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FINAL FIVE YEAR REVIEW REPORT SITE 12 AND SITE 42 SNWC INDIAN HEAD MD

(PUBLIC DOCUMENT)

8/1/2007

JM WALLER ASSOCIATES INC.

Final Five-Year Review Report

for

Site 12 - Town Gut Landfill and Site 42 - Olsen Road Landfill

Naval Support Facility – Indian Head Indian Head, Maryland

NAVFAC Washington

Contract Number N62477-03-D-0163

Contract Task Order 0012

August 2007

Final Five-Year Review

For

Site 12 - Town Gut Landfill and
Site 42 - Olsen Road Landfill

Naval Support Facility – Indian Head
Indian Head, Maryland

Submitted to:
Naval Facilities Engineering Command
1314 Harwood St., S.E.
Washington Navy Yard, D.C. 20374-5018

Submitted by:
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CONTRACT NUMBER N62477-03-D-0163
DELIVERY ORDER 0012

August 2007

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LIST OF ACRONYMS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Chemical of Concern
COMAR	Code of Maryland Regulations
COPC	Chemical of Potential Concern
DCE	cis-1,2-dichloroethene
EPA	US Environmental Protection Agency
FS	Feasibility Study
GIS	Geographical Information System
HSL	Hazard Substance List
IC	Institutional Controls
IHIRT	Indian Head Installation Restoration Team
IR	Installation Restoration
JMWA	J.M. Waller Associates, Inc.
LUC	Land Use Controls
MCL	Maximum Contaminant Level
MDE	Maryland Department of the Environment
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEESA	Naval Energy and Environmental Support Activity
NPL	National Priorities List
NSF-IH	Naval Support Facility, Indian Head
O&M	Operation and Maintenance
PA	Preliminary Assessment
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
RA	Remedial Action
RAB	Restoration Advisory Board
RAO	Remedial Action Objectives
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SI	Site Inspection
SVOC	Semi Volatile Organic Compound
TCE	Trichloroethene
TIE	Toxicity Identification Evaluation
TtNUS	Tetra Tech NUS, Inc.
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compound
VC	Vinyl chloride
µg/kg	microgram per kilogram
µg/L	microgram per liter

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Navy Five-Year Review Signature Cover
Key Review Information

Site Identification		
Site Name: IR Site 12 - Town Gut Landfill & IR Site 42 - Olsen Road Landfill		EPA ID: MD7170024684
Region: 3	State: MD	City/County: Indian Head/Charles County

Site Status	
NPL Status: Listed	
Remediation Status: Complete	
Multiple Operable Units (highlight): Y **N**	Number of Sites/OUs: 2/NA
Construction Completion Date: July 2006	
Fund/PRP/Federal Facility Lead: Federal Facility	Lead Agency: Department of the Navy NAVFAC, Washington
Has site been put into reuse? (highlight): Y **N**	

Review Status		
Who conducted the review (EPA Region, State, Federal Agency): NAVFAC Washington		
Author Name: Joseph Rail	Author Title: Remedial Project Manager	
Author Affiliation: Department of the Navy, NAVFAC Washington		
Review Period: September 2002 – August 2007	Date(s) of Site Inspection: June 2, 2006	
Highlight: **Statutory** Policy	Policy Type (name): 1. Pre-SARA **Ongoing** 3. Removal Only 4. Regional Discretion	Review Number (1, 2, etc) 1
Triggering Action Event: Commencement of remediation at Site 12 – Town Gut Landfill		
Trigger Action Date: September 9, 2002		
Due Date: September 8, 2007		

This Five-Year Review applies to the final remedial actions at Site 12 - Town Gut Landfill and Site 42 - Olsen Road Landfill, at the Naval Support Facility, Indian Head.

Issues:

Site 12: Height of vegetation on cover is excessive; excessive vegetation and debris are present in some of the rip-rap lined channels; monitoring well covers need new locks.
Site 42: Heavy rainfall eroded newly vegetated areas just downgradient of the asphalt cap.

Recommendations and Required Actions:

Site 12: Vegetation on the landfill soil cover should be cut once per year; as a preventive maintenance measure, excessive vegetation and debris should be removed from the rip-rap channels; all wells should have locks replaced.
Site 42: It is recommended that temporary erosion and sediment controls be added until vegetation is established on the engineered cap system.

Protectiveness Statement(s):

The final remedies for Site 12 - Town Gut Landfill and Site 42 - Olsen Road Landfill, as described in the Record of Decision, are protective of human health and the environment. Protectiveness is achieved primarily through land use controls, which prohibit groundwater use and intrusive activities on the landfills and through operation and maintenance (O&M) inspections and engineering controls, which include signs, and a landfill cover. Evaluation of future groundwater and surface water monitoring data should be continued to ensure protectiveness.

Other Comments:

None.

Next Review:

The next Five-Year Review will be completed in 2012.

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

J.L. Smith
Captain, U.S. Navy
~~Installation~~ Commanding Officer
Naval Support Activity South Potomac

J L Smith

Date 26 July 07

EXECUTIVE SUMMARY

The final remedies for both Site 12 - Town Gut Landfill and Site 42 - Olsen Road Landfill consist of a landfill cover system, land use controls (LUCs) to prohibit the use of groundwater as a potable water supply and to prohibit any type of intrusive activity which may compromise the integrity of the cover system, and long-term groundwater and surface water monitoring. Even though the final remedies are similar, there is a significant difference between the cover systems of the two sites. The soil cover at Site 12 is not intended to prevent infiltration of precipitation into the shallow groundwater because much of the waste is already below the groundwater table. However, the engineered cap at Site 42 is designed to prevent such infiltration and reduce contact between the shallow groundwater and any remaining waste. These differences have been accounted for during the reviews of the implemented remedies. The purpose of this report is to review the efficacy of the final remedy selected for both landfills relative to the continued protection of human and environmental receptors.

The assessment of this Five-Year Review is that the final remedies for both the Town Gut Landfill and the Olsen Road Landfill are protective of human health and the environment based on prohibiting the use of groundwater as a potable water supply and prohibiting intrusive activities, which would prevent contact with solid waste material. The LUCs are primarily responsible for the protectiveness provided by the selected remedial actions. LUCs have been effective in preventing usage of groundwater as a potable water supply and have also restricted activities within the limits of the landfills that could affect the integrity of the cover systems. The landfill covers have isolated the solid waste and are expected to prevent erosion, which will result in protection of both human and environmental receptors. Operation and Maintenance (O&M) inspections, and engineering controls (signs and guide rail) are expected to maintain the integrity of the cover systems and ensure that all the components of the remedy function as intended. In addition, long-term monitoring will ensure that any site-related contaminants are not migrating beyond the site areas in unacceptable concentrations.

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1.0 INTRODUCTION

The purpose of this Five-Year Review is to determine whether the final remedies at Installation Restoration (IR) Site 12 - Town Gut Landfill and Site 42 - Olsen Road Landfill at Naval Support Facility, Indian Head (NSF-IH) in Indian Head, Maryland, are protective of human health and the environment. The methods, findings, and conclusions of the Five-Year Review are documented in this report. In addition, the report identifies issues found during the review and identifies recommendations to address them.

The Department of the Navy (Navy) is the lead agency for site activities at NSF-IH. The US Environmental Protection Agency Region 3 (EPA) and the Maryland Department of Environment (MDE) are the support agencies. Cleanup monies are provided by the Department of Defense.

The Navy prepared this Five-Year Review report pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA §121 states the following:

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

Furthermore, 40 Code of Federal Regulations (CFR) §300.430(f) (4) (ii) states:

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

JM Waller Associates, Inc. (JMWA) and Tetra Tech NUS, Inc. (TtNUS) conducted an analysis of the available information during June and July 2006 in support of the Five-Year Review in response to Delivery Order 012 under Contract Number N62477-03-D-0163. Representatives of JMWA and TtNUS conducted an inspection of Sites 12 and 42 on June 2, 2006.

This is the first Five-Year Review for the NSF-IH facility. The triggering action for this statutory review is the initiation of remedial action at NSF-IH IR Site 12 - Town Gut Landfill on September 9, 2002. A Five-Year Review is required for both Sites 12 and 42 because hazardous substances, pollutants, or contaminants remain above levels that allow for unlimited use and unrestricted exposure.

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2.0 SITE CHRONOLOGY

2.1 Site 12 – Town Gut Landfill

Between 1968 and June 1980, Site 12 was used by NSF-IH to dispose of landscaping waste, fill material, and rubble. Reportedly, material from outside the facility was also disposed at the site until 1972 (Initial Assessment Study (IAS), Fred C. Hart Associates, Inc., 1983). Unauthorized dumping of trash may also have occurred. Some of the unauthorized items reportedly disposed at Site 12 included paint, varnish, and other chemical waste.

An IAS was conducted in 1982, when a leachate sample was collected by Naval Energy and Environmental Support Activity (NEESA) (Hart, 1983).

A Confirmation Study was conducted in 1985 when surface water and sediment samples were collected from the edge of the landfill (CH2M Hill, 1985).

NSF-IH was placed on the National Priorities List (NPL) in September 1995.

A remedial investigation (RI) was initiated at Site 12 in 1997. The investigation included a geophysical investigation, installation of soil borings and shallow groundwater monitoring wells, and collection and analysis of surface soil, shallow groundwater, surface water, and sediment samples.

Additional activities were performed in 1999 to fill data gaps, which included test pit excavation and wetland delineation. The RI report was completed in July 1999.

The feasibility study (FS) and the Proposed Plan were completed in January 2001.

An Engineering Evaluation/Cost Analysis (EE/CA) and Action Memorandum for a non-time critical removal action were prepared in 2002 (Navy, 2002a and 2002b). A non-time critical removal action to remove waste and debris from the shores of the ponds was implemented. The majority of the landfilled waste remained on-site and a soil cover was installed. This action was completed in 2002.

The Record of Decision was finalized in 2004.

Groundwater sampling for long-term monitoring purposes commenced in March 2004 and continues to the present.

A chronology of events for Site 12 is presented in Table 2-1.

2.2 Site 42 – Olsen Road Landfill

Between 1982 and 1987 and during construction of Building 1866 in 1992, a 1.43-acre area near the current location of Building 1866 was used as an unauthorized disposal site for solid wastes. A preliminary assessment (PA) conducted by the NEESA prior to the construction of Building 1866 concluded that unauthorized disposal occurred at the site over a 5-year period ending in 1987. The report also noted that there was no record of hazardous waste disposal, and no such disposal was recalled by facility personnel (NEESA, 1992).

As a follow-up to the PA, a site inspection (SI) was conducted in 1991 and 1992 (E/A&H, 1992). The SI included installation of soil borings and shallow groundwater monitoring wells; a geophysical survey to define the extent of the landfill; and collection and analysis of surface soil, subsurface soil, groundwater, surface water, and sediment samples.

NSF-IH was placed on the National Priorities List (NPL) in September 1995.

A remedial investigation (RI) was initiated at Site 42 in 1997 (TtNUS, 1999). The investigation included installation of an additional shallow groundwater monitoring well and collection and analysis of surface soil, groundwater, surface water, and sediment samples.

Additional activities were performed at Site 42 in 1999 to fill data gaps as part of the feasibility study (FS) preparation process (TtNUS, 2003). Field activities included collecting and analyzing sediment samples, sediment toxicity testing, test pit excavation, and wetland delineation. Because the results from the sediment toxicity testing were inconclusive, a toxicity identification evaluation (TIE) demonstration was conducted for sediment in 2000 (SAIC, 2001).

Investigations were performed at Site 42 in 2002 and 2003 to better define the extent of the landfill and to provide additional shallow groundwater data. Activities included excavation of test pits, installation of shallow (12 to 15 feet deep) groundwater monitoring wells, and collection and analysis of soil and groundwater samples. These additional field investigations were followed by the preparation of a remedial design (RD) (TtNUS, 2005a).

The remedial action (RA) at Site 42 commenced in October 2005 and was completed in August 2006.

Groundwater and surface water sampling for long-term monitoring purposes commenced in July 2006.

No other enforcement activities, removal actions, or remediation activities have been initiated at Site 42.

A chronology of events for Site 42 is presented in Table 2-2.

