPatuxentRiver\MapFiles\Site11\OU2\ROD\Figure 4a - Conceptual Site Model - Plan View.mxd



Legend

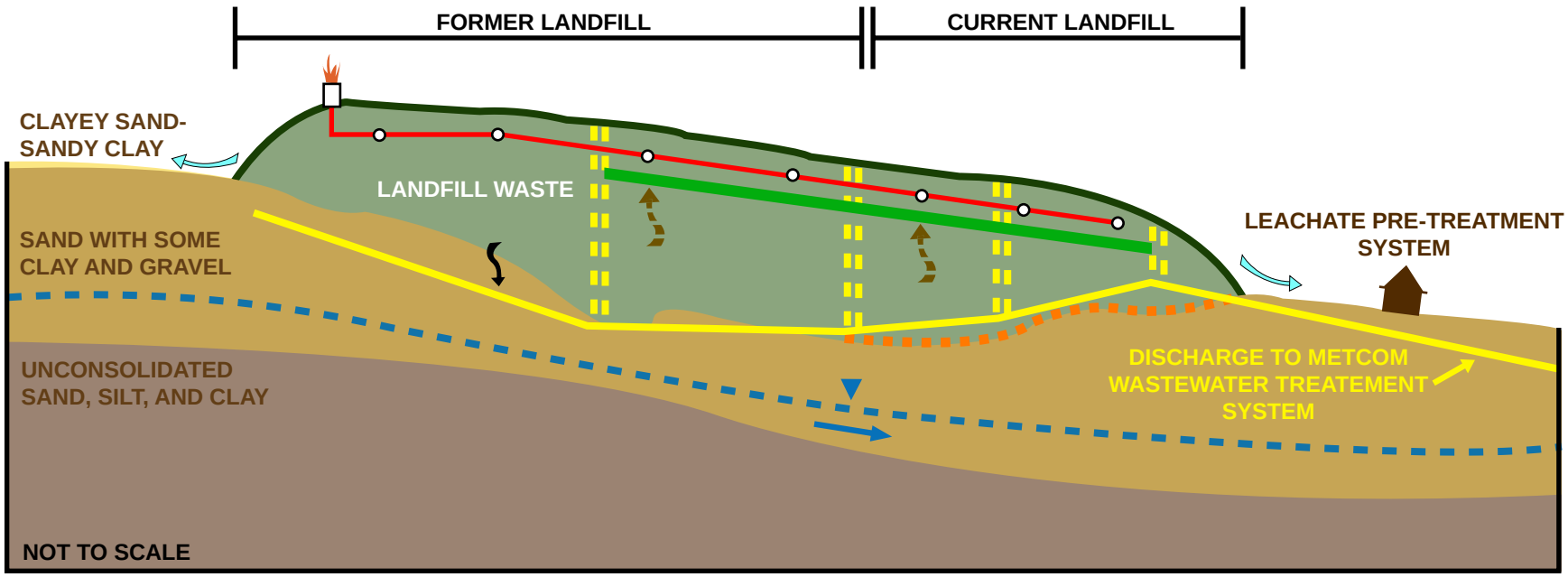
- Site 11 OU-2 Boundary/LUC Boundary
- IR Site Boundary
- Ponds
- Forested Wetland
- Landfill Boundary
- Landfill Gas Management System Header Pipe and Vault Boxes
- Conceptual Site Model Cross Section Location
- Elevation Contours (5 ft Interval)
- Monitoring Well
- Landfill Gas Flare Unit
- Manholes
- Drainage Ditch
- Perennial Stream
- Intermittent Stream
- Leachate Collection System Discharge to METCOM (Underground)
- Perimeter Leachate Collection System
- Overall direction of Surface Runoff
- Generalized Direction of Groundwater Flow

N

0 200 400 Feet

Figure 4a
Conceptual Site Model – Plan View
Site 11 OU-2 Record of Decision
NAS Patuxent River
St. Mary's County, Maryland

CH2MHILL



LEGEND

- Landfill gas flare
- Landfill gas header pipe and horizontal extraction well
- Potentiometric surface elevation (April 28, 2004)
- RCRA Subtitle D Landfill cap with vegetated cover
- Manholes/Leachate collection system installed in 1980
- Landfill bottom liner (Current landfill only)
- Leachate collection system installed in 1997

POTENTIAL MIGRATION PATHYWAYS

- Landfill gas
- Surface Runoff (prior to capping)
- Infiltration
- Direction of Groundwater Flow

Figure 4b
Conceptual Site Model - Cross Section View
Site 11 OU-2 Record of Decision
NAS Patuxent River
St. Mary's County, Maryland

Appendix A
State Concurrence Letter

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Shari T. Wilson
Secretary

Robert M. Summers, Ph.D.
Deputy Secretary

September 24, 2008

Mr. Stephen Hurff
NAVFAC Washington
Washington Navy Yard, Building 212
1314 Harwood Street SE
Washington, DC 20374-5018

RE: Record of Decision for Site 11- Former and Current Sanitary Landfill, Operable Unit 2 (Groundwater, Sediment, and Surface Water) – Final – September 2008, Naval Air Station Patuxent River, St. Mary's County, Maryland

Dear Mr. Hurff:

The Federal Facilities Division (FFD) of the Maryland Department of the Environment's Hazardous Waste Program has completed its review of the referenced document. This Record of Decision (ROD) documents the Navy's final remedial action at Site 11, Former and Current Sanitary Landfill, Operable Unit (OU) 2. This final remedial action will include land use controls and long-term monitoring. The final remedy selection is based upon a Remedial Investigation of Site 11 OU-2, which indicated that this action is necessary to ensure protection of human health and the environment at this site. The remedy selected by the Navy is in compliance with the Comprehensive Environmental Response, Compensation and Liability Act.

A public meeting was held on August 13, 2008, to present the findings in the Proposed Plan. The FFD reviewed the response to comments within the ROD and found the Navy's responses satisfactory. Based upon the acceptable level of protection to human health and the environment provided by the remedy, the FFD concurs with the Navy's selected remedy for Site 11 OU-2.

If you have any questions, please contact me at (410) 537-4238.

Sincerely,

Heather Njo
Remedial Project Manager
Federal Facilities Division

HN:hn

cc: Mr. S. Andrew Sochanski
Mr. Horacio Tablada
Mr. Harold L. Dye, Jr.

Appendix B
Public Notice and Public Meeting Transcript

NAVAL AIR STATION PATUXENT RIVER

PROPOSED REMEDIAL ACTION PLAN
SITE 11, OPERABLE UNIT 2

WEDNESDAY, AUGUST 13, 2008

FRANK KNOX BUILDING
21866 CEDAR POINT ROAD
ROOM 100
PATUXENT RIVER, MARYLAND

P R O C E E D I N G S

- - - - -

MR. HURFF: Okay, next up, this is starting off the public meeting for the Site 11 OU-2, Current and Former Sanitary Landfill Proposed Remedial Action Plan which deals with groundwater, surface water and sediment.

As I'm going through this, if you've got any questions, just please stop me. The site is located down at the end of the Base, Gate 2 is over here. The site has been a landfill since 1974, it's been used prior to that. It was the main landfill. It does not have a liner. The Former Landfill does not have a liner to it. What's known as the current landfill was used from '74 to '94, it does have a bottom liner, it is a fully permitted MDE landfill.

The cap for the both landfills was done to satisfy the requirements of closing the Current Landfill, although they just extended the cap over both, it didn't make sense to do it

just half the job. It has landfill gas collection, groundwater monitoring, leachate collection, everything a modern landfill needs to have.

This is the vicinity map for the site. Site 34 is an adjacent site where there was drum disposal once upon a time. We did assess groundwater for not only Site 11, which is here, but also Site 34, at the same time, since Site 34 could be flowing into Site 11, we wanted to make sure we didn't have anything coming from an off-site source.