TABLE 2-1

CHRONOLOGY OF SITE EVENTS
SITE 12 – TOWN GUT LANDFILL
NAVAL SUPPORT FACILITY – INDIAN HEAD

Event	Date
Unauthorized dumping at Town Gut Landfill	1968-1980
Initial Assessment Study	1983
Confirmation Study	1985
NSF-IH added to the National Priorities List (NPL)	1995
Remedial Investigation initiated	1997
Additional field investigations performed and RI report prepared	1999
Feasibility Study Report and Proposed Plan published	2001
EE/CA prepared	2002
Removal Action completed	2002
Record of Decision signed	2004
Long Term Monitoring initiated	2004

TABLE 2-2

CHRONOLOGY OF SITE EVENTS
SITE 42 – OLSEN ROAD LANDFILL
NAVAL SUPPORT FACILITY – INDIAN HEAD

Event	Date
Unauthorized dumping at Olsen Road Landfill	1982-1987 and 1992
Preliminary Assessment Report published	1992
Site Inspection Report published	1992
NSF-IH added to the National Priorities List (NPL)	1995
Remedial Investigation Report published	1999
Additional field investigations performed	1999
Feasibility Study Report published	2003
Pre-design field investigations performed	2002 – 2003
Record of Decision signed	2005
Remedial Action Design published	2005
Removal Action completed	2006
Long Term Monitoring initiated	2006

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3.0 BACKGROUND

3.1 FACILITY PHYSICAL CHARACTERISTICS

NSF-IH is located in northwestern Charles County, Maryland, approximately 25 miles southwest of Washington, D.C. (Figure 3-1). The NSF-IH is a military facility consisting of the main area on the Cornwallis Neck Peninsula and the Annex on Stump Neck. The main area is bounded by the Potomac River to the northwest, west and south; Mattawoman Creek to the south and east; and the town of Indian Head to the northeast. Stump Neck Annex is located across Mattawoman Creek. Sites 12 and 42 are located in the Main area (Figure 3-2).

Prior to implementation of the remedial designs, precipitation at both sites infiltrated the soil column and migrated vertically downward to the shallow groundwater table where it moved under the influence of gravity and discharged to either the ponds at Site 12 or the stream at Site 42. The ponds and streams eventually convey flow from the shallow groundwater southward to Mattawoman Creek which discharges to the Potomac River. With the implementation of the remedial design, precipitation no longer infiltrates to the groundwater under the Site 42 landfill due to the presence of a geomembrane layer within the engineered cap system.

Conceptually, streams and ponds can be viewed as hydraulic boundaries where groundwater and contaminant flow paths terminate as they exit the groundwater regime and enter the surface water system. Consequently, Town Gut Landfill and Olsen Road Landfill can be viewed as isolated sources within separate groundwater discharge basins bounded by upgradient groundwater recharge areas and downgradient ponds or streams. The shallow groundwater beneath Sites 12 and 42 are restricted from potable use because Maryland regulations prohibit potable water supply wells within 100 feet of known sources of contamination (i.e., landfills). Another reason that this restriction applies to Site 12 is that the waste below Site 12 is located within the groundwater regime. The deeper aquifers are the principal source of potable water at NSF-IH.

3.1.1 Site 12 Physical Characteristics

Site 12 - Town Gut Landfill covers an area of approximately 4 acres and the site features are shown on Figure 3-3. Site 12 was estimated to contain approximately 70,000 cubic yards (CY) of mixed solid waste materials, primarily landscaping wastes, tree stumps, and construction debris. There are no buildings, structures, or other development at the site. Ground surface elevations range from approximately sea level at the ponds to 25 feet above mean sea level (msl) at the highest (northern) portion of the site. The site is bisected by Atkins Road Extension, which is oriented in a northwest-southeast direction. A pond is adjacent to the western and southern sides of the northern portion of the site. Another pond is adjacent to the western and northern sides of the southern portion of the site. The ponds are connected via a 78-inch diameter metal pipe located under Atkins Road Extension. Runoff from the site flows into these two ponds and eventually discharges to Mattawoman Creek. The water flow at the discharge (southern) end of the southernmost pond is controlled by a weir with a v-notch that inhibits

influences on the pond by tidal changes in Mattawoman Creek and helps prevent sediment from entering the creek. Wetlands are located adjacent to the ponds, particularly the area between the central and northern portions of the landfill.

Subsurface soil conditions at the site were investigated during the installation of six monitoring wells. Subsurface materials generally consist of silt, sand, and gravel fill overlying refuse material (wood, plastic, cloth, concrete, and tar shingles) mixed with silt, sand, and gravel, and interspersed with void spaces. Natural materials beneath the site consist of greenish gray silt and gravel.

The shallow groundwater beneath Site 12 occurs primarily under unconfined (water table) conditions. Shallow groundwater flows toward and into the adjacent surface water (ponds). The groundwater is primarily recharged by downward migration of precipitation through the unsaturated zone to the water table. In addition, recharge of shallow groundwater may occur along the edges of the ponds during high water conditions. While depth to the water table is generally 1 to 4 feet below ground surface over most of the site, it is greater than 10 feet in the northern portion. Groundwater from the shallow aquifer is not used as a potable water supply. Drinking water is obtained from a deeper aquifer (190 to 240 feet deep). There is no known hydrological connection or communication between the shallow water-table zone and the deeper aquifer used for drinking water.

3.1.2 Site 42 Physical Characteristics

Olsen Road Landfill comprised approximately 1.43 acres in the southwestern portion of NSF-IH. The landfill area includes a portion of the paved area south of building 1866 and the undeveloped land west, southwest, and south of Building 1866 (Figure 3-4). Between 1982 and 1987 and in 1992 during construction of Building 1866, the area was used as an unauthorized disposal site for solid wastes. Waste subsequently encountered in test pits included construction and demolition debris, cut wood logs, charred wood, metal debris, and demolished steel drums. The unauthorized disposal area was not lined, and there were no historical records of hazardous waste disposal within the limits of the landfill. Although the topography of the site has changed over time, the general direction of surface water runoff continues to be toward the unnamed stream south of the site. Three drainage channels located within and adjacent to the Olsen Road Landfill limits convey storm water runoff and steam line condensate to the unnamed stream, which conveys flow southeastward toward Industrial Wastewater Outfall 71. From this outfall, flow continues in the unnamed stream southward toward Mattawoman Creek.

Based on the results of the geophysical surveys, soil borings, and test pits, the landfill covers an area of approximately 1.43 acres. Landfilled material was encountered just below the ground surface at one location and as deep as 16 feet at another location. The FS estimated that the volume of landfilled waste is approximately 13,300 cubic yards. Following the implementation of the remedial action which included removal of some of the waste, the volume of solid waste remaining below the engineered landfill cap is estimated to be 11,120 cubic yards.

Construction of Building 1866 included the installation of a parking lot and driveway over a portion of the landfill. Under post-construction conditions, this portion of the landfill remains in place below the Building 1866 parking lot and driveway. Other physical features within the limits of the landfill include a steam line and a high pressure air line supported on concrete pedestals that penetrate the landfill. Under post-construction conditions the steam and high pressure air lines and their foundation systems remain. During implementation of the remedial design, approximately 2,530 cubic yards of waste was removed from the landfill to allow for the construction of the engineered cap system. The consolidated landfill limits were capped with a geomembrane/soil cover cap system during construction.

Due to height restrictions related to the steam and air lines and their foundation system over a portion of the landfill (approximately 0.15 acres), the soil and vegetation component of the engineered cap system was replaced with an asphalt component to allow a reduced cap thickness in the affected area. The resulting landfill cap system slopes southward toward the stream, and the channel that traverses the landfill is lined with gabion baskets. Additionally, the southern and eastern limits of the landfill cap system include a gabion basket wall to protect the cap from the erosive forces related to flow in the adjacent drainage channels and the stream. Lastly, to prevent vehicular traffic on the asphalt portion of the cap adjacent to the Building 1866 parking lot and driveway, a guide rail was installed. Although this guide rail is located with the limits of the consolidated landfill, it is located outside the limits of the newly installed geomembrane liner (within the portion of the landfill previously covered with the Building 1866 parking lot and driveway).

3.2 LAND AND RESOURCE USE

NSF-IH is located on a peninsula on the eastern bank of the Potomac River which lies within the Atlantic Coastal Plain Physiographic Province, approximately 8 to 10 miles east of the Fall Line that marks the western extent of the Physiographic Province. NSF-IH has gently rolling and undulating topography with elevation ranging from sea level to greater than 100 feet above mean sea level. The higher elevations exist in the northwestern portion of the facility. Generally, the land surface slopes to the southwest and southeast. The northwestern side of the facility, along the Potomac River, is characterized by 20- to 100-foot bluffs, and the southeastern side, along Mattawoman Creek, is more gently sloping. A composite of the geologic units underlying the Indian Head peninsula, in stratigraphically ascending order, are the Lower Cretaceous Potomac Group, the Tertiary age Aquia Formation and Park Hall Formation, and several Quaternary fluvial and estuarine deposits (McCartan, 1989).

The Town of Indian Head, located upgradient of NSF-IH, uses the Mattawoman Creek and the Potomac River for recreational purposes. The principal sources of water for domestic use within the Town of Indian Head are the Patapsco and Patuxent Formations. The aquifers are separated by the Arundel Formation confining unit (Hart, 1983). The water supply wells for the Town of Indian Head are located laterally of any potential NSF-IH discharges. There are no private or public water supply wells affected by Sites 12 or 42.

Potential future land use plans for the Site 12 and Site 42 landfills include vacant land, assembly building activities, minor construction and limited development. There are no plans for residential development of the sites. The fact that the sites have been landfilled is also a limiting factor for future development. Land Use Controls restrict the use of groundwater as a potable water supply and prevent intrusive activities on the landfill covers.

3.3 BASIS FOR REMEDIAL ACTION

The need for remedial action at the Town Gut Landfill and the Olsen Road Landfill was based on the history of site activities, the nature and extent of contamination, and human health and ecological risk assessments. The history of site activities has been discussed in the previous section and a summary of the contamination areas and risk assessment results are discussed in the following sections.

3.4 SUMMARY OF CONTAMINATION

3.4.1 Site 12 – Town Gut Landfill

Between 1968 and June 1980, Site 12 was used by NSF-IH to dispose of landscaping waste, fill material, and rubble. Reportedly, material from outside the facility was also disposed at the site until 1972. Unauthorized dumping of trash may also have occurred. Some of the unauthorized items reportedly disposed at Site 12 included paint, varnish, and other chemical waste.

Contaminants of Concern (COCs) have been identified for soil based on the analytical data, risk drivers from human health and ecological risk assessments, and exceedances of regulatory standards and criteria. The COCs for soil based on protection of human health for the hypothetical future resident are arsenic and iron. The concentrations of arsenic and iron were similar in all soil samples. Additional COCs based on protection of ecological receptors are Arochlor 1254 (a PCB), mercury and silver. Further analysis of the COCs indicated that none of the soil concentrations exceeded EPA screening levels for migration of soil contaminants to groundwater.

Shallow groundwater COCs based on unacceptable risks to human health are cis-1,2-dichloroethene, vinyl chloride, arsenic, iron, and manganese. Additional COCs for shallow groundwater based on exceedances of federal and state Maximum Contaminant Levels (MCLs), are trichloroethene and lead. Trichloroethene, vinyl chloride, arsenic, and lead are classified as carcinogens. Cis-1,2-dichloroethene, iron, and manganese are classified as non-carcinogens. VOCs are relatively mobile in the environment while metals are relatively immobile in the environment. There is no discernable plume of the organic COCs evident from the data. The organic COCs were only detected at one location (S12WP02). Additional chemicals that were detected less frequently in shallow groundwater but did not result in unacceptable risks include PAHs, pesticides, and other metals.

No Site 12-related COCs have been identified for surface water or sediment.

A summary of the COCs and their concentrations are shown on Table 3-1.

3.4.2 Site 42 Olsen Road Landfill

The Olsen Road Landfill was used for disposal of solid wastes between 1982 and 1987 and in 1992 during the construction of Building 1866. The disposal activities were unregulated and the landfill was unlined. RI/FS investigations were performed at Olsen Road Landfill from 1997 through 2003. The extent of contamination as described in the RI and FS is summarized below.

Localized areas of contamination or "hot spots" appeared to be present. The presence of these hot spots is consistent with the use of Site 42 as a landfill because materials placed in the landfill may serve as sources of contamination in the limited area surrounding the material. For example, trichloroethene (TCE) and its degradation products were detected at concentrations ranging from 9 to 5,210 micrograms per liter (µg/L) in the groundwater sample collected from monitoring well S42MW04. This suggested the presence of a TCE hot spot in the area southwest of the southeastern corner of Building 1866. In fact, a TCE hot spot was removed and verification sampling was performed during the remedial action. Chemical concentrations in groundwater were greater than chemical-specific ARARs; however, shallow groundwater beneath the site is not a current or potential source of drinking water (TtNUS, 2003).

COCs have been identified in both the groundwater beneath Site 42 and the Site 42 surface water. These COCs have been identified based on the risk drivers from the baseline human health and ecological risk assessments, and exceedances of regulatory criteria. The COCs identified for groundwater include cis-1,2-dichloroethene, TCE, vinyl chloride, bis(2-ethylhexyl)phthalate, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, and thallium. The COCs for surface water include arsenic and manganese. A summary of the COCs and their concentrations are shown on Table 3-2.

3.5 RISK ASSESSMENT SUMMARY

3.5.1 Site 12 Town Gut Landfill

The human health risk assessment (HHRA) was performed to characterize the potential risks to people from site-related contaminants. The primary focus of this summary is on those exposure pathways and chemicals found to pose actual or potential threats to human health. COCs are those chemicals that are identified as a potential threat to human health or the environment and are evaluated further in the baseline risk assessment.

- Based on unacceptable risks to human health, the soil COCs are arsenic and iron. Each of these metals was detected in all soil samples collected at the site.

- Based on unacceptable risks to human health, the shallow groundwater COCs are cis-1,2-dichloroethene, vinyl chloride, arsenic, iron, and manganese. Additional COCs based on exceedances of federal and state MCLs are trichloroethene and lead. The metals were the most frequently detected COCs, while the organics were only detected in one shallow groundwater sample.

There are no unacceptable risks to human receptors under the current and reasonably anticipated future land use scenarios. The only unacceptable risks to human health were for the hypothetical future child and adult residents that are exposed to soil and use shallow groundwater as a source of drinking water.

The ecological risk assessment (ERA) was performed to characterize the potential risks to ecological receptors from site-related contaminants. The primary focus of this summary is on exposure pathways and chemicals found to potentially pose threats to ecological receptors. The emphasis of the ERA was on exposure of ecological receptors to surface soil and food chain modeling. The ERA for Site 12 only included the following steps of the eight-step EPA process:

- Step 1 – Preliminary Problem Formulation and Ecological Effects Evaluation
- Step 2 – Preliminary Exposure Assessment and Risk Calculation
- Step 3A – Refinement of Chemicals of Potential Concern (COPC)
- Step 8 – Risk Management

Additional COPC for soil based on protection of ecological receptors are Arochlor 1254 (a PCB), mercury and silver. Further analysis of the COPC indicated that none of the soil concentrations exceeded EPA screening levels for migration of soil contaminants to groundwater.

3.5.2 Site 42 Olsen Road Landfill

A baseline risk assessment was conducted as part of the RI (TtNUS, 1999). The baseline risk assessment identified COCs and estimated carcinogenic and non-carcinogenic risks to human and ecological receptors. The following is a summary of the COCs identified through the baseline risk assessment.

- COCs have been identified based on the analytical data, risk drivers from the human health and ecological risk assessments, and exceedances of regulatory standards and criteria.

- The COC for soil based on protection of human health for the hypothetical future resident is iron.

- No soil COCs were identified for the other human and ecological receptors evaluated.

- The COCs for shallow groundwater based on protection of human health (hypothetical future resident) are cis-1,2-dichloroethene, trichloroethene, vinyl chloride, arsenic, chromium, iron, lead, and vanadium.

- No groundwater COCs were identified for the other receptors evaluated. Although cis-1,2-dichloroethene does not pose an unacceptable risk, it is also a COC based on exceedances of federal and state Maximum Contaminant Levels (MCLs).

- No COCs have been identified for surface water or sediment.

Additional details on the spatial distribution and concentrations of chemicals detected in all site media are contained in the RI (TtNUS, 1999) and FS (TtNUS, 2003) reports.

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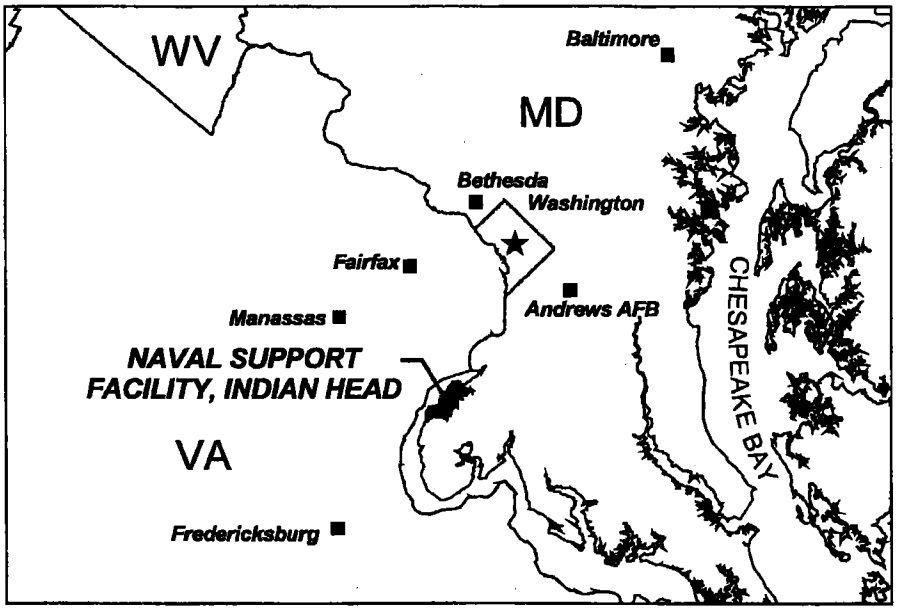
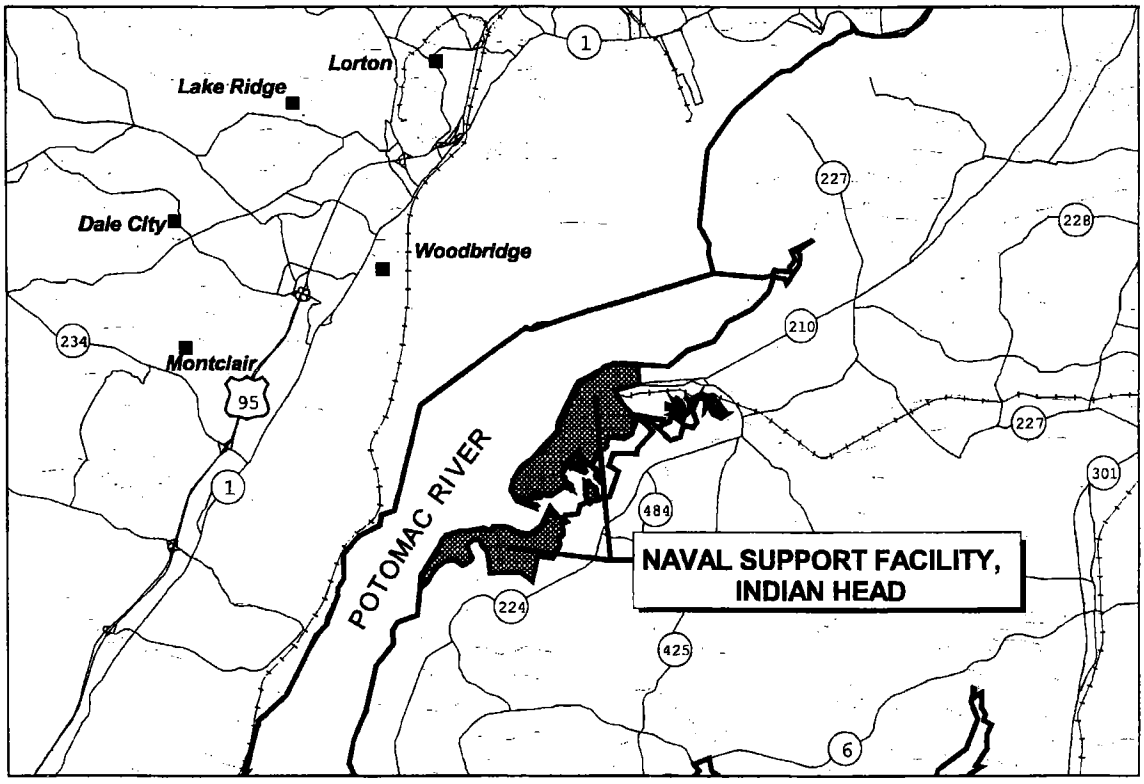


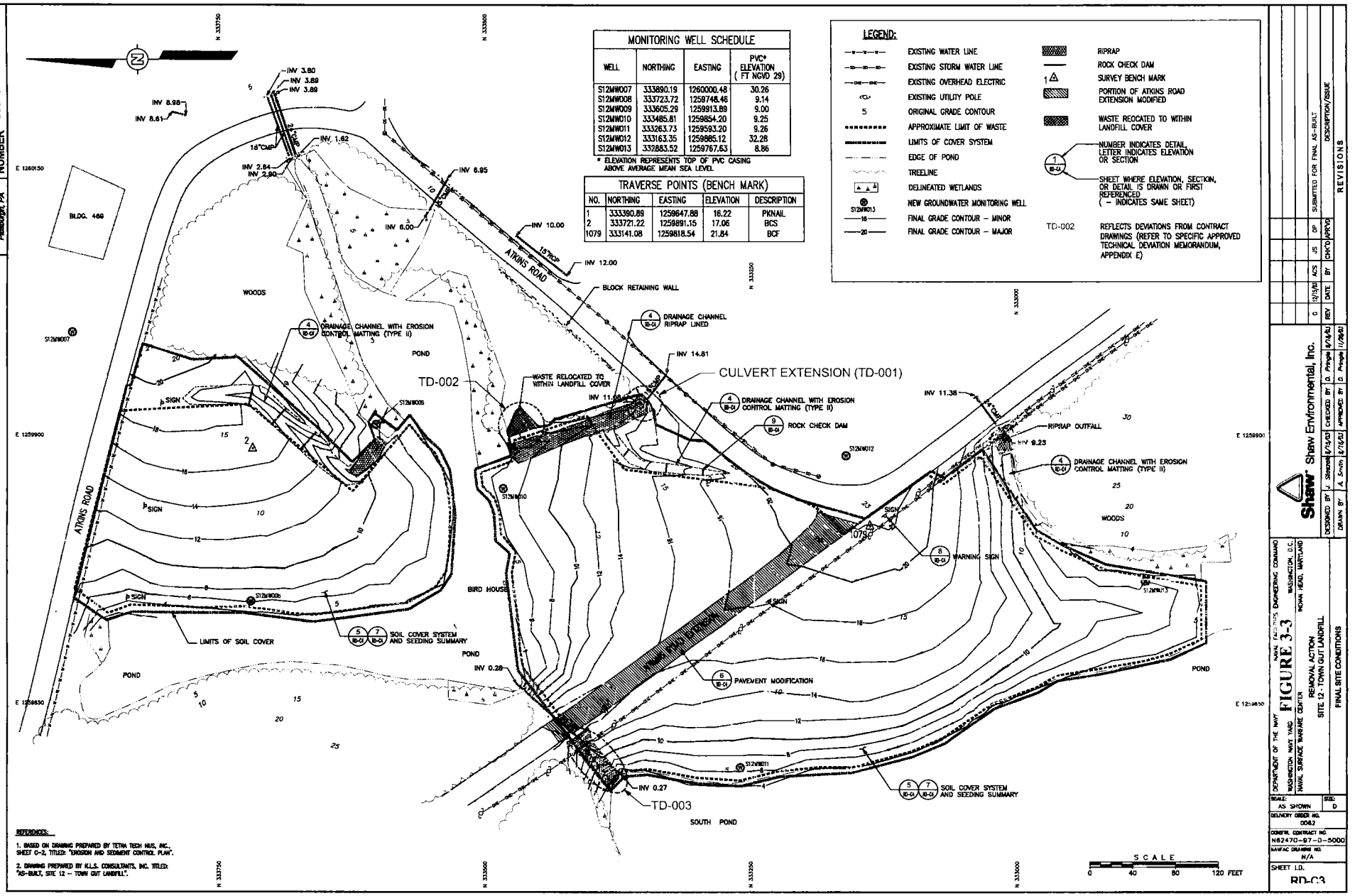


DRAWN BY: K. PELLA — DATE: 11/15/05	Tetra Tech NUS, Inc.	CONTRACT NUMBER: 2194	OWNER NO.: 007
CHECKED BY: G. LATULIPPE — DATE: 11/15/05	FACILITY LOCATION MAP SITE 12 – TOWN GUT LANDFILL SITE 42 – OLSEN ROAD LANDFILL NAVAL SUPPORT FACILITY – INDIAN HEAD INDIAN HEAD, MARYLAND	APPROVED BY: GJL — DATE: 11/15/05	
COST/SCHEDULE AREA		APPROVED BY: — — DATE: —	
SCALE: AS NOTED		DRAWING NO. FIGURE 3-1	REV: 0