The yellow line that's shown here is the current boundary for Site 11, for both operable units. This is also the land use control boundary line for the sites.

We're going to step through some aerial photographs from 1938 to the present. The yellow line, which will change to a gray line later on in the slides, shows the same boundary line you just saw for the vicinity map. 1938 farmland, forest. 1943, the Base is just

starting to be built, the farms are still there, forests are still pretty much the same.

1952, you start to see some of the borrow material operations, soils being used elsewhere on the Base for the construction. '57, the borrow continues. '64, it's bigger. '65. 1970, this is when they're on the edge of preparing to start using it as a landfill. 1977, this is where landfilling operations are in place. If you look at this line here, this is actually one of the edges of the material being placed.

These photos are also in the remedial investigation report, you can look at them a lot closer up. '77, you can now see an awful lot more definition to the areas where waste is being placed. We're starting to get into the 1980s. This one wasn't dated, so -- 1981, this is where the Current Landfill was in operation, and a good detection of the fill operations are being done there.

This is the landfill as it appeared before the Operable Unit 1 remedy, where it

was capped. And that's after the cap. The landfill gas collection system you can see down the spine of the landfill. And that's pretty much as it looks today. This area over here is a berm area that was used for native material to cover up the landfill, saved a lot of money during the first remedy.

This is how it looked in the 1980s when they were working on it. Former Landfill up here, current down this end.

Please let me know if you want to stop or look at anything along the way.

This is a shot of the site when it was undergoing regrading for the OU-1 remedy. They were done with final grading at this point, they were getting prepared to put the liner on top. And the liner being installed.

And that's the way it looked when the liner was installed. The cover was vegetated.

Okay, the remedial investigation. Our objectives here were to fully evaluate groundwater, surface water, sediment, human

health and ecological risk assessments. We were looking at all of our scenarios, including unrestricted, even though for the Operable Unit 1 remedy, it is restricted from access, there is a gate, fence, use restrictions, can't go on the cap, can't disturb the cap, maintain the cap, that's all part of the Operable Unit 1 remedy.

We looked at the groundwater at Site 34 as well. We had ten years worth of monitoring data to look at, since the site had been sampled since 1996. We had at the end 26 monitoring wells, ten surface water samples, ten sediment samples, so we had a pretty good data set for the site itself.

The conceptual site model, there's going to be two slides for this. The blue lines here are depicting which way surface water flows. In general, this is the higher end of the site, this is the lower end of the site. Both surface water and groundwater head in this direction. There are two streams that come

around the site. There are little -- they are intermittent up until here and about here, and then they become pretty much a defined stream on their way out.

There is a leachate treatment system that's here. And these dashed lines you see here are the leachate collection system on its way out.

The section line depicted by A to A’ will be shown on the next slide, which is more of what you expect to see on a conceptual site model, the cartoon depiction of the site. This is from the entrance to the site down to the leachate system that was shown on the map that was previously going up. There is the flare that's there now with the landfill gas collection. The leachate system underlying the site that goes into the treatment that goes off to METCOM, wastes, liner, Former/Current split.

MR. CALVANO: What type of volume do you have in your collection system there?

MR. HURFF: Which collection system?

MR. CALVANO: Like the leachate, as far as the discharge to METCOM? It ranges?

MR. HURFF: It ranges, I believe, on the rate of six gallons per minute on average. It does go higher, it does go lower. The reason that it's going higher and lower is that a portion of the site, this figure is being very kind. A portion of the leachate collection system, we know is under the groundwater table. That's one of the discussion items we have currently with MDE solid waste division, we've covered in previous meetings in here, that we're discussing what we can do to close off certain portions of the leachate system that are intercepting groundwater. With a landfill of this age, we should not be seeing that volume of leachate coming out. The leachate itself is comparable to groundwater. It's virtually identical chemically. The only thing we're taking and doing with the leachate right now at the treatment system is adjusting pH. There's no other pretreatment.

MR. CALVANO: But it's still going through METCOM's tertiary system?

MR. HURFF: Yes.

MR. COLLINS: Basically at this point in time, leachate is a misnomer, because chemically it's no different than the groundwater.

MR. HURFF: And METCOM doesn't want to see us sending water, it just dilutes the process and it's not helpful.

MR. CALVANO: Right.

MR. HURFF: Okay. This map here shows our surface water monitoring points, as well as our sediment monitoring points that we've done historically. We have points we're upgrading at Site 34, downgradient, down along the two streams. This shows you the site, all of the wells that are at the site, we have wells that are upgradient, cross gradient. At the perimeter of the landfill, at Site 34, and also downgradient of the landfill. The well differentiation between ones at the perimeter

and the ones downgradient will be important in just a moment.

MR. CALVANO: To go back to your leachate collection system, at what point would MDE say that it's not necessary and therefore not require treatment?

MS. NJO: That is a great question. We're going to be meeting with solid waste in the September/October time frame, and it's kind of the feeling at that point that they will be ready to make that decision.

MR. CALVANO: Okay.

MR. HURFF: Yeah, we've had a couple of different studies out there, discussing flow volumes, showing the maps, we've gone back to look at the original construction drawings with the different elevations where materials were placed, how they were placed, a lot of the details that weren't available in past years, we've now collected it all up together. So, we've got a much better picture to present to MDE for their consideration.

MS. NJO: MDE's first concern was the depth between the waste and the groundwater, and we didn't have enough information at the time to prove that there was, what, the five-foot -- three-foot, excuse me, difference between it. So, that could make a difference.

MR. CALVANO: I mean, if they discontinue the collection and treatment of that, what would happen to it? Just are there down slope springs that would surface, or would it eventually just go into the watershed through the intermittent streams?

MR. HURFF: We would actually be discontinuing only a portion of the collection system, just the portion that's under the water table. The remainder of the system, if I can get back to it here, the part of the system we're talking about is up on the top end of the landfill, up here in the older section of the Former Landfill side. This area here is what we're looking at. I think it's on both sides. But at the very least, on this one side here.

It would basically be closing off at this manhole here. The remainder of the system would stay in place.

The remainder of the water that would be left at that point, if it did go anywhere, would be daylighting into the stream, most likely.

MR. CALVANO: Okay.

MR. HURFF: Which actually segues into -- this is the super-complicated groundwater contour map. You can see the general direction of groundwater is heading that way. This wide area here where there are no contours, this is where the landfill has a bottom liner. It's been scooped out. It may or may not, depending upon what elevation things are at, for the leachate, or the groundwater at this point, it could continue on down. Or the intermittent stream that's here now could become more of a perennial stream. But in either case, the water that we're seeing is virtually undistinguishable from groundwater now. So --

Okay, the human health risk assessment. We went through two different exposure scenarios, those wells that were at the perimeter of the landfill to assess the water that was underneath and at the perimeter, and then the downgradient wells. We wanted to do this because we didn't want to have the potential situation of diluting with a downgradient well what could be a source area. So, we kept those two evaluations separate for the report.

As I said before, we did evaluate Site 34, we did not find any unacceptable risk for Site 34 groundwater, it's acceptable for unrestricted use. That is going to be presented in another report, it's not in the Site 11 OU-2 RI. The only exposure for surface water and sediment, as I said, we tried to evaluate all the uses, including and up to unrestricted. However, because of the OU-1 remedy, no one can get inside of the fence line, so it would be a trespasser or site worker scenario only. You

couldn't have a house there or a residence there, unless the landfill went away. So, we only evaluated the trespasser site worker for surface water study.

This is the list of COPCs. As you can see, there are very few on the surface water, fewer in sediment. Groundwater under the landfill, compared to groundwater downgradient of the landfill, there were more items of concern under the landfill, versus downgradient.

MR. COLLINS: Steve, you might explain what this represents in terms of -- well, I guess I could just explain it. We do screening to some criteria, and this is the list that falls out. The concentrations are such that they could potentially pose an unacceptable risk. You then do further quantitative evaluation for each one of those constituents based on toxicity and reference doses and exposures, to calculate whether or not those create an unacceptable risk.