P:\GIS\NSWC_INDIAN_HEAD\SITE42_SITELOCATION.APR FACILITY LOCATION MAP 07/21/05 KM

P:\GIS\INDIANHEAD_NSW\CIAPR\COMMUNITYRELATIONSPLAN.APR SITE 57 WORK PLAN 7/21/06 KM

DRAWN BY K. PEILA DATE 3/17/05	Tetra Tech NUS, Inc.	CONTRACT NUMBER 2194	OWNER NUMBER 007
CHECKED BY GJL DATE 3/17/05	SITE LOCATION MAP SITE 12 – TOWN GUT LANDFILL SITE 42 – OLSEN ROAD LANDFILL NAVAL SUPPORT FACILITY – INDIAN HEAD	APPROVED BY GJL	DATE 3/17/05
COST/SCHEDULE-AREA		APPROVED BY	DATE
SCALE AS NOTED		DRAWING NO. FIGURE 3-2	REV 0


MONITORING WELL SCHEDULE
WELL | NORTHING | EASTING | PVC* ELEVATION (FT NGVD 29)
S12MW007 | 333890.19 | 1260000.48 | 30.26
S12MW008 | 333723.72 | 1259746.46 | 9.14
S12MW009 | 333605.29 | 1259913.89 | 9.00
S12MW010 | 333485.81 | 1259854.20 | 9.25
S12MW011 | 333263.73 | 1259593.20 | 9.26
S12MW012 | 333163.35 | 1259885.12 | 32.28
S12MW013 | 332883.52 | 1259767.63 | 8.86
* ELEVATION REPRESENTS TOP OF PVC CASING ABOVE AVERAGE MEAN SEA LEVEL
TRAVERSE POINTS (BENCH MARK)
NO. | NORTHING | EASTING | ELEVATION | DESCRIPTION
1 | 333390.89 | 1259647.88 | 16.22 | PKNAIL
2 | 333721.22 | 1259891.15 | 17.06 | BCS
1079 | 333141.08 | 1259818.54 | 21.84 | BCF
LEGEND:
EXISTING WATER LINE
EXISTING STORM WATER LINE
EXISTING OVERHEAD ELECTRIC
EXISTING UTILITY POLE
ORIGINAL GRADE CONTOUR
APPROXIMATE LIMIT OF WASTE
LIMITS OF COVER SYSTEM
EDGE OF POND
TREELINE
DELINEATED WETLANDS
NEW GROUNDWATER MONITORING WELL
FINAL GRADE CONTOUR – MINOR
FINAL GRADE CONTOUR – MAJOR
RIPRAP
ROCK CHECK DAM
SURVEY BENCH MARK
PORTION OF ATKINS ROAD EXTENSION MODIFIED
WASTE REOCATED TO WITHIN LANDFILL COVER
NUMBER INDICATES DETAIL, LETTER INDICATES ELEVATION OR SECTION
SHEET WHERE ELEVATION, SECTION, OR DETAIL IS DRAWN OR FIRST REFERENCED (– INDICATES SAME SHEET)
TD-002 REFLECTS DEVIATIONS FROM CONTRACT DRAWINGS (REFER TO SPECIFIC APPROVED TECHNICAL DEVIATION MEMORANDUM, APPENDIX E)
ATKINS ROAD
CULVERT EXTENSION (TD-001)
TD-002
TD-003
DRAINAGE CHANNEL WITH EROSION CONTROL MATTING (TYPE II)
DRAINAGE CHANNEL RIPRAP LINED
ROCK CHECK DAM
WASTE RELOCATED TO WITHIN LANDFILL COVER
RIPRAP OUTFALL
WARNING SIGN
PAVEMENT MODIFICATION
SOIL COVER SYSTEM AND SEEDING SUMMARY
LIMITS OF SOIL COVER
BLOCK RETAINING WALL
BIRD HOUSE
POND
SOUTH POND
WOODS
BLDG. 466
SIGN
INV 3.80
INV 3.89
INV 3.89
INV 8.98
INV 8.61
INV 1.62
INV 2.84
INV 2.90
INV 6.95
INV 6.00
INV 10.00
INV 12.00
INV 14.81
INV 11.38
INV 9.23
INV 0.28
INV 0.27
18"CMP
15"RCP
N 333750
N 333500
N 333250
N 333000
E 1260150
E 1259900
E 1259650
REFERENCES:
1. BASED ON DRAWING PREPARED BY TETRA TECH NUS, INC., SHEET C-2, TITLED: "EROSION AND SEDIMENT CONTROL PLAN".
2. DRAWING PREPARED BY K.L.S. CONSULTANTS, INC. TITLED: "AS-BUILT, SITE 12 – TOWN GUT LANDFILL".
SCALE
0 40 80 120 FEET
OFFICE Pittsburgh, PA
DRAWING NUMBER 809401-D8
REVISIONS
NO. | DATE | BY | CHK'D/APP'D | DESCRIPTION/ISSUE
0 | 10/15/03 | ACS | JS | DP | SUBMITTED FOR FINAL AS-BUILT
DESIGNED BY: J. Stencel 9/15/03 | CHECKED BY: D. Pringle 9/15/03 | APPROVED BY: D. Pringle 11/26/03
DRAWN BY: A. Smith 9/15/03
Shaw Shaw Environmental, Inc.
DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON, D.C.
NAVAL SURFACE WARFARE CENTER INDIAN HEAD, MARYLAND
FIGURE 3-3
REMOVAL ACTION
SITE 12 - TOWN GUT LANDFILL
FINAL SITE CONDITIONS
SCALE: AS SHOWN
SIZE: D
DELIVERY ORDER NO. 0042
CONSTR. CONTRACT NO. N62470-97-D-5000
NAVFAC DRAWING NO. N/A
SHEET I.D. RD-C3
Xref:
Image:
File: G:\Project\LANTDIV\Indian Head\809401\XD8401D8.dwg
Plot Date/Time: Dec 15, 2003 - 8:59am
Plotted By: arthursmith

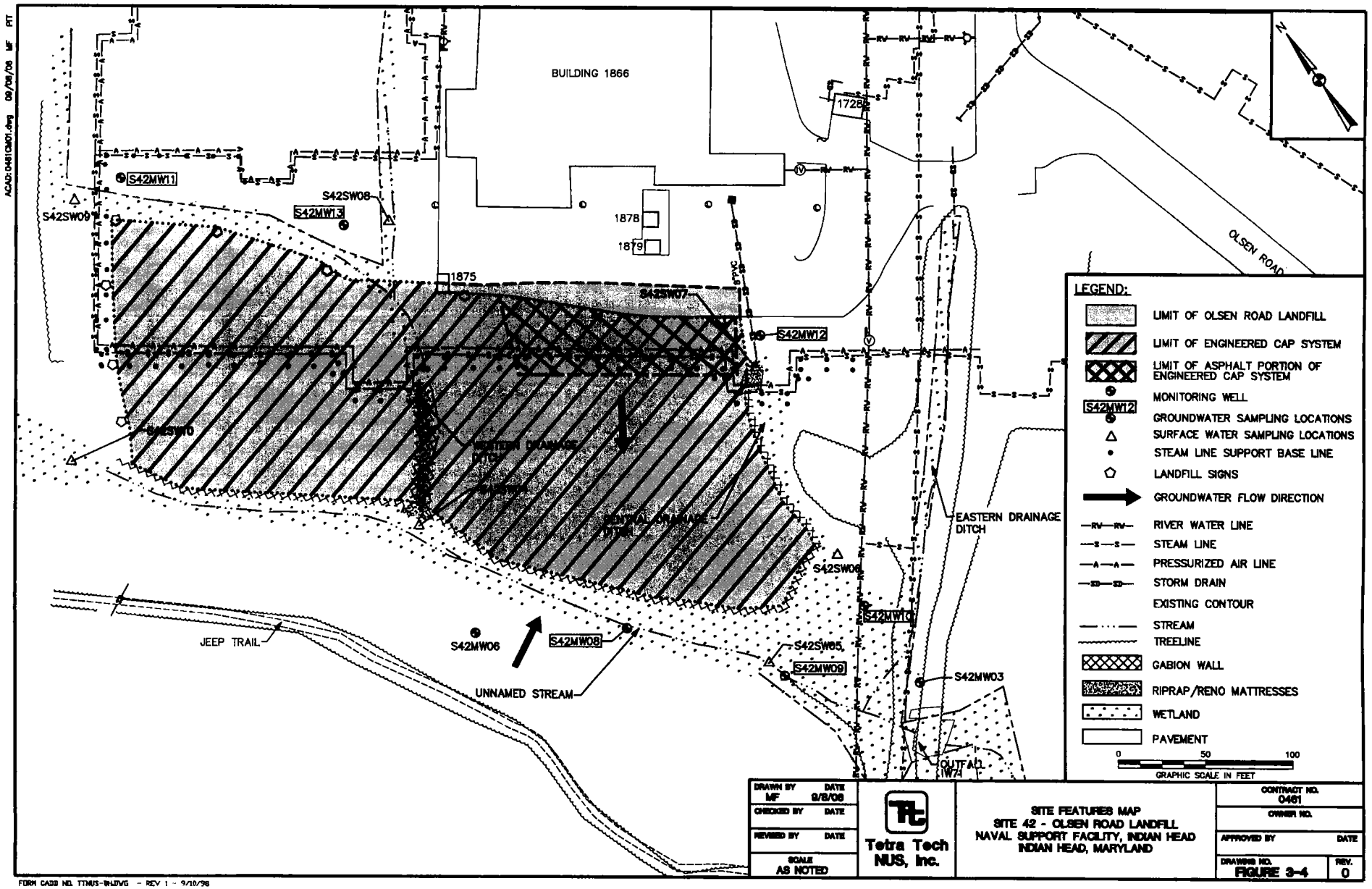

BUILDING 1866
1728
1878
1879
1875
OLSEN ROAD
S42MW11
S42SW09
S42SW08
S42MW13
S42SW07
S42MW12
S42SW10
WESTERN DRAINAGE DITCH
CENTRAL DRAINAGE DITCH
EASTERN DRAINAGE DITCH
S42SW06
S42MW10
JEEP TRAIL
S42MW06
S42MW08
S42SW05
S42MW09
S42MW03
UNNAMED STREAM
OUTFALL 007
LEGEND:
LIMIT OF OLSEN ROAD LANDFILL
LIMIT OF ENGINEERED CAP SYSTEM
LIMIT OF ASPHALT PORTION OF ENGINEERED CAP SYSTEM
MONITORING WELL
GROUNDWATER SAMPLING LOCATIONS
SURFACE WATER SAMPLING LOCATIONS
STEAM LINE SUPPORT BASE LINE
LANDFILL SIGNS
GROUNDWATER FLOW DIRECTION
RIVER WATER LINE
STEAM LINE
PRESSURIZED AIR LINE
STORM DRAIN
EXISTING CONTOUR
STREAM
TREELINE
GABION WALL
RIPRAP/RENO MATTRESSES
WETLAND
PAVEMENT
0
50
100
GRAPHIC SCALE IN FEET
DRAWN BY MF DATE 9/8/06
CHECKED BY DATE
REVISED BY DATE
SCALE AS NOTED
Tetra Tech NUS, Inc.
SITE FEATURES MAP
SITE 42 - OLSEN ROAD LANDFILL
NAVAL SUPPORT FACILITY, INDIAN HEAD
INDIAN HEAD, MARYLAND
CONTRACT NO. 0461
OWNER NO.
APPROVED BY DATE
DRAWING NO. FIGURE 3-4
REV. 0

TABLE 3-1
SUMMARY OF CHEMICALS OF CONCERN
SITE 12 TOWN GUT LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND

Exposure Point	Chemical of Concern	Concentration Detected	Frequency of Detection	Exposure Point Concentration	Statistical Measure
Soil – ingestion, dermal contact, inhalation	Arsenic	5.5 – 14.4 mg/kg	5/5	14.4 mg/kg	Maximum
	Iron	20,600 – 23,000 mg/kg	5/5	23,000 mg/kg	Maximum
Groundwater – ingestion, dermal contact, inhalation	cis-1,2-Dichloroethene	306 µg/L	1/6	306 µg/L	Maximum
	Trichloroethene	12 µg/L	1/6	12 µg/L	Maximum
	Vinyl chloride	317 µg/L	1/6	317 µg/L	Maximum
	Arsenic	3.3 – 32.8 µg/L	5/6	32.8 µg/L	Maximum
	Iron	30,400 – 83,700 µg/L	6/6	83,700 µg/L	Maximum
	Lead	1.6 – 34.5 µg/L	5/6	34.5 µg/L	Maximum
	Manganese	624 – 4,470 µg/L	6/6	4,470 µg/L	Maximum

This table presents the chemicals of concern (COCs) and exposure point concentrations for each of the COCs detected in soil and groundwater (i.e., the concentration that will be used to estimate the exposure and risk from each COC). The table includes the range of concentrations detected for each COC, the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the exposure point concentration, and how the exposure point concentration was derived. The table indicates that arsenic and iron were detected in all soil samples collected at the site. Arsenic, iron, lead, and manganese were the most frequently detected COCs in groundwater at the site. Due to the limited amount of sample data available, the maximum concentration was used as the default exposure point concentration.

TABLE 3-2
SUMMARY OF CHEMICALS OF CONCERN
SITE 42 OLSEN ROAD LANDFILL
NSF-IH, INDIAN HEAD, MARYLAND

Exposure Point	Chemical of Concern	Concentration Detected (ug/L)	Frequency of Detection [1]	Exposure Point Concentration (ug/L)
Groundwater - ingestion, dermal contact, inhalation	CIS-1,2-DICHLOROETHENE	0.7 J - 660 J	9/23	660
	TRICHLOROETHENE	1 J - 6,460	9/27	6,460
	VINYL CHLORIDE	6.5 - 19.8 J	4/27	19.8
	BIS(2-ETHYLHEXYL)PHTHALATE	2 J - 7	3/27	7
	ARSENIC	3.1 J - 102 K	12/27	102
	BARIUM	17.3 - 5,520	27/27	5,520
	BERYLLIUM	1 J - 47.2	7/27	47.2
	CADMIUM	0.3 K - 7.1 K	10/27	7.1
	CHROMIUM	0.8 - 839	10/27	839
	LEAD	1.2 J - 575	8/25	575
	MERCURY	0.08 - 2.2 K	5/27	2.2
	THALLIUM	3.2 K - 16 K	5/27	16
	ARSENIC	3.3 K - 14.4	7/23	14.4
	LEAD	50 - 50	1/21	50
	THALLIUM	3.5 K - 14.5 K	4/23	14.5
Surface Water	ARSENIC	4.2 - 4.2	1/4	4.2
	MANGANESE	236 L - 1,520 L	4/4	1,520

J = Estimated Result
K = Result is biased high
L = Result is biased low

4.0 REMEDY IMPLEMENTATION

4.1 REMEDIAL ACTION OBJECTIVES

Site 12 – Town Gut Landfill

The Town Gut Landfill Remedial Action Objectives (RAOs), as presented in the ROD (USEPA, 2004), include the following:

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

Site 42 – Olsen Road Landfill

The Olsen Road Landfill RAOs, as presented in the ROD (USEPA et al., 2005), include the following:

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

4.2 SELECTED REMEDY

Site 12 – Town Gut Landfill

A detailed analysis of potential remedial alternatives for the Town Gut Landfill was included in the FS (TtNUS, 2001). The analysis was conducted in accordance with the United States Environmental Protection Agency (USEPA) document entitled "*Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA*" and the NCP.

The selected remedy for Site 12 identified in the Record of Decision (ROD) included:

- Waste removal, addition of soil cover and vegetation (which were implemented during the 2002 removal action).

- Land use controls, which prohibit the use of shallow groundwater as a potable water source, prohibit residential use, and prevent land disturbance activities that could compromise the integrity of the soil cover.

- Long-term monitoring of groundwater and surface water. The long-term monitoring plan titled Post-Closure Long-Term Monitoring Plan for Site 12 – Town Gut Landfill (TtNUS, 2002) provides for the periodic collection and analysis of groundwater and surface water samples

- Review of removal action performance every five years.

Site 42 – Olsen Road Landfill

A detailed analysis of potential remedial alternatives for the Olsen Road Landfill was conducted in the FS (TtNUS, 2003). The analysis was conducted in accordance with the United States Environmental Protection Agency (USEPA) document entitled "*Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA*" and the NCP.

The selected remedy for Site 42 identified in the Record of Decision (ROD) included:

- Construction of an engineered cap system

- Land use controls, which prohibit the use of shallow groundwater as a potable water source, prohibit residential use, and prevent land disturbance activities that could compromise the integrity of the engineered cap.

- Long-term monitoring of groundwater and surface water. The long-term monitoring plan titled Post-Closure Long-Term Monitoring and Inspection Plan for Site 42 – Olsen Road Landfill (TtNUS, 2005b) provides for the periodic collection and analysis of groundwater and surface water samples.

- Review of remedial action performance every five years.

4.3 REMEDIAL SYSTEM OPERATION AND MAINTENANCE

Site 12 – Town Gut Landfill

The remedy for the Town Gut Landfill included a soil cover with vegetation and institutional controls with monitoring. Operation and maintenance (O&M) costs reported in the ROD include

costs associated with maintaining the soil cover system along with costs associated with long-term monitoring. The ROD identified an annual O&M and monitoring cost of $24,340 with an additional $10,000 being incurred every 5 years. Actual annual and 5-year O&M and monitoring costs were not available at the time this 5-year review was prepared.

Site 42 – Olsen Road Landfill

The remedy for Olsen Road Landfill includes an engineered cap and institutional controls with monitoring. Operation and maintenance (O&M) costs reported in the ROD include costs associated with maintaining the engineered cap system along with costs associated with long-term monitoring. The ROD identified an annual O&M and monitoring cost of $34,890 with an additional $25,500 being incurred every 5 years. Because construction of the engineered cap system was recently completed (July 2006), actual O&M and monitoring costs were not available at the time this 5-year review was conducted.

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5.0 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

This is the first Five-year Review for the Town Gut and Olsen Road Landfills at the NSF-IH facility.

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6.0 FIVE-YEAR REVIEW PROCESS

6.1 ADMINISTRATIVE COMPONENTS

The USEPA and Maryland Department of the Environment (MDE) were notified of the initiation of the Five-Year Review during the Restoration Advisory Board Meeting on June 14, 2006. The Town Gut Landfill and the Olsen Road Landfill Five-Year Review team is led by the Remedial Project Manager (RPM) for the Navy. JMWA and TtNUS have prepared this Five-Year Review document under contract N62477-03-D-0163 with the Navy.

The components of the Five-Year Review process include the following:

- Community involvement
- Document review
- Site inspection
- Data and Performance Evaluation
- Five-Year Review report development and review

6.2 COMMUNITY INVOLVEMENT

A notification was placed in the *Maryland Independent* on June 7, 2006 to notify the public that the 5-Year Review for Site 12 – Town Gut Landfill and Site 42 – Olsen Road Landfill located at the NSF-IH has been initiated. The initiation of the 5-Year Review was discussed at the June 14, 2006 Restoration Advisory Board (RAB) meeting. A questionnaire was handed to each RAB member with a verbal request to return responses within 30 days. The completed questionnaires are included in Appendix C.

Upon completion of this Five-Year Review, the results will be made available to the RAB members at the next meeting. The results of this review will be made available to the public at the local Information Repository located at NSF-IH.

6.3 DOCUMENT REVIEW

The Five-Year Review began with a review of relevant investigation and decision documents including monitoring results. The documents reviewed include the following:

- Hart, 1983. Initial Assessment Study of Naval Ordnance Station, Indian Head, Maryland (13-021). Prepared for Naval Energy and Environmental Support Activity (NEESA), May.

- CH2M Hill, 1985. Naval Assessment and Control of Installation Pollutants (NACIP) Confirmation Study Naval Ordnance Station, Indian Head, Maryland.

- E/A&H, 1992. Final Report Site Inspection: Phase I Olsen Road Landfill, July.

- NEESA, 1992. Supplemental Preliminary Assessment Report, Naval Ordnance Station, Indian Head, Maryland (13-021A).

- E/A&H, 1994. Final Site Inspection Report, Phase II Indian Head Division, Naval Surface Warfare Center. March 4.

- TtNUS, 1999. Remedial Investigation Report, Site 12 - Town Gut Landfill, Site 39/41 - Organics Plant/Scrap Yard, Site 42 - Olsen Road Landfill, Site 44 - Soak Out Area, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland. Prepared for Engineering Field Activity Chesapeake, Naval Facilities Engineering Command, Washington, DC, July.

- TtNUS, 1999. Abbreviated Pre-Feasibility Study Field Investigation Work Plan for Site 12 – Town Gut Landfill, Site 41 – Scrap Yard, Site 42 – Olsen Road Landfill, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland, September.

- TtNUS, 2002. Post–Closure Long-Term Monitoring Plan for Site 12 – Town Gut Landfill, Naval Support Facility – Indian Head, Indian Head, Maryland. Prepared for Naval Facilities Engineering Command Washington, July.

- TtNUS, 2002. Background Soil Investigation Report, Indian Head and Stump Neck Annex, Naval Surface Warfare Center, Indian Head, Maryland, October.

- US Navy, 2002. Engineering Evaluation/Cost Analysis for Site 12 – Town Gut Landfill, Naval Support Facility – Indian Head, Indian Head, Maryland.

- TtNUS, 2003. Final Feasibility Study Report for Site 42 – Olsen Road Landfill Revision 3, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland. Prepared for Engineering Field Activity Chesapeake, Naval Facilities Engineering Command, Washington, DC, December.

- Unites States Environmental Protection Agency, Maryland Department of the Environment, and Naval Facilities Engineering Command Washington, 2004. Record of Decision Site 12-Town Gut Landfill for Naval District Washington – Indian Head, Indian Head, Maryland, September.

- TtNUS, 2005. Final Remedial Action Design Submittal for Site 42 – Olsen Road landfill, Naval District Washington – Indian Head, Indian Head, Maryland. Prepared for Naval Facilities Engineering Command Washington, March.

- Unites States Environmental Protection Agency, Maryland Department of the Environment, and Naval Facilities Engineering Command Washington, 2005. Record of Decision Site 42-Olsen Road Landfill for Naval District Washington – Indian Head, Indian Head, Maryland, September.

- TtNUS, 2005. Post–Closure Long-Term Monitoring and Inspection Plan for Site 42 – Olsen Road Landfill, Naval Support Facility – Indian Head, Indian Head, Maryland. Prepared for Naval Facilities Engineering Command Washington, November.

- TtNUS, 2005. Remedial Design for Land Use Controls Site 42 – Olsen Road Landfill, Naval Support Facility, Indian Head, Maryland. Prepared for Naval Facilities Engineering Command Washington, November.

6.4 DATA REVIEW

As indicated in the Post-Closure Long-Term Monitoring Plans for Site 12 – Town Gut Landfill and Site 42 - Olsen Road Landfill (TtNUS, 2002, 2005b), groundwater and surface water samples will initially be collected quarterly. Upon completing four quarters of sampling and analysis, the analytical data will be subjected to a trend analysis to determine if contaminant concentrations are increasing, decreasing, or remaining the same. If they are increasing, quarterly sampling will continue. If concentrations are decreasing or remaining the same, periodic sampling will be reduced to once every 9 months. Following sampling at four 9-month intervals, the data will again be subjected to a trend analysis. In the event that the trend analysis indicates concentrations are increasing, quarterly sampling will resume. If the trend analysis indicates concentrations are decreasing or remaining the same, sampling frequency will be reduced to once every 18 months. Following sampling for three 18-month intervals, the data will again be subjected to a trend analysis. In the event that the trend analysis indicates concentrations are increasing, quarterly sampling will resume. If the trend analysis indicates concentrations are decreasing or remaining the same, the analytical data will be compared to the relevant criteria. If analytical data indicates that COCs are below the criteria for three consecutive 18-month sampling intervals, some or all of the COCs can be eliminated from the sampling analysis list. When all COCs are eliminated from the sampling analysis list, the long-term monitoring program can be discontinued on a well by well basis. Following elimination of all COCs from the analyte list for a well, analysis for the full-suite Hazardous Substance List (HSL) will be conducted before reaching the decision to remove a well from the LTMP. The final decision to reduce the sampling frequency and/or parameter list will be made by the Indian Head Installation Restoration Team (IHIRT) and that decision will be based on the previous rounds of sampling as well as the results of the HSL sampling. The rationale for performing long-term groundwater and surface water monitoring and a review of the long-term monitoring data is presented in the following sections.

6.4.1 Rationale for Monitoring Town Gut Landfill

To meet the long-term monitoring requirements of the ROD, periodic shallow groundwater and surface water monitoring is required at the Town Gut Landfill. In accordance with the Post-Closure Long-Term Monitoring Plan for Site 12 – Town Gut Landfill (TtNUS, 2002), the purpose of the long-term monitoring program is to monitor the effect that the selected remedial action at Town Gut Landfill has on preventing migration of contaminants from the landfill. Due to the shallow depth to groundwater and proximity to surface water, groundwater and surface water were selected as the media that would provide the most information with respect to the continued

migration of landfill contaminants. Each groundwater and surface water sample will be analyzed for select VOCs and select metals. The specific parameters for which the groundwater and surface water samples will be analyzed include trichloroethene (TCE), cis-1,2-dichloroethene (DCE), vinyl chloride (VC), arsenic, iron, lead, and manganese. The selection of these parameters is based on the baseline risk assessment performed during the RI.