So, the COPC is just kind of the first

cut at what might be a problem and then you go into more detail in the evaluation.

MR. CALVANO: So, this is you're saying is both qualitative and quantitative?

MR. COLLINS: This is qualitative, you do a screening to compare your maximum concentration to this list of criteria, and if it exceeds, you retain it, as a COPC, and then you do further quantitative evaluation based on the characteristics of each constituent.

MR. CALVANO: Okay.

MR. HURFF: That feeds into the risk assessment, and this is a summary of that risk assessment. There are two different ways that risk is looked at under a reasonable maximum exposure RME, and then a central tendency exposure scenario. The RME basically is taking the maximums, what was your highest of everything, across the -- wherever your evaluation unit is, that's what gets fed into the risk assessment.

The central tendency takes an average

of the site, rather than the maximum, and does -- feeds that through the assessment.

For here, under the current and future trespasser or visitor, the carcinogenic cancer risk is within the acceptable risk range. The HI, noncarcinogenic risk is below the threshold of one. Above one it's considered to be something you have to deal with.

Again, for the trespasser or visitor adolescent, same deal, it's below the risk range on both sides.

For a future resident adult, if you were going to live at the landfill, you had an HI that was exceeding the one for both the child and adult. The risk drivers for that finding were iron, manganese and thallium. Adding in arsenic for the resident child. You weren't really finding a driver for the noncarcinogenic risk from anything, essentially minerals that are present in the soil.

For the carcinogenic risk for the site, we were exceeding the acceptable risk range at

1.7 times ten to the negative fourth, and that was due to arsenic, benzene, dieldrin and PCE, a solvent.

MR. COLLINS: That resident child/adult risk assumes the person lives there for 70 years, from childhood to adulthood, and then consumes so much water per day. So, that's an exposure over a very long period of time.

MR. HURFF: And this is if they were drinking the worst of all of the wells at the site. When you evaluate that on an average or more reasonable risk scenario under the CTE, the HIs drop quite substantially. It's still above the threshold of one, but in this case, the drivers are iron, manganese and thallium. We pretty much find iron, manganese and thallium everywhere we drill a well. You're not going to not find those elements.

The resident child/adult, when you look at the carcinogenic risk, now you fall within the what's known as an acceptable risk range between one times ten to the negative fourth and

one times ten to the negative sixth. So it's one chance in 10,000 to one chance in a million of an increased cancer risk.

MR. CALVANO: But again, this doesn't really play into this site, because it's restricted use?

MR. COLLINS: Correct.

MR. HURFF: The scenarios for the future residents, yes. This is at the perimeter and underneath of the landfill, yes.

MR. COLLINS: It's unrealistic to assume the resident, but EPA likes -- and the Navy's objective would be unrestricted use, so typically you look at a residential scenario to see, well, what would happen if we did that. Because obviously, the Navy would like to use the property.

Now, in this case, they know it's a landfill, but for other sites that weren't landfills, that's useful information.

MR. CALVANO: Right.

MR. HURFF: When you -- to sum up,

there were no unacceptable risk for trespassers or future site workers. If someone needs to come in and do a repair, they're okay at the site, groundwater. There's no further protections involved.

For residential use, if the landfill was changed, if we took the fence away, if the restrictions all went away, if they did, the carcinogenic risks, under the CTE evaluation, it -- the risk evaluations are tiered, you start off with your most conservative and then work your way out from there. There are additional safety factors, if you're dealing with an RME scenario, as you step down, you get into more realistic risk scenarios when you get into the CTE assessment.

Under the CTE assessment, we were within the acceptable risk range for carcinogenic risk. The noncarcinogenic risk, that was above one for both the child and adult that you saw, at 1.4 and 4.4. 4.4 for the child, 1.4 for the adult. The risks were from

iron, manganese, thallium. Iron and manganese, the concentrations we were finding are within the same range that you would find for essential nutrients. You would eat that every day. It's comparable.

The thallium that we found was found very infrequently. It wasn't in all of the wells, it was only in a couple of the wells. We found that thallium in the total metal samples, they were not found in the filtered samples. So, that is indicative of the thallium is due to particulates that are in the well itself. If we were finding thallium in a dissolved phase, that means it's something that's moving around that could be potentially coming from the landfill as a source, and going out. If you're finding it in particulates, particulates can't move through an aquifer matrix, in general. It's not -- not in this type of matrix we have.

MR. COLLINS: Plus in terms of exposure, you wouldn't be drinking water that's got particulates in it. I mean, you could drink

it, but you wouldn't want to.

MR. HURFF: And the last bullet we have there is that the ranges that we found of those three elements are comparable to other no-action sites, sites we've already closed out on the facility.

All of these factors go into part of a risk assessment known as risk management, where you take a look at what is -- what's driving your risk, where is it coming from, what is it affecting? That was taken into consideration, the finding of the report is that there was no unacceptable noncarcinogenic risk. Those three elements, they're found naturally, they're particulates, all those factors, there's no unacceptable noncarcinogenic risk from this site at the perimeter and underneath the landfill.

So, in theory, you could drink the water under the landfill.

For the risk assessment for the downgradient landfill. As you saw, there were a lot less COPCs at that site. The risk

assessment here reflected similar results under the RME exposure scenario. You were above the -- well, actually, you're still within the acceptable carcinogenic threshold, but we don't -- when we start seeing numbers in the negative four range, that's real close to the edge of what's acceptable. Construction worker was acceptable under RME scenario.

When you drop into the CTE exposure, the average exposure for the downgradient wells, the hazard index for the resident adult is below the threshold of one. The resident child is at 1.3, which is slightly above the threshold of one. And the carcinogenic risk was within the acceptable range.

The 1.3 was due to iron, arsenic, manganese and vanadium. When you separate that out, the target organ and effect, there's no -- none of those are above one. So, again, you're not having anything above an HI or HQ of one for any of the effects ordinance. The ranges we found for the iron, arsenic, manganese, were

comparable, same as the other scenario underneath the landfill. And there was no unacceptable noncarcinogenic risk from this scenario either.

So, in summary, we didn't have any risks from surface water sediment, from groundwater in either area.

Ecological risk, we had done a previous assessment at Pine Hill Run where Site 11 was included in. The samples that we took were the original findings from that assessment which determined the site posed no ecological risk. All the data was consistent, the conclusion is that there's no further ecological risk exposed by this site, from OU-2.

So, why are we having an action ROD for the site? We did not have any risk exposures. We did, however, have three excedences of MCLs, for benzene, bis(2-ethylhexyl)phthalate and thallium and those are only at a couple of landfill perimeter wells, it's not at all the perimeter wells, and there are no other MCL excedences downgradient

or crossgradient from Site 34.

As a result, we were required to do a feasibility study to investigate the MCL excedences since we are returning groundwater to beneficial use and MCLs are one of the evaluations we have to make.

So, for the feasibility study, we needed to look at groundwater. We had already had a cap on the landfill that was controlling infiltration into the landfill and sweeping material out of it. By the OU-1 remedy. We had a lot of monitoring data in the ten years. We wanted to make sure that groundwater with the excedences is not used for drinking water and ensure that anything at the landfill, at and underneath of the landfill, does not migrate downgradient to potential receptors off of the site.

Those are our remedial goals. Those are equivalent to MCLs at the current time. The three alternatives that we have, the no action alternative required for comparative purposes,

it's the do nothing alternative, it does not meet any of the criteria that we need to meet for a remedy.

Alternative 2 is implementing institutional controls. Access restrictions, deed notices, does not have any monitoring as a component of it.

And alternative 3, which is our preferred alternative, we keep the institutional controls as from alternative 2, it satisfies potentially eight of the nine criteria, assuming that there is public and state acceptance, as well, in that assumption of eight of nine. The one that it doesn't meet would be the reduction in toxicity, mobility and volume through treatment.