In addition to groundwater, surface water will also be sampled as part of the long-term monitoring program. The surface water sampling locations were selected based on the RI sample locations and the long-term monitoring groundwater sampling locations. The surface water sample locations are in the ponds surrounding Site 12 and in the stream between the northern and central portions of the Site 12 landfill.

6.4.2 Town Gut Landfill Groundwater Monitoring Data Review

Groundwater at the Town Gut Landfill was sampled from March 2004 through October 2006. The groundwater results from March 2004 through October 2006 are included in Tables 6-1 through 6-7 and are listed by monitoring well to allow for comparisons of contaminant concentrations versus time.

The three volatile organics: DCE, TCE, and VC were nearly undetected in all the wells in groundwater throughout the entire monitoring period. This is a strong indication that little if any organic waste or refuse was disposed of at this landfill, which supports the historical information provided in the past.

The following observations are presented for metals (arsenic, iron, lead and manganese) concentrations. To avoid confusion, only dissolved metals concentrations are discussed here and the reader is referred to tables 6-1 through 6-7 for total metals concentrations.

- Monitoring wells 7, 8, 9, and 11 showed no significant increase or decrease with respect to all four metals analyzed for. MW 7 is in fact a background well and minimal change in concentrations would be expected. MW 7 was not sampled in January and July 2006 due to an obstruction in the well. A possible explanation for no change in wells 8, 9, and 11 is that metals migrate very slowly and very little change occurred over a two year monitoring period.

- Monitoring wells 10, 12 and 13 showed slight increases for all four metals. The slight increase is partly due to elevated metals concentrations in two of the events (July 2005 and April 2006). A review of the water table elevations reveals that the water levels were elevated in wells 10 and 13 during April 2006 and in well 12 in July 2005. These elevated water levels are an indication of a greater amount of infiltration from rainfall, which may be flushing the contaminants through these wells.

- With respect to arsenic concentration levels, the highest levels were consistently detected in monitoring well 10 with detections in 8 of the 10 events and exceedance of the MCL of 10 ug/L in 4 of the 10 events. The maximum detected concentration was 35.5 ug/L in October 2005.

- With respect to iron concentration levels, the highest levels were consistently detected in monitoring well 11 with 3 of the 10 events exceeding 100,000 ug/L. Iron exceeded the RBC of 11,000 ug/L in all wells. Iron showed no significant increase or decrease within each well (certain wells were consistently higher with respect to iron concentration and certain wells were consistently lower).

- With respect to lead concentration levels, lead was below the MCL of 15 ug/L in all wells. Lead was detected most often in well 13 in 3 of 10 events.

- With respect to manganese concentration levels, the highest levels were consistently detected in monitoring well 13 with all 10 events exceeding 5,000 ug/L. Manganese exceeded the MCL of 50 ug/L in all wells except MW-12, which is a background well.

6.4.3 Rationale for Monitoring Olsen Road Landfill

To meet the long-term monitoring requirements of the ROD, periodic shallow groundwater and surface water monitoring is required at the Olsen Road Landfill. In accordance with the Post-Closure Long-Term Monitoring and Inspection Plan for Site 42 – Olsen Road Landfill (TtNUS, 2005b), the purpose of the long-term monitoring program is to monitor the effect that the selected remedial action at Olsen Road Landfill has on preventing migration of contaminants from the landfill. Because the remedial action included construction of an engineered cap system, groundwater and surface water were selected as the media that would provide the most information with respect to the continued migration of landfill contaminants. Each groundwater and surface water sample will be analyzed for select VOCs and select metals. The specific parameters for which the groundwater and surface water samples will be analyzed include TCE, cis-1,2-dichloroethene, VC, arsenic, chromium, iron, lead and vanadium. The selection of these parameters was based on the baseline risk assessment performed during the RI.

The surface water sampling locations were selected based on the RI sample locations and the long-term monitoring groundwater sampling locations. The surface water sample locations (identified on Figure 3-4) are within the stream (downgradient) and drainage ditches (upgradient) of the Site 42 landfill.

6.4.4 Olsen Road Landfill Groundwater Monitoring Data Review

Post-remediation monitoring of groundwater at Site 42 was performed for the first time in July 2006 and then again in October 2006. The July and October 2006 results are provided and compared with the MCLs in Tables 6-8 through 6-13. Since the focus of the 5-Year Review is to review results over a longer time period (5 years), discussion and evaluation of the Site 42 data will be deferred until additional sampling results become available.

Table 6-1
Monitoring Well 7/7A (Background)
Site 12

VOCs (ug/L)	MCL	3/04	9/04	2/05	5/05	7/05	10/05	1/06	4/06	7/06	10/06
Cis-1,2-DCE	70	ND	ND	ND	ND	ND	ND	NS	ND	NS	ND
TCE	5	ND	ND	ND	ND	ND	ND	NS	ND	NS	ND
VC	2	ND	ND	ND	ND	ND	ND	NS	ND	NS	ND
Metals –Total (ug/L)											
Arsenic	10	ND	ND	8.6	5.8	29.7	21.2	NS	ND	NS	ND
Iron	11,000	15,400	11,700	47,900	48,800	186,000	133,000	NS	2,500	NS	ND
Lead	15	21	9.3	34.3	37.1	145	109	NS	2.7	NS	1.9 L
Manganese	50	305	52.3	154	224	596	472	NS	105	NS	1,270
Metals –Dissolved (ug/L)											
Arsenic	10	ND	ND	ND	ND	3.5 J	ND	NS	ND	NS	ND
Iron	300	675	35.7	360	380	753	1,440	NS	662	NS	ND
Lead	15	ND	ND	ND	ND	2.5 J	ND	NS	ND	NS	2.7 L
Manganese	50	111	65.3	58.4	103	98.9	24.1	NS	94	NS	1,440

J = Estimated concentration
L = Result is biased low
ND = not detected
NS = not sampled
Shading = concentrations exceed MCLs

Table 6-2
Monitoring Well 8
Site 12

VOCs ug/L	MCL	3/04	9/04	2/05	5/05	7/05	10/05	1/06	4/06	7/06	10/06
Cis-1,2-DCE	70	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TCE	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VC	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals –Total (ug/L)											
Arsenic	10	ND	ND	ND	ND	ND	81.8	3.1	ND	6.9 K	4.4
Iron	11,000	89,700	88,000	87,600	90,900	79,600	146,000	87,100	91,400	99,600	89,000
Lead	15	16	2.2	ND	ND	ND	33.2	ND	1.4	ND	ND
Manganese	50	2,500	2,780	2,670	2,670	2,540	2,510	2,740	2,840	2,680	2,530
Metals –Dissolved (ug/L)											
Arsenic	10	ND	ND	ND	ND	ND	ND	ND	ND	3.2 K	2.2
Iron	11,000	82,300	3,400	89,600	91,300	91,400	88,800	87,000	89,700	63,300 J	33,600
Lead	15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Manganese	50	2,440	2,640	2,670	2,700	2,480	2,360	2,750	2,850	2,610	2,390

J = Estimated concentration
K = Result is biased high
ND = not detected
Shading = concentrations exceed MCLs

Table 6-3
Monitoring Well 9
Site 12

VOCs ug/L	MCL	3/04	9/04	2/05	5/05	7/05	10/05	1/06	4/06	7/06	10/06
Cis-1,2-DCE	70	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TCE	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VC	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals –Total (ug/L)											
Arsenic	10	28.3	6.4	13.9	8.9	9.6 J	7.7	9.9	13.1	7.9 K	7
Iron	11,000	120,000	34,300	116,000	65,600	92,400	97,300	90,600	98,300	96,600	11,800
Lead	15	13.9	ND	25.8	ND	13.3	12.2	8.5	2.0	ND	ND
Manganese	50	1,580	473	997	1,630	8,220	10,500	3,950	3,140	5,110	590
Metals –Dissolved (ug/L)											
Arsenic	10	8.3	ND	ND	5.8	7.6	ND	6.4	3.1	1.8 K	ND
Iron	11,000	99,600	1,430	40,500	68,200	74,900	80,400	73,200	83,900	87,300 J	69,400
Lead	15	ND	ND	ND	ND	2.6	5.3	ND	ND	ND	ND
Manganese	50	2,130	409	1,500	1,520	7,930	11,100	5,420	2,860	5,850	8,880

J = Estimated concentration
K = Result is biased high
ND = not detected
Shading = concentrations exceed MCLs

Table 6-4
Monitoring Well 10
Site 12

VOCs (ug/L)	MCL	3/04	9/04	2/05	5/05	7/05	10/05	1/06	4/06	7/06	10/06
Cis-1,2-DCE	70	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TCE	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VC	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals –Total (ug/L)											
Arsenic	10	20.6	5.7	6.0	33.1	16.7 J	44.5	25.9	16.6	27.4	12.1
Iron	11,000	54,100	16,500	32,600	114,000	3,450	101,000	61,200	45,900	56,050	26,700
Lead	15	10	5.2	3.8	111	4.2 J	56.7	29.6	14.4	ND	ND
Manganese	50	889	682	1,010	1,410	228	1,380	951	879	759	599
Metals –Dissolved (ug/L)											
Arsenic	10	ND	ND	8.4	7.0	9.9 J	35.5	18.0	14.8	2.1 K	ND
Iron	11,000	28,000	ND	41,500	41,300	48,600	68,900	47,000	41,900	4,405	ND
Lead	15	ND	ND	ND	ND	ND	ND	2.5	1.5	1.6	ND
Manganese	50	711	588	1,010	957	1,020	1,230	803	861	709	546

J = Estimated concentration
K = Result is biased high
ND = not detected
Shading = concentrations exceed MCLs

Table 6-5
Monitoring Well 11
Site 12

VOCs (ug/L)	MCL	3/04	9/04	2/05	5/05	7/05	10/05	1/06	4/06	7/06	10/06
Cis-1,2-DCE	70	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.5 J
TCE	5	ND	ND	ND	1.2	ND	ND	ND	ND	ND	ND
VC	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.4 J
Metals –Total (ug/L)											
Arsenic	10	5.3	ND	4.0	ND	6.5 J	ND	8.2	5.0	9.2 K	4.8 L
Iron	11,000	113,000	99,700	37,500	60,500	99,700	119,000	112,000	127,000	93,000	100,250
Lead	15	ND	ND	5.9	ND	3.3 J	2.4	2.2	1.2	ND	1.6 JL
Manganese	50	1,430	1,240	821	5,690	1,400	1,380	1,290	1,450	1,610	1,360
Metals –Dissolved (ug/L)											
Arsenic	10	ND	ND	4.5	ND	6.3 J	ND	7.2	ND	ND	ND
Iron	11,000	113,000	22,700	48,100	57,900	10,300	117,000	114,000	83,500	52,600 J	48,250
Lead	15	ND	ND	ND	ND	ND	2.5	ND	0.7	ND	ND
Manganese	50	1,440	1,190	842	5,170	1,350	1,450	1,280	1,420	1,580	1,270

J = Estimated result
K = Result is biased high
L = Result is biased low
ND = not detected
Shading = concentrations exceed MCLs

Table 6-6
Monitoring Well 12/12A (Background)
Site 12

VOCs (ug/L)	MCL	3/04	9/04	2/05	5/05	7/05	10/05	1/06	4/06	7/06	10/06
Cis-1,2-DCE	70	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TCE	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VC	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals –Total (ug/L)											
Arsenic	10	5.5	ND	4.8	448	10 J	ND	ND	8.6	ND	ND
Iron	11,000	22,100	12,400	10,900	21,500	42,900	20,800	3,430	50,300	ND	ND
Lead	15	38.3	10.9	8.4	13.0	31	28.6	3.2	33.9	ND	ND
Manganese	50	281	39.3	40.3	71.4	123	203	24.4	144	17.6	36.4
Metals –Dissolved (ug/L)											
Arsenic	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron	11,000	541	ND	1,580	18.8	10,800	1,290	136	3,430	350 J	ND
Lead	15	ND	ND	ND	ND	9.5 J	ND	ND	2.2	ND	ND
Manganese	50	22.4	11.6	24.7	19.47	43.5	22.8	20.8	30.5	16.4	36.7

J = Estimated concentration
ND = not detected
Shading = concentrations exceed MCLs