There is a preference in the NCP for treatment versus just monitoring. In this case, because the MCL excedences that we have are isolated, we have got ten years of data showing that they're isolated, we didn't really feel that we he had to have a treatment to control or

address them beyond the ICs that we're proposing here.

We're going to be monitoring out there for the SOVCs, VOCs and metals on a 15-month interval. What this allows us to do is capture seasonal variations. Sampling results can vary via the seasons.

So, as we're rotating through a five-year monitoring period, every 15 months gives us summer, winter, spring, fall, that we'll go back and look at every five years and evaluate what do we see from the sampling. Do we see trends that are going up, down, things staying the same, should we monitor more, should we monitor less. That will be evaluated at the very least once every five years. If there are results that show up that say we should be looking at it before then, we can bring it up at that point.

MR. CALVANO: When would it stop, just whenever it's been, you know, falls below the MCL?

MR. HURFF: Yes.

This is a comparison chart of the different criteria and costs at the very bottom. The cost is proposed over a 30-year time period. This is making the assumption of the monitoring that we had just talked about in the last slide, continues for 30 years every 15 months.

As you can see, the first alternative, the only thing it's got going for it is it's easily implemented. The second alternative doesn't -- it's felt that the yellow signifies that it kind of meets it. The green is it meets it. The red is doesn't meet it. It would kind of sort of protect the human health of the environment, without monitoring, you really wouldn't know. Same thing for long-term effectiveness, if you weren't monitoring it, you wouldn't know whether it would be effective or not. And it doesn't have any component of reduction of toxicity, mobility of volume through treatment.

Alternative 3A, the -- actually it's

alternative 3, I don't know why there's an A on there, the green highlighted column is our preferred alternative.

MR. COLLINS: One thing we should point out about the cost, those are present worth costs, and there's really a minus 30 percent/plus 50 percent bracket for this type of estimate. It's just a standard engineering practice that for this kind of estimating you assume minus 30/plus 50, and based on present worth cost over 30 years.

MR. HURFF: And this is, again, the figure that we showed earlier. This would be the perimeter that we would have in place that we would maintain the institutional controls for and monitoring of the downgradient wells. That's about it.

MR. CALVANO: So, you said that MDE would weigh in on it, as well as the community, and then you make the decision which alternative, or just because of the fact that you meet eight of the nine criteria, you're kind

of shooting for alternative 3?

MR. HURFF: Yes. Yeah, the community, there's a public comment period that's going on now, that lasts for 30 days. There's a notice in the newspaper, there's this public meeting, there was also what I was the notice in the newspaper for the meeting as well. There's the opportunity on the back of the PRAP, there is a form that can be filled out and sent back to John, comments can be sent back, any which way the public can get them there. They can also call up any one of the MDE, EPA or myself to transmit those comments. They can comment on what the remedy is, do they like the remedy, do they not like the remedy. Pretty much any comment that we address during the review for the record of decision.

We consider the public's input. We may choose to go back to find a different remedy. We could keep going with the remedy here. The public, you know, could come back and say, don't monitor, you know, anything can happen in that

case.

All right? And that would wrap up site 11.

(Whereupon, at 6:52 p.m., the meeting was concluded.)

CERTIFICATE OF REPORTER

I, Sally Jo Bowling, do hereby certify that the foregoing proceedings were recorded by me via stenotype and reduced to typewriting under my supervision; that I am neither counsel for, related to, nor employed by any of the parties to the action in which these proceedings were transcribed; and further, that I am not a relative or employee of any attorney or counsel employed by the parties hereto, nor financially or otherwise interested in the outcome of the action.

SALLY JO BOWLING

designate
a driver

DON'T
DRINK
and
DRIVE

THE DEPARTMENT OF THE NAVY INVITES PUBLIC COMMENT ON PROPOSED REMEDIAL ACTION PLANS FOR THREE SITES UNDER THE INSTALLATION RESTORATION PROGRAM NAVAL AIR STATION PATUXENT RIVER, MARYLAND

In accordance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Naval Air Station (NAS) Patuxent River invites public comment on the Proposed Remedial Action Plans (PRAPs) for the following three Installation Restoration (IR) Program sites:

Site 6/6A Operable Unit (OU) 2

The findings of the Remedial Investigation (RI) and the results of the removal action for Site 6/6A OU-2, which consists of the groundwater and surface water at Site 6/6A (Bohneyard adjacent to the Fuel Farm) and the surface soil and sediment in the drainage area downgradient of Site 6/6A, indicate that there are no unacceptable risks to human health or the environment from site media. Therefore, 'no further remedial action' is proposed for Site 6/6A OU-2.

Site 11 OU-2

The findings of the RI for Site 11 OU-2, which consists of the groundwater, surface water, and sediment associated with the Former and Current Sanitary Landfill, indicate that there are no unacceptable risks to human health or the environment from the site. However, three contaminants were detected in Site 11 OU-2 groundwater samples at concentrations exceeding federal standards. Therefore, the proposed remedy to address the groundwater is land use controls and long-term monitoring of the groundwater.

Sites 4 and 5 OU-6

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Change

Continued from Page B-1

ent since a lot of people aren't aware of the date. It's been [Aug.] 15th forever," said Huntingtown head volleyball coach Shari Turner, whose program has been the Class 3A state runner-up the last three years. "We lose a whole day [of practice this year under the new bylaw versus the former schedule], and I don't like that too much. You start and you have to stop, because you're not allowed to practice on Sunday."

She added: "I'm sure the reason was pure [in passing the new bylaw], because the 15th can fall on whatever day of the week. But it just made sense to me to keep the same date [of Aug. 15]. I guess I'm just not a fan to start on a Saturday, then have nothing on Sunday, then restart on Monday. You lose some connectivity with starting practice. It seems like you have two starting dates to preseason practices."

Other modifications to the Southern Maryland athletic landscape this fall are the brand new varsity life of St. Mary's Ryken football and Waldorf's Potomac Ridge Golf Course getting selected as the site for this year's state golf tournament on Oct. 21-23. University of Maryland's greens in College Park, the usual location for the state gathering, is closed for a year beginning July 1 for course upgrades.

> "We don't know what to expect since we've never played varsity football before. Our whole community is very excited about this."
>
> **Michael Vosburgh, St. Mary's Ryken athletic director**

Ryken's first-year program, which began two seasons ago as a freshman unit, hits the practice fields beginning today to prepare for its inaugural gridiron varsity season.

"There is a lot of buildup, our kids are really excited," Ryken athletic director Mike Vosburgh said. "We don't know what to expect since we've never played varsity football before. Our whole community is very excited about this."

Last year, Ryken's junior varsity team went 6-3.

The varsity schedule includes four Washington Catholic Athletic Conference opponents and six outside Ryken's league.

The selection of Potomac Ridge for the state gathering could have positive ramifications locally, because it is the home course of Westlake. And many other SMAC teams — which perennially feature state contender La Plata — are also familiar with the course.

"I think any time a state championship is held at a home course, there are benefits [for the home team]," Zaccarelli said. "Just like the cross county [state meet at Hereford High School] is an advantage for Hereford, its works the same way for golf. But there are only two sports that have a home course for a state championship."

Westlake is not projected as a state contender this year.

Zaccarelli noted that football — especially at the junior varsity and freshman levels — will be impacted from the change in the preseason start-up date to the fall. The first available regular season play date is 20 days from the first day of practice, falling on Sept. 5 this year.

Usually junior varsity and freshman games are played on Thursdays during the season, but the first Thursday in September will not be 20 days from the Aug. 16 first practice date. So the junior varsity and freshman games will be moved to Saturday in Week 1 and then resume their Thursday-heavy schedule from there.

Football teams are only allowed to play one game per week, unless approved for exceptional circumstances, but Zaccarelli said five days between games is satisfactory. There is another Saturday game for junior varsity and freshman teams scheduled during the season for schools within the SMAC.

"Teachers report on Aug. 18 this year, and usually they don't report until after two or three days of two-a-days [practices]," Zaccarelli said. "The [new preseason startup] could bump everything back — that's kind of the weakness of the whole thing. Other than that, it makes sense."

dcogle@somdnews.com

Hut-1, hut-2 ..... Hike!

■ Ryken snaps ball on n varsity football program

By DALLAS COGLE
Staff writer

The entrance into a new arena of athletic competition for St. Mary's Ryken is now here.

The Leonardtown Catholic school launches its brand new varsity football program today with preseason practices unfolding, as the Knights build toward their groundbreaking opening game on Aug. 29 at Annapolis Area Christian School.

All 10 of Ryken's varsity games will be played on the road during this inaugural football season. The school does not break ground on a stadium until next spring and has plans for the structure to be completed by the beginning of next season.

Four of Ryken's opponents hail from the Washington Catholic Athletic Conference, while the six others are Christian and private schools at a similar level of competitiveness. Last year at the junior varsity level, Ryken went 6-3 to provide plenty of momentum heading into its first foray in the varsity ranks.

"Our JV team was very good, and the kids realized they can play football," Ryken athletic director Mike Vosburgh said. "We've scheduled four WCAC teams and six outside the conference, so we're hoping to be very competitive."

Vosburgh added that he believed Annapolis Area Christian was only in its second year as a varsity outfit.

Just two years ago when Ryken began its football existence at the freshman level, it captured just one win. So there was great improvement last year given the junior varsity's success.

"There were a lot of l had never played foot years ago until their fr year," Vosburgh said. hungry to play football.

Ryken also fielded man team last year, but have one this season wi sity and junior varsity sy the works.

Vosburgh did state th very good possibility" o the freshman level bac mix down the road.

About 110 players are ed at today's preseason and Vosburgh expects th ty and junior varsity t equally share the turnc about 55 at each level.

"This is going to be tion year — it's Year 3 o year plan for us to be c tive," Vosburgh said abc the varsity program i groomed along. "Anyti start a program, it's take some time. That's have a five-year pro building, of being very itive in WCAC.

"This is our first year ing real football at a hi Realistically, we know th happen overnight. It's a

Bob Harmon, who the freshman team tw ago and was at the junior varsity last sea Ryken's head coach in th ty world. Ray Terrell, a tant to Harmon the years, is the junior varsi man at Ryken.

Ryken's junior varsi will have six home among its nine-game sc hosting visitors at La Park.

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Outdoors

Continued from Page B-1

helper on board) to cut up the fish you caught (they'll be now in your cooler where the sandwiches and drinks used to be) into boneless and skinless filets.

Those empty-zippered plastic bags you brought along are for these fish filets.

Tip the mate generously for this service … it's well worth it.

Also, if you're a true novice at fishing, when you do go aboard, it will only take the mate about five seconds to realize this little fact. You likely won't even know the evaluation has happened, and you probably won't have to say a word to get this perception across.

Just smile nicely and maybe say, "I'll take any help you're willing to give me," and you'll probably make a quick friend for the honesty plus get some real assistance throughout the day on your trip.

For example, I'll bet when you catch that first fish, the mate will likely be at your side before you even get your little trophy out of the water, and will help you take it off the hook and throw it into the cooler. It really is going to be that easy.

Before you drop your line overboard, spend that first minute after the captain yells, "Lines in" watching everyone else. You'll quickly see how easy it is. Imitate, exactly, what everyone else is doing.

Then, when you finally get those fresh fish filets back home, get out a couple of bowls like you'd put cereal in. Crack a few eggs into one (no shells), seasoned flour goes in another and some crushed up bread crumbs are put in the third. Dunk the filets individually in the flour (get both sides good and white), then give them an egg wash and the bread crumbs all ov next.

Into the pan they the (spray in some Pam firs them nicely, flip just on don't overdo the cookin you'll quickly have a me for a king of the creek li self.

You'll also, very likely to go out and do this all again real soon.

And, the big bonus, time out you'll be a seas headboat pro.

I'm serious. That's all to it, and a headboat ex ence is absolutely and p ly the very best way to s fishing and find out hov you're going to like it.

I'm guessing, you're relish this experience a

Another headboat I'd recommend is the "Bay over in Ocean City. If yo there for a family holida time soon, this is a grea spend a few hours.

This particular vesse two trips every day (mo and afternoon) and the only $28 for adults for a day out on the water. It moored at the O.C. Fish Center, and that place i ed right along the ocear southern end of Maryla vacation capital.

Trust me. Taking a he the first time fishing is g and sound advice. Nex Wednesday, I'll pass alo some other pointers an you want to take this up notch as Emeril would the next level.

Good luck.

If you do try it, don't to e-mail me afterward me know how it went. I would love to read your about it. If I get any real ones, I might even pass along to everyone. Of c I'll be sure to get your p sion to do that first.

zbasser@aol.com

THE DEPARTMENT OF THE NAVY INVITES PUBLIC COMMENT ON PROPOSED REMEDIAL ACTION PLANS FOR THREE SITES UNDER THE INSTALLATION RESTORATION PROGRAM NAVAL AIR STATION PATUXENT RIVER, MARYLAND

In accordance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Naval Air Station (NAS) Patuxent River invites public comment on the Proposed Remedial Action Plans (PRAPs) for the following three Installation Restoration (IR) Program sites:

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Soper

Continued from Page B-1

Taylor, a rising senior. "I'm definitely excited."

"He's really good," said teammate Kelly Kady, also a rising senior. "I'm excited to play for him."

Former Calvert varsity girls coach Doug Jones, who had Soper as an assistant for a year, agreed.

"They're getting a fabulous coach," he said. "This is one very skilled person. He's very knowledgeable coach. Not only is he a very fine player but he has a lot of soccer smarts. He knows the game and he can teach the game. He's going to have a very formidable program."

Soper graduated from Thomas Stone High School in 1982 where he was a three-year starter on the varsity team. During his tenure, the Cougars won the SMAC championship twice and were crowned Class 3A South regional champions three times. After a year at Charles County Community College, now called College of Southern Maryland today, Soper transferred to Salisbury University where he played back/sweep for three years.

He graduated in 1987 with a degree in liberal studies and entered the Army. He stayed there for his four-year stint and saw action during Operation Desert Storm.

He currently works at the Census Bureau and has two children; Mitchell and Lauren, a rising sophomore at Huntingtown.

He was an assistant coach with the Thomas Stone boys soccer team for a year and was Jones' assistant at Calvert for another season. He's been an assistant at Huntingtown the previous two years.

"It was huge, because I had the opportunity to be very much involved but at the same time, I could sit back and do some assessing," Soper said of his two-year stint with the Hurricanes. "I could determine where I think we can improve, where our weaknesses are and what areas we need to improve in and what things we can do different on the pitch tactically this year. I feel like I established a real good rapport."

Soper said he learned plenty from Hobson.

"Obviously Gina has a great track record and one of the great things about working with her is that I learned a lot," he said. "I feel comfortable going in and doing X's and O's and running [practice] sessions but [now I also] know how to deal with 18 or 20 high school teenagers. She taught me tolerance and patience. Just that one season I learned a lot from her."

Kady and Taylor agree that adjusting to a new coach for their senior campaigns would have been more difficult had Soper not been with the team.

"I think it would have been more frustrating if it was somebody that didn't know the program as well," Kady said. "But the fact he was on the staff before makes it an easier transition."

"It is tough, but since he was there last year, we all got to know him pretty well," Taylor said. "We know what he expects of us so it won't be too much of a difference."

What Soper expects is hard work, and plenty of it. He said there will be no long discussions to open or close practice and no standing still. He said he'll carry a three-hour practice plan for a 120-minute session.