Table 6-7
Monitoring Well 13
Site 12

VOCs (ug/L)	MCL	3/04	9/04	2/05	5/05	7/05	10/05	1/06	4/06	7/06	10/06
Cis-1,2-DCE	70	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TCE	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VC	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals –Total (ug/L)											
Arsenic	10	5	ND	5.4	ND	ND	ND	2.8	ND	3.0 K	2.3 L
Iron	11,000	89,100	84,900	54,500	71,000	77,400	89,900	10,600	110,000	100,000	110,000
Lead	15	13.2	ND	ND	ND	ND	3.9	2.6	1.0	ND	ND
Manganese	50	7,270	8,020	5,430	61,500	7,320	8,560	10,200	10,300	8,440	8,750
Metals –Dissolved (ug/L)											
Arsenic	10	ND	ND	3.5	6.4	ND	ND	ND	ND	2.6 K	ND
Iron	11,000	78,700	41,300	57,100	70,800	76,900	90,400	10,600	111,000	59,300 J	67,600
Lead	15	ND	ND	ND	ND	2.9 J	2.7	ND	1.2	ND	ND
Manganese	50	6,990	7,820	5,360	6,070	7,180	5,920	10,100	10,400	8,300	8,520

J = Estimated concentration
K = Result is biased high
L = Result is biased low
ND = not detected
Shading = concentrations exceed MCLs

Table 6-8
Monitoring Well 8
Site 42

VOCs (ug/L)	MCL	7/7/06	10/13/06
Cis-1,2-DCE	70	ND	ND
TCE	5	ND	ND
VC	2	ND	ND
Metals –Total (ug/L)			
Arsenic	10	8.3	35.6
Chromium	100	2.2	8
Iron	11,000	38,700	48,900 J
Lead	15	ND	3.3 J
Vanadium	--	3	12.3
Metals –Dissolved (ug/L)			
Arsenic	10	7	27.9
Chromium	100	ND	ND
Iron	11,000	33,000	33,600
Lead	15	ND	ND
Vanadium	50	ND	ND

J = Estimated concentration
ND = not detected
Shading = concentrations exceed MCLs

Table 6-9
Monitoring Well 9
Site 42

VOCs (ug/L)	MCL	7/7/06	10/13/06
Cis-1,2-DCE	70	ND	ND
TCE	5	ND	ND
VC	2	ND	ND
Metals –Total (ug/L)			
Arsenic	10	28.1	12.8
Chromium	100	0.85	1.8 B
Iron	11,000	26,300	19,600 J
Lead	15	ND	ND
Vanadium	--	0.94	ND
Metals –Dissolved (ug/L)			
Arsenic	10	3.9	4.5
Chromium	100	ND	ND
Iron	11,000	14,500	15,900
Lead	15	ND	ND
Vanadium	50	ND	ND

B = Result is between Instrument Detection Limit and RL
J = Estimated concentration
ND = not detected
Shading = concentrations exceed MCLs

Table 6-10
Monitoring Well 10
Site 42

VOCs (ug/L)	MCL	7/7/06	10/13/06
Cis-1,2-DCE	70	ND	ND
TCE	5	ND	ND
VC	2	ND	ND
Metals –Total (ug/L)			
Arsenic	10	3.9	3.1
Chromium	100	ND	1.2 B
Iron	11,000	31,400	38,300 J
Lead	15	ND	ND
Vanadium	--	ND	ND
Metals –Dissolved (ug/L)			
Arsenic	10	2.2	2.9
Chromium	100	ND	ND
Iron	11,000	29,900	35,100
Lead	15	ND	ND
Vanadium	50	ND	ND

B = Result is between Instrument Detection Limit and RL
J = Estimated concentration
ND = not detected
Shading = concentrations exceed MCLs

Table 6-11
Monitoring Well 11 (Background)
Site 42

VOCs (ug/L)	MCL	7/7/06	10/13/06
Cis-1,2-DCE	70	ND	ND
TCE	5	ND	ND
VC	2	ND	ND
Metals –Total (ug/L)			
Arsenic	10	2.5	ND
Chromium	100	9.2	1.2 B
Iron	11,000	11,300	4,580 J
Lead	15	5.5 B	ND
Vanadium	--	13.1	ND
Metals –Dissolved (ug/L)			
Arsenic	10	ND	ND
Chromium	100	ND	ND
Iron	11,000	4,150	4,210
Lead	15	ND	ND
Vanadium	50	ND	ND

ND = not detected
B = Result is between Instrument Detection Limit and RL
J = Estimated concentration
Shading = concentrations exceed MCLs

Table 6-12
Monitoring Well 12 (Background)
Site 42

VOCs (ug/L)	MCL	7/7/06	10/13/06
Cis-1,2-DCE	70	ND	ND
TCE	5	140	300
VC	2	ND	ND
Metals –Total (ug/L)			
Arsenic	10	1.5	ND
Chromium	100	2.9	1 B
Iron	11,000	5,900	3,360 J
Lead	15	ND	ND
Vanadium	--	0.405	ND
Metals –Dissolved (ug/L)			
Arsenic	10	ND	1.6
Chromium	100	0.43	ND
Iron	11,000	4,525	3,410
Lead	15	ND	ND
Vanadium	50	ND	ND

B = Result is between Instrument Detection Limit and RL
J = Estimated concentration
ND = not detected
Shading = concentrations exceed MCLs

Table 6-13
Monitoring Well 13 (Background)
Site 42

VOCs (ug/L)	MCL	7/7/06	10/13/06
Cis-1,2-DCE	70	ND	ND
TCE	5	ND	ND
VC	2	ND	ND
Metals –Total (ug/L)			
Arsenic	10	4.3	2.3
Chromium	100	8.8	2.6 B
Iron	11,000	2,050	1,860 J
Lead	15	ND	ND
Vanadium	--	2.6	ND
Metals –Dissolved (ug/L)			
Arsenic	10	3	ND
Chromium	100	ND	ND
Iron	11,000	736	1,680
Lead	15	2.2 B	ND
Vanadium	50	ND	ND

B = Result is between Instrument Detection Limit and RL
J = Estimated concentration
ND = not detected
Shading = concentrations exceed MCLs

6.4.5 Town Gut Landfill Surface Water Monitoring Data Review

Surface water at the Town Gut Landfill was sampled from March 2004 through October 2006. These results are included in Tables 6-14 through 6-17 and are listed by surface water location to allow for comparisons of concentrations versus time.

Two volatile organics (TCE and VC) were undetected for all surface water monitoring events except for February 05 and October 06 at SW-07 and May 05 at SW-09. It is unusual that these VOCs were only detected in 2 of 9 events with non-detects both before and after these events. It is also unusual that TCE and VC were detected, while DCE was not detected during the same events (on the degradation chain, DCE is a degradation product between TCE and VC). No explanation is currently available for this phenomenon.

The following observations are presented for metals (arsenic, iron, lead and manganese) concentrations. To avoid confusion, only dissolved metals are discussed here and the reader is referred to tables 6-14 through 6-17 for total metals concentrations.

- All surface water locations (7, 8, 9 and 10) showed no significant increase or decrease in the four metals analyzed for during the monitoring period. It should be noted that locations SW-9 (background location) and SW-10 (upgradient of two of the three landfill portions) had higher overall metals concentrations than locations SW-7 and 8 (further downgradient locations), which indicates that the contribution of metals from the landfill to the more downgradient surface water locations is not significant.

- With respect to arsenic concentration levels, no trends are evident since arsenic was only detected in 4 of 10 events. Although all detections of arsenic exceeded the NRWQC of 0.018 ug/L, it should be noted that this surface water criteria is extremely low (lower than the method detection limit (MDL) of most laboratory analytical instruments).

- With respect to iron concentration levels, the levels for all wells appear to be fluctuating up and down with no trends evident. Nearly all events and locations exceeded the AWQC of 1,000 ug/L.

- With respect to lead concentration levels, no trends are evident since lead was only detected in 4 of 10 events.

- With respect to manganese concentration levels, no significant increase or decrease in concentrations was evident. All locations, including background location SW-9, exceeded the AWQC of 50 ug/L for manganese.

6.4.6 Olsen Road Landfill Surface Water Monitoring Data Review

Post-remediation monitoring of surface water at Site 42 was performed for the first time in July 2006 and then again in October 2006. These results are provided and compared with the AWQC in Tables 6-18 through 6-24. Since the focus of the 5-Year Review is to review results over a longer time period (5 years), discussion and evaluation of the Site 42 data will be deferred until additional sampling results become available.

Table 6-14
Surface Water Location 7
Site 12

VOCs (ug/L)	AWQC	3/04	9/04	2/05	5/05	705	10/05	1/06	4/06	7/06	10/06
Cis-1,2-DCE	70	ND	ND	ND	ND	ND	ND	ND	ND	3.8 J	8.5
TCE	2.5	ND	ND	17	ND	ND	1.8 J	ND	ND	ND	ND
VC	2	ND	ND	23	ND	ND	ND	ND	ND	ND	6
Metals –Total (ug/L)											
Arsenic	0.018	10.6	8.1	4.9	14.3	13.0 J	ND	ND	8.7	5.6	ND
Iron	1,000	9,640	2,890	4,110	14,600	4,670	5,400	1,400	3,910	1,010	10,300
Lead	2.5	10.7	3.9	2.5	6.0	4.8 J	5.6	ND	4.1	ND	ND
Manganese	50	526	115	387	642	297	158	125	480	144	389
Metals –Dissolved (ug/L)											
Arsenic	0.018	ND	ND	ND	4.9	ND	ND	ND	ND	5.4	ND
Iron	1,000	853	564	2,190	1,010	276	1,560	188	592	1,150	536
Lead	2.5	2.3	2.7	ND	ND	ND	ND	ND	1.3	2.1	ND
Manganese	50	151	1.9	390	502	3.4 J	46	93.7	376	5.3	78

J = Estimated concentration
ND = not detected
Shading = concentrations exceed MCLs

Table 6-15
Surface Water Location 8
Site 12

VOCs (ug/L)	AWQC	3/04	9/04	2/05	5/05	7/05	10/05	1/06	4/06	7/06	10/06
Cis-1,2-DCE	70	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.4
TCE	2.5	ND	ND	ND	ND	ND	1.3 J	ND	ND	ND	ND
VC	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals –Total (ug/L)											
Arsenic	0.018	ND	ND	4.0	6.9	11.3 J	ND	2.8	3.2	5.3	1.7
Iron	1,000	2,450	2,760	2,400	4,570	4,310	3,180	2,190	2,260	1,080	389 J
Lead	2.5	4.4	4.9	2.2	5.8	6.5 J	3.7	3.0	3.0	2.4	ND
Manganese	50	215	167	311	333	275	191	137	232	121	178
Metals –Dissolved (ug/L)											
Arsenic	0.018	ND	ND	4.3	ND	ND	ND	ND	ND	5.7	1.8
Iron	1,000	372	581	1,050	575	ND	1,360	148	222	1,420	658
Lead	2.5	ND	ND	ND	ND	ND	ND	ND	0.8	2.4	ND
Manganese	50	58	3.1	331	218	ND	81.7	81.8	142	12.3	97

J = Estimated concentration
ND = not detected
Shading = concentrations exceed MCLs

Table 6-16
Surface Water Location 9 (Background)
Site 12

VOCs (ug/L)	AWQC	3/04	9/04	2/05	5/05	7/05	10/05	1/06	4/06	7/06	10/06
Cis-1,2-DCE	70	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TCE	2.5	ND	ND	ND	2.4	ND	ND	ND	ND	ND	ND
VC	2	ND	ND	ND	2.7	ND	ND	ND	ND	ND	ND
Metals –Total (ug/L)											
Arsenic	0.018	8.6	6.5	9.3	7.9	18.7 J	7.3	2.9	6.3	5.8	3.5
Iron	1,000	4,140	2,470	6,040	4,480	3,740	1,930	2,240	2,900	716	640
Lead	2.5	4.3	6.1	9.8	4.8	6.9 J	2.8	3.8	4.6	ND	2 L
Manganese	50	354	84.9	400	313	49.6	30.5	245	135	53.3	141
Metals –Dissolved (ug/L)											
Arsenic	0.018	ND	ND	ND	ND	12.0 J	ND	ND	5.5	7.3	4.1
Iron	1,000	768	363	1,510	340	335	309	191	2,640	1,860	1,350
Lead	2.5	ND	ND	2.7	ND	ND	ND	ND	3.6	2.6	ND
Manganese	50	185	13.7	316	245	3.7 J	14	225	41	29.1	8.1

J = Estimated concentration
L = Result is biased Low
ND = not detected
Shading = concentrations exceed MCLs