"I'm a little demanding, [because] I have expectations," he said. "I wouldn't say I'm a huge disciplinarian, but I do expect discipline and I expect effort. Give me effort and everything will take care of itself. When we practice, we're not standing around for two hours; they're going to work for two hours. Practice time is valuable, because you don't have a whole lot of time; you really don't. We don't have a real big window, so you need to be effi what you have."

"Oh my gosh, ye said when asked if So ers will work hard. " to have one very tigh They will work, that's statement. They defi work."

But Kady and Tayl with that.

"Yeah, I know [th work hard], but I think we need to w Taylor said. "If we wa states and hopefully what we're going to h so I'm ready."

"Our fitness level v ter and our team bo be a lot better than year," Kady said. "Th thing we lacked ar need. It's all about the

Soper said his ex on the eve of the seas slate full of marquee g as high as his practice

"My approach is to game," he said. "It sou gant and I don't m sound arrogant, bu game-by-game situa play every game to game. My goal is to games in November, v it all, because if you games in Novembe won states."

mreid@somdnews.com

Looking for a few good leaders

New Huntingtown girls soccer coach Rob Soper said the key to the 2008 season will be getting much-needed leadership from his senior-laden team

"There was a lot of talk last year, but I never really felt we walked the walk. When you go back and look at the four games we lost last year, once we got down by a goal we never came back and won a game. And to me, that's a sign of leadership and gutting it out and someone putting the team on their back and carrying them. We have a lot of strong players; they just don't necessarily fit the leadership role and that's OK because you need good followers as well. But we need some good leaders on the field. We need to do it with our actions versus just talking about how we're going to do it. That's the big theme I'm going to carry this year."

MICHAEL REID

"They're getting a fabulous coach."

"This is one very skilled person. He's very knowledgeable coach. Not only is he a very fine player but he has a lot of soccer smarts. He knows the game and he can teach the game. He's going to have a very formidable program."

Doug Jones, former Calvert girls soccer coach , on new Huntingtown girls socecr coach Rob Soper

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Subm

Riptide too strong for diamond f

The Northern Calvert Riptide, a girls 12-U fastpitch softba concluded the 2008 Calvert County Little League softball with a win at the five-team Northern Calvert Shootout leagu pionship tournament.

The Riptide, which finished 11-5 on the season, was also c co-champions of the "Super Six" Calvert County Championsh nament, which was sponsored by 5 Star Athletics.

Northern Calvert, which was sponsored by J&R Business C also placed second in the season-ending Maryland District 7 peake Conference's "Battle by the Bay" championship game Dunkirk District Park.

In the front row, from left, are Kaitlyn Hynes, Katie Kampse nah Peters, Erika Jaensch, Karly Klem and Diamond Rodgers back row are Madison Marinaccio, left, Gillian Krautman, Juli Kayley Powell, Megan Howell and Coach Steve Marinaccio. tured are assistant coaches Chris Kampsen and Mike Klem.

Tim O'Brien Senior Men's Golf League

The following are the second half standings for the Tim O'Brien Senior Men's Golf League, which plays Tuesday through Thursdays at the Chesapeake Hills Golf Club in Lusby.

Standings are as of Aug. 1

Tuesday

Flight 1: Rick Varley 44, Charles Knapper 40, Jack Van Wie 35, Tony Luvara 34, John Benish 33, Len Addiss 32, Rob Benson 27, Cary Gradle 25

Flight 2: Barney Hathaway 46, Kermit Dyke 42, Roland Smith 40, Bill Foley 37, Dave Underwood 36, Brian Stevens 36, William King 27, John Manessa 23, Larry Glaubitz 19, Charles Craft 18

Flight 3: Don Kirby 41, Allen Brown 40, Harold Aurand 36, Jesse Blake 35, Tom Schwartz 35, Dick Patterson 29, George Wilson 29, Steve Sadler 25

Flight 4: Willie Ouellette 26, Tim Hale 14, Jim D'Amico 13

Flight 5: Nick Vagianos 42, Ted Kolowski 41, Bob Remmel 33, Emmett Early 26, Don Plastow 24, Jim Moore 9

Wednesday

Flight 1: Larry Smialek 41, nagle 40, Bob Litz 37, Gary 36, Jim Hutcheson 35.5, Joh 31, Dave Laigle 23.5

Flight 2: Ron Swingler 40.5 Lawyer 37, Frank McCabe 3 Rodgers 32, Ron Fields 28, 26.5,

Flight 3: Bill Lambart 44, J ry 44, Bob Bombard 37, Do Roger Snead 34, Herbert Sa Ben Bowie 23, Zane Mason Polak 16

Flight 4: Clark Bennett 46, ston 36, Ian Sommerville 3 ton 22, Riley Harrison 6

Thursday

Flight 1: Charles Knapper son 44, Tony Luvara 43, Joh Barney Hathaway 31

Flight 2: Bill Foley 43, Fran Larry Glaubitz 38, George W Dodson 33, Harold Aurand

Flight 3: Jim D'Amico 46, 42, Tim Hale 38, Jim Rank 3 Early 32

Correction

The following athletes should have been added to the Patuxent all-a team, which appeared in the Aug. 1 edition of The Calvert Recorder.

First team

Nicholas Mosquera, freshman - tennis; Lauren Nicole Trollinger, fresh tennis

Second team

Andrew Ragusa, junior – soccer, lacrosse; Chris Ly, senior – tennis

Appendix C
ARAR Tables

TABLE C-1
Chemical-Specific ARARs
Site 11 OU-2 Record of Decision
NAS Patuxent River
St. Mary's County, Maryland

Regulatory Authority	Chemical Medium	Requirement	Status	Requirement Synopsis	Consideration in the Remedial Response Process
Federal	Groundwater	Safe Drinking Water Act, National Primary Drinking Water Regulations, MCLs: Benzene - 40 CFR 141.61(a)(2); Bis(2 ethylhexyl)phthalate - 40 CFR 141.61(c)(22); Thallium - 40 CFR 141.62(b)(15)	Applicable	The National Primary Drinking Water Regulations establish MCLs for common organic and inorganic contaminants. MCLs specify the maximum permissible concentrations of contaminants in public drinking water supplies. MCLs are federally enforceable standards based in part on the availability and cost of treatment techniques.	Monitoring will be performed to measure changes in contaminant concentrations or migration. MCLs will be achieved at the point of compliance (i.e., downgradient monitoring wells within the OU-2 boundary) through natural attenuation processes.

ARAR = Applicable or relevant and appropriate requirement
MCLs = Maximum Contaminant Levels
CFR = Code of Federal Regulations

TABLE C-2
Location-Specific ARARs
Site 11 OU-2 Record of Decision
NAS Patuxent River
St. Mary's County, Maryland

Regulatory Authority	Chemical Medium	Requirement	Status	Requirement Synopsis	Consideration in the Remedial Response Process
There are no location-specific ARARs for Site 11 OU-2.					

ARAR = Applicable or relevant and appropriate requirement

TABLE C-3
Action-Specific ARARs
Site 11 OU-2 Record of Decision
NAS Patuxent River
St. Mary's County, Maryland

Regulatory Authority	Chemical Medium	Requirement	Status	Requirement Synopsis	Consideration in the Remedial Response Process
State	Solid Waste (landfill material)	COMAR 26.04.07.22	Applicable	The regulations include landfill post-closure monitoring and maintenance requirements.	Monitoring and maintenance will meet post-closure requirements.
State	Groundwater	COMAR 26.04.04.02, 26.04.04.05(B), 26.04.04.07, 26.04.04.08, 26.04.04.10, 26.04.04.11	Applicable	To ensure a clean and adequate supply of underground drinking water, the State carries out programs to prevent contamination of aquifers from improper well construction, maintenance, and well abandonment.	The groundwater monitoring program for Site 11 OU-2 includes sampling existing monitoring wells both upgradient and downgradient of the former landfills. Groundwater sampling at Site 11 OU-2 will include procedures, guidelines, and techniques for proper sample collection, preservation, shipment, analytical procedures, chain-of-custody, quality assurance and quality controls.
State	Groundwater	COMAR 26.13.01.03, 26.13.03.02, and 26.13.03.05E	Applicable	These regulations contain standards and procedures for the identification, listing, transportation, treatment, storage, and disposal of hazardous wastes. Establishes specific analytical requirements for testing and evaluating solid, hazardous, and water wastes.	Groundwater sampling will be conducted at Site 11 OU-2 monitoring wells. Based on years of quarterly groundwater sampling data, investigative derived waste (IDW) is not expected to be hazardous. If hazardous, storage of the IDW will not exceed 90 days, and the IDW will be disposed off-site in accordance with appropriate waste disposal requirements.