Table 6-17
Surface Water Location 10
Site 12

VOCs (ug/L)	AWQC	3/04	9/04	2/05	5/05	7/05	10/05	1/06	4/06	7/06	10/06
Cis-1,2-DCE	70	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TCE	2.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VC	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals –Total (ug/L)											
Arsenic	0.018	5.4	ND	3.8	10.2	28.9	ND	ND	6.7	7.4	4.0
Iron	1,000	2,740	1,730	1,680	4,750	91,100	3,440	1,290	3,590	1,140	113 L
Lead	2.5	2.9	3.8	1.8	4.7	42.7	3.1	2.1	4.0	ND	ND
Manganese	50	500	184	392	486	1,300	146	147	612	114	92
Metals –Dissolved (ug/L)											
Arsenic	0.018	ND	ND	3.7	4.3	ND	ND	ND	ND	6.6	3.7
Iron	1,000	341	1,730	914	377	1,180	384	188	384	1,120	294
Lead	2.5	ND	3.8	ND	ND	ND	ND	ND	0.9	2.2	ND
Manganese	50	62.6	184	384	393	1,020	39.6	119	311	7.7	10.5

L = Result is biased low.
ND = not detected
Shading = concentrations exceed MCLs

Table 6-18
Surface Water Location 4
Site 42

VOCs (ug/L)	AWQC	7/7/06	10/13/06
Cis-1,2-DCE	70	ND	ND
TCE	2.5	ND	5.1
VC	2	ND	ND
Metals –Total (ug/L)			
Arsenic	0.018	ND	ND
Chromium	74	1.1	1.3 B
Iron	1,000	1,130	2,660 J
Lead	2.5	ND	ND
Vanadium	--	1.4	ND
Metals –Dissolved (ug/L)			
Arsenic	0.018	ND	ND
Chromium	74	ND	0.72 B
Iron	1,000	42	1,230
Lead	2.5	ND	ND
Manganese	--	ND	ND

B = Result is between Instrument Detection Limit and RL
J = Estimated concentration
ND = not detected
Shading = concentrations exceed MCLs

Table 6-19
Surface Water Location 5
Site 42

VOCs (ug/L)	AWQC	7/7/06	10/13/06
Cis-1,2-DCE	70	ND	ND
TCE	2.5	1.6 J	ND
VC	2	ND	ND
Metals –Total (ug/L)			
Arsenic	0.018	ND	9.9
Chromium	74	ND	46.2
Iron	1,000	1,850	39,200 J
Lead	2.5	2.3 B	70.5 J
Vanadium	--	ND	62.7
Metals –Dissolved (ug/L)			
Arsenic	0.018	ND	5.2
Chromium	74	ND	25.1
Iron	1,000	203	17,400
Lead	2.5	ND	22
Vanadium	--	ND	29.2

B = Result is between Instrument Detection Limit and RL
J = Estimated concentration
ND = not detected
Shading = concentrations exceed MCL

Table 6-20
Surface Water Location 6
Site 42

VOCs (ug/L)	AWQC	7/7/06	10/13/06
Cis-1,2-DCE	70	ND	ND
TCE	2.5	ND	ND
VC	2	ND	ND
Metals –Total (ug/L)			
Arsenic	0.018	ND	ND
Chromium	74	2	1.6 B
Iron	1,000	1,870	1,110 J
Lead	2.5	3.2 B	ND
Vanadium	--	3.7	ND
Metals –Dissolved (ug/L)			
Arsenic	0.018	ND	ND
Chromium	74	ND	0.81 B
Iron	1,000	174	254
Lead	2.5	ND	ND
Vanadium	--	ND	ND

B = Result is between Instrument Detection Limit and RL
J = Estimated Result
ND = not detected
Shading = concentrations exceed MCLs

Table 6-21
Surface Water Location 7
Site 42

VOCs (ug/L)	AWQC	7/7/06	10/13/06
Cis-1,2-DCE	70	ND	ND
TCE	2.5	ND	ND
VC	2	ND	ND
Metals –Total (ug/L)			
Arsenic	0.018	ND	ND
Chromium	74	0.71	0.85 B
Iron	1,000	1,020	213 J
Lead	2.5	2.7 B	ND
Vanadium	--	1.3	ND
Metals –Dissolved (ug/L)			
Arsenic	0.018	ND	ND
Chromium	74	ND	0.67 B
Iron	1,000	192	133
Lead	2.5	2.6 B	ND
Vanadium	--	ND	ND

B = Result is between Instrument Detection Limit and RL
J = Estimated Result
ND = not detected
Shading = concentrations exceed MCLs

Table 6-22
Surface Water Location 8
Site 42

VOCs (ug/L)	AWQC	7/7/06	10/13/06
Cis-1,2-DCE	70	ND	ND
TCE	2.5	ND	ND
VC	2	ND	ND
Metals –Total (ug/L)			
Arsenic	0.018	ND	1.55
Chromium	74	ND	5.9 B
Iron	1,000	908	6,130 J
Lead	2.5	ND	7.6 J
Vanadium	--	ND	10.8
Metals –Dissolved (ug/L)			
Arsenic	0.018	ND	ND
Chromium	74	ND	0.82 B
Iron	1,000	265	124
Lead	2.5	ND	ND
Vanadium	--	ND	ND

B = Result is between Instrument Detection Limit and RL
J = Estimated Result
ND = not detected

Table 6-23
Surface Water Location 9
Site 42

VOCs (ug/L)	AWQC	7/7/06	10/13/06
Cis-1,2-DCE	70	ND	ND
TCE	2.5	ND	ND
VC	2	ND	ND
Metals –Total (ug/L)			
Arsenic	0.018	9.1	1.5
Chromium	74	19.9	2 B
Iron	1,000	45,300	2,620 J
Lead	2.5	26.6	ND
Vanadium	--	42.1	ND
Metals –Dissolved (ug/L)			
Arsenic	0.018	ND	ND
Chromium	74	ND	0.76 B
Iron	1,000	223	80
Lead	2.5	2.4 B	ND
Vanadium	--	ND	ND

B = Result is between Instrument Detection Limit and RL
J = Estimated concentration
ND = not detected
Shading = concentrations exceed MCLs

Table 6-24
Surface Water Location 10 (Background)
Site 42

VOCs (ug/L)	AWQC	7/7/06	10/13/06
Cis-1,2-DCE	70	ND	ND
TCE	2.5	ND	ND
VC	2	ND	ND
Metals –Total (ug/L)			
Arsenic	0.018	ND	ND
Chromium	74	ND	1.5 B
Iron	1,000	2,650	1,730 J
Lead	2.5	ND	ND
Vanadium	--	1	ND
Metals –Dissolved (ug/L)			
Arsenic	0.018	ND	ND
Chromium	74	ND	0.69 B
Iron	1,000	2,210	666
Lead	2.5	2.1 B	ND
Vanadium	--	ND	ND

B = Result is between Instrument Detection Limit and RL
J = Estimated concentration
ND = not detected
Shading = concentrations exceed MCLs

6.5 SITE INSPECTIONS

6.5.1 Site 12 -Town Gut Landfill Inspection

Representatives of the Navy and JMWA conducted a site inspection of Town Gut Landfill on June 2, 2006. The purpose of the inspection was to assess the protectiveness of the implemented removal action, including the presence of access restrictions, the condition of the soil cover, drainage structures, and the integrity/condition of the groundwater monitoring wells. Appendix A contains the site inspection checklists. Photographs taken during the site inspection are included in Appendix B.

The landfill cover appears to be in very good condition and there were no signs of erosion, cracks, settlement, ponding or seeps. Vegetation on the landfill surface appeared to be full and in good condition. In fact, the vegetation is more than waist high in places and should be mowed. There was no physical sign of slope failure on any of the sides of the landfill. A hole, presumably dug by a burrowing animal, was present on the east side of the northern portion of the landfill. This hole was located to the west of S12MW009 but without a drawing and a tape, it was difficult to determine if the hole was on or adjacent to the landfill.

The drainage structures consist of two rip-rap drainage channels, three culverts, and several smaller rip-rap areas. All drainage structures appeared to be in good condition and functioning as intended. The longest rip-rap channel (to the east of the central landfill portion and extending from Atkins Road northward to the pond) had significant vegetation growing between the rip rap. As a preventive maintenance measure, it is recommended that any excessive vegetation and debris be removed from the rip rap area so that surface water runoff is not restricted through the channel and so that saplings and brush do not become established. One of the rip-rap lined outfall channels (downgradient of Atkins Road and east of the southern landfill portion) also had significant vegetation and leaves present in the rip rap. The exit end of the culvert was partially blocked by sediment, vegetation, and leaves. Although this channel still functions as intended, it is recommended that the sediment, excess vegetation and leaves be removed so that surface water may run off freely through the channel.

The monitoring wells appeared to be in good condition at the time of inspection; however the locks were either missing or rusted rendering all the wells unlockable. All wells will be furnished with new locks that can be opened with the same key.

The Land Use Controls for Site 12 appear to be functioning as intended. The permitting process prevents any intrusive activities form occurring at the landfill without prior approval by the environmental office. The presence of the Town Gut Landfill in the GIS system will prevent any intrusive activities on the landfill since any planned construction would have to consider any land use restrictions identified in the GIS. In addition there were no signs of any residential use or disturbance of the landfill cover during the site inspection. There are eight signs restricting access to the landfill along Atkins Road Extension. The signs clearly state that groundwater use and intrusive activities are restricted.

6.5.2 Site 42 - Olsen Road Landfill Site Inspection

Representatives of the Navy, JMWA, and TtNUS conducted a site inspection of Olsen Road landfill on June 2, 2006. The purpose was to physically inspect the site in order to assess the protectiveness of the remedy, including the presence of access restrictions, the condition of the engineered cap system, drainage structures, and the integrity/condition of the groundwater monitoring wells. Appendix A contains the site inspection checklists. Photographs taken during the site inspection are included in Appendix B.

The final construction walkthrough for the Olsen Road Landfill remediation occurred on the morning of the site inspection. Due to the recent completion of the engineered cap system, the landfill and associated structures (gabion walls, monitoring wells, and asphalt cover) appear to be in very good condition. Additionally there was no sign of slope failure on any side slopes and no sign of settlement across the surface of the landfill. Based on the walkthrough, the following item remains to be performed: vegetation on the soil cover portions of the engineered cap system is still in the process of being established and evidence of erosion was noted. Discussions with the remedial action contractor resulted in the decision to add temporary erosion and sediment controls until vegetation is established on the engineered cap system.

The drainage structures consist of two main drainage channels and the stream south of the site. The two main drainage ditches include the western drainage ditch and the central drainage ditch identified on Figure 3-4. The western drainage ditch conveys flow across the engineered cap system and is lined with gabion baskets. The central drainage ditch conveys flow along the eastern limits of the engineered cap system and is lined with gabion baskets along the western bank. The stream located along the southern limits of the engineered cap system collects flow from all of the engineered cap drainage features including overland flow and from areas upgradient of the Olsen Road Landfill. The northern bank of the stream is lined with gabion baskets. All drainage structures appeared to be in good condition and free of excessive vegetation or other obstructions.

The site inspection conducted on June 2, 2006 verified that the Remedial Design for Land Use Controls has been implemented. In addition, there was no evidence of shallow groundwater being used as potable water, no evidence of any well (water supply or other type) installation activities, and no construction or other intrusive activities were observed on the cap of the Olsen Road Landfill.

All the monitoring wells within the limits of construction and included in the long-term groundwater monitoring program were located, and were in good condition. All monitoring wells were covered and locked and the locks were in good condition. The monitoring wells along the Building 1866 parking lot and driveway were protected with bollards. Although the three newly installed wells did not have identification tags, subsequent conversation indicated that the remedial action contractor would install those identification tags prior to demobilization.

The only devices used to prevent access to the engineered cap system are signage and a guide rail. Signs are in place, legible, and in good condition. During the site inspection, it was decided to add a guide rail along the southern extent of the Building 1866 parking lot outside the limits of the newly installed geomembrane cover to prevent vehicular traffic from traversing the asphalt portion of the engineered cap system. This guide rail has been installed.

6.6 INTERVIEWS

Interviews were conducted by JMWA in June and July 2006 by sending out electronic questionnaires and distributing them at a RAB meeting held in June 2006. All responses received have been incorporated into Appendix C of this Five-Year Review report.

6.7 INSTITUTIONAL CONTROLS

The selected remedies for both Sites 12 and 42 involve institutional controls (ICs) to address unacceptable human health risks by establishing land use controls to prevent the use of shallow groundwater as potable water and prevent activities that could damage the landfill covers. In accordance with the ROD, the Navy submitted, and the USEPA approved the Remedial Design for Land Use Controls (TtNUS, 2005c) in November 2005.

The objectives of the land use controls include:

- No residential use.

- No use of shallow groundwater as a potable water supply (all other uses of groundwater require Navy approval. The acceptability of such use will be evaluated based on the chemical concentrations present in the groundwater at the time of such use and whether such use would permanently damage the engineered cap).

- Restrict activities within the limits of the cap that could potentially affect the integrity of the landfill cover system.

The information contained in the Geographical Information System (GIS), in conjunction with the Comprehensive Work Approval Process (CWAP) permitting requirements