ARAR = Applicable or relevant and appropriate requirement
COMAR = Code of Maryland Regulations
IDW = investigation-derived waste

Appendix D
Cost Estimate

Appendix D
Remedial Alternatives Cost Summary*
Site 11 OU-2 Feasibility Study
NAS Patuxent River, Maryland

	Remedial Alternatives	Construction Time (weeks)	Operation Time (years)	2008 Capital Cost**	2008 Lifetime O&M**	Lifetime Present Worth O&M	Total Present Worth
OU-2: Surface Water, Sediment, and Groundwater							
1	No Action	NA	30	$ -	$ -	$ -	**$ -**
2	LUCs	NA	30	$ 7,500	$ 90,000	$ 38,400	**$ 45,900**
						Cost Accuracy Range	$32,100 to $68,900
3	LUCs and Long Term Monitoring	NA	30	$ 20,500	$ 841,000	$ 401,000	**$ 421,500**
						Cost Accuracy Range	$281,300 to $632,300

Notes:

All costs are roundup by 2 significant digits

Cost accuracy ranges from **-30% to +50%.**

REMEDIAL ALTERNATIVE 2 Appendix D	LOCATION: Site 11 OU-2, Former and Current Landfill NAS Patuxent River, Maryland	MEDIA: Surface Water, Sediment, and Groundwater	Construction time: weeks Operation time: 30 years Post Remediation Monitoring: Included in the groundwater monitoring component

Cost Component	Qty	Unit	Cost Source/Assumptions	Estimated Activity Duration (day)	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Material Unit Cost	Material Total Cost	Subcontractor	Total Cost
DESCRIPTION OF ALTERNATIVE:												
Revise LUC to include OU-2 media and five-year reviews for 30 years												
ASSUMPTIONS:												
Cost Component	**Qty**	**Unit**	**Cost Source/Assumptions**	**Estimated Activity Duration (day)**	**Labor Unit Cost**	**Labor Total Cost**	**Equipment Unit Cost**	**Equipment Total Cost**	**Material Unit Cost**	**Material Total Cost**	**Subcontractor**	**Total Cost**
CAPITAL COSTS												
Institutional Controls/Planning												**$7,500.00**
Site-Specific LUC	1	lump sum	Allowance		$7,500.00	$7,500.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,500.00
2008 SUBTOTAL CAPITAL COST						**$7,500.00**		**$0.00**		**$0.00**	**$0.00**	**$7,500.00**
TOTAL CAPITAL COST												**$7,500.00**
OPERATION & MAINTENANCE AND PERIODIC ACTIVITIES - PER EVENT COST												
Five-Year Review												**$10,000.00**
Report - Engineer	1	lump sum	Professional Judgment		$10,000.00	$10,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$10,000.00
Site Closure												**$15,000.00**
Report development	1	lump sum	Allowance		$15,000.00	$15,000.00	$0.00		$0.00	$0.00	$0.00	$15,000.00
TOTAL CAPITAL COST												**$25,000.00**

REMEDIAL ALTERNATIVE 2
Appendix D

Location:	Site 11 OU-2, Former and Current Landfill, NAS Patuxent River, Maryland	Construction time:	0 weeks
Media:	Surface Water, Sediment, and Groundwater	Operation time:	30 years
		Discount Rate:	5.2%
		O&M Contingency:	20%

Year	Real Cost Incurred	Cost Description	Cost Type	Discount Factor	Present Worth
0	$7,500	Revise LUC Implementation Plan to include OU-2 media	Capital	1.00	$7,500
1	$0			1.05	$0
2	$0			1.11	$0
3	$0			1.16	$0
4	$0			1.22	$0
5	$10,000	5-Yr Data Report	Periodic	1.29	$7,761
6	$0			1.36	$0
7	$0			1.43	$0
8	$0			1.50	$0
9	$0			1.58	$0
10	$10,000	5-Yr Data Report	Periodic	1.66	$6,023
11	$0			1.75	$0
12	$0			1.84	$0
13	$0			1.93	$0
14	$0			2.03	$0
15	$10,000	5-Yr Data Report	Periodic	2.14	$4,675
16	$0			2.25	$0
17	$0			2.37	$0
18	$0			2.49	$0
19	$0			2.62	$0
20	$10,000	5-Yr Data Report	Periodic	2.76	$3,628
21	$0			2.90	$0
22	$0			3.05	$0
23	$0			3.21	$0
24	$0			3.38	$0
25	$10,000	5-Yr Data Report	Periodic	3.55	$2,816
26	$0			3.74	$0
27	$0			3.93	$0
28	$0			4.13	$0
29	$0			4.35	$0

REMEDIAL ALTERNATIVE 2
Appendix D

Location:	Site 11 OU-2, Former and Current Landfill, NAS Patuxent River, Maryland	Construction time:	0 weeks
Media:	Surface Water, Sediment, and Groundwater	Operation time:	30 years
		Discount Rate:	5.2%
		O&M Contingency:	20%

Year	Real Cost Incurred	Cost Description	Cost Type	Discount Factor	Present Worth
30	$25,000	5-Yr Data Report and Closure Report	Periodic, Site Closure	3.55	$7,040
CAPITAL COST	**$7,500**				
2007 Dollar LIFETIME O&M	**$90,000**		**Lifetime Present Worth O&M**		**$38,331**
TOTAL IMPLEMENTATION COST	**$97,500**		**TOTAL PRESENT WORTH**		**$45,831**

REMEDIAL ALTERNATIVE 3

Appendix D

SOIL REMEDIAL ALTERNATIVE 3 LUCs with LTM	LOCATION: Site 11 OU-2, Former and Current Landfill NAS Patuxent River, Maryland	MEDIA: Surface Water, Sediment, and Groundwater	Construction time: weeks Operation time: 30 Post Remediation Monitoring: none

DESCRIPTION OF ALTERNATIVE:

Revise LUC to include OU-2 media, long-term monitoring, and five-year reviews for 30 years.

ASSUMPTIONS:

Cost Component	Qty	Unit	Cost Source	Estimated Activity Duration (day)	Labor Unit Cost	Labor Total Cost	Equipment Unit Cost	Equipment Total Cost	Material Unit Cost	Material Total Cost	Subcontractor	Total Cost
CAPITAL COSTS												
Institutional Controls/Planning												**$7,500.00**
Site-Specific LUC	1	lump sum	Allowance		$7,500.00	$7,500.00	$0.00	$0.00	$0.00	$0.00	$0.00	$7,500.00
Permitting, Planning, and Reporting												**$13,000.00**
Health and Safety Plan	1	lump sum	Professional Judgment		$3,000.00	$3,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,000.00
UFP SAP and DQOs	1	lump sum	Professional Judgment		$10,000.00	$10,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$10,000.00
Subcontracting	1	lump sum	Professional Judgment		$1,500.00	$1,500.00	$0.00	$0.00	$0.00	$0.00	$0.00	
2008 SUBTOTAL CAPITAL COST						**$20,500.00**		**$0.00**		**$0.00**	**$0.00**	**$20,500.00**
TOTAL CAPITAL COST												**$20,500.00**
OPERATION & MAINTENANCE AND PERIODIC ACTIVITIES - PER EVENT COST												
15-month Groundwater Sampling and Analysis (for 3 wells only)												**$19,118.00**
15-Month Sample Collection												**$3,814.00**
Project Management	4	hrs	Professional Judgment		$80.00	$320.00	$0.00	$0.00	$0.00	$0.00	$0.00	$320.00
Sample collection - 2 crew,14 hrs (4 hrs prep), 1 days	28	hrs	Professional Judgment		$80.00	$2,240.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,240.00
Per Diem (2 person crew)	2	day	Professional Judgment		$0.00	$0.00	$0.00	$0.00	$127.00	$254.00	$0.00	$254.00
Consumables	1	day	Professional Judgment		$0.00	$0.00	$0.00	$0.00	$200.00	$200.00	$0.00	$200.00
Equipment Rental	1	day	Professional Judgment		$0.00	$0.00	$800.00	$800.00	$0.00	$0.00	$0.00	$800.00
15 Month Lab Analysis (30% QA/QC)												**$10,938.00**
TCL Volatiles by CLP SOM01.2	7	samples	BOA Rates		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,352.00	$2,352.00
TCL Semivolatiles by CLP SOM01.2	6	samples	BOA Rates		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,708.00	$3,708.00
TAL Metals and Cyanide (total) by CLP ILM05.	6	samples	BOA Rates		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,646.00	$2,646.00
TAL Metals (dissolved) by CLP ILM05.3	6	samples	BOA Rates		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,232.00	$2,232.00
Data Management/Validation	12	hrs	Professional Judgment		$50.00	$600.00	$0.00	$0.00	$0.00	$0.00	$1,266.00	**$1,866.00**
Reporting	50	hrs	Professional Judgment		$50.00	$2,500.00	$0.00	$0.00	$0.00	$0.00	$0.00	**$2,500.00**
Comprehensive Groundwater Sampling and Analysis (Every Five Year)												**$44,446.00**
Comprehensive Sample Collection												**$16,190.00**
Project Managemeent	12	hrs	Professional Judgment		$80.00	$960.00	$0.00	$0.00	$0.00	$0.00	$0.00	$960.00
Sample collection - 2 crew, 10 hrs/day, 1 wk, 6 hrs Prep/ea	112	hrs	Professional Judgment		$80.00	$8,960.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8,960.00
Per Diem per event (2 person crew)	10	day	Professional Judgment		$0.00	$0.00	$0.00	$0.00	$127.00	$1,270.00	$0.00	$1,270.00

SOIL REMEDIAL ALTERNATIVE 3 LUCs with LTM		LOCATION: Site 11 OU-2, Former and Current Landfill NAS Patuxent River, Maryland			MEDIA: Surface Water, Sediment, and Groundwater		Construction time: weeks Operation time: 30 Post Remediation Monitoring: none					
Consumables	5	day	Professional Judgment		$0.00	$0.00	$0.00	$0.00	$200.00	$1,000.00	$0.00	$1,000.00
Equipment Rental per event	5	day	Professional Judgment		$0.00	$0.00	$800.00	$4,000.00	$0.00	$0.00	$0.00	$4,000.00
Comprehensive Lab Analysis (30% QA/QC), All wells (20 wells)												**$20,446.00**
TCL Volatiles by CLP SOM01.2	33	samples	BOA Rates		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,696.00	$3,696.00
TCL Semivolatiles by CLP SOM01.2	25	samples	BOA Rates		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,150.00	$5,150.00
TAL Metals and Cyanide (total) by CLP ILM05.	25	samples	BOA Rates		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,675.00	$3,675.00
TAL Metals (dissolved) by CLP ILM05.3	25	samples	BOA Rates		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,100.00	$3,100.00
TCL Pesticides/PCBs by CLP SOM01.2	25	samples	BOA Rates		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,825.00	$4,825.00
Data Management/Validation - 1 Comp Event	24	hrs	Professional Judgment		$50.00	$1,200.00	$0.00	$0.00	$0.00	$0.00	$2,610.00	$3,810.00
Report - 1 Comp Event	80	hrs	Professional Judgment		$50.00	$4,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,000.00
UFP-SAP Update												**$2,500.00**
Five-year updates	1	lump sum	Professional Judgment		$2,500.00	$2,500.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,500.00
Five-Year Review												**$10,000.00**
Report - Engineer	1	lump sum	Professional Judgment		$10,000.00	$10,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$10,000.00
Site Closure												**$15,000.00**
Report development	1	lump sum	Allowance		$15,000.00	$15,000.00	$0.00		$0.00	$0.00	$0.00	$15,000.00
TOTAL O&M and LTM COST												**$88,564.00**

REMEDIAL ALTERNATIVE 3 - LUCs with LTM
Appendix D

Location:	Site 11 OU-2, Former and Current Landfill, NAS Patuxent River, Maryland	Construction time:	0 weeks
Media:	Surface Water, Sediment, and Groundwater	Operation time:	30 years
		Discount Rate:	5.2%
		O&M Contingency:	20%

Year	Real Cost Incurred	Cost Description	Cost Type	Discount Factor	Present Worth
0	$20,500	Cost associated with LUCs and planning	Capital	1.00	$20,500
1	$0			1.05	$0
2	$19,118	15 month groundwater sampling event	LTM	1.11	$17,275
3	$19,118	30 month groundwatersampling event	LTM	1.16	$16,421
4	$19,118	45 month groundwater sampling event	LTM	1.22	$15,609
5	$56,946	Comprehensive GW sampling and 5-yr data review	LTM, Periodic	1.29	$44,196
6	$0			1.36	$0
7	$19,118	15 month groundwater sampling event	LTM	1.43	$13,407
8	$19,118	30 month groundwatersampling event	LTM	1.50	$12,744
9	$19,118	45 month groundwater sampling event	LTM	1.58	$12,114
10	$56,946	Comprehensive GW sampling and 5-yr data review	LTM, Periodic	1.66	$34,301
11	$0			1.75	$0
12	$19,118	15 month groundwater sampling event	LTM	1.84	$10,405
13	$19,118	30 month groundwatersampling event	LTM	1.93	$9,891
14	$19,118	45 month groundwater sampling event	LTM	2.03	$9,402
15	$56,946	Comprehensive GW sampling and 5-yr data review	LTM, Periodic	2.14	$26,621
16	$0			2.25	$0
17	$19,118	15 month groundwater sampling event	LTM	2.37	$8,076
18	$19,118	30 month groundwatersampling event	LTM	2.49	$7,676
19	$19,118	45 month groundwater sampling event	LTM	2.62	$7,297
20	$56,946	Comprehensive GW sampling and 5-yr data review	LTM, Periodic	2.76	$20,661
21	$0			2.90	$0
22	$19,118	15 month groundwater sampling event	LTM	3.05	$6,268
23	$19,118	30 month groundwatersampling event	LTM	3.21	$5,958
24	$19,118	45 month groundwater sampling event	LTM	3.38	$5,663
25	$56,946	Comprehensive GW sampling and 5-yr data review	LTM, Periodic	3.55	$16,035
26	$0			3.74	$0
27	$19,118	15 month groundwater sampling event	LTM	3.93	$4,864
28	$19,118	30 month groundwatersampling event	LTM	4.13	$4,624
29	$19,118	45 month groundwater sampling event	LTM	4.35	$4,395
30	$71,946	Comprehensive GW sampling and 5-yr data review; site closure report	LTM, Periodic, Site Closure	3.55	$20,259
CAPITAL COST	**$20,500**				
2007 Dollar LIFETIME O&M	**$840,960**		**Lifetime Present Worth O&M**		**$400,995**
TOTAL IMPLEMENTATION COST	**$861,460**		**TOTAL PRESENT WORTH**		**$421,495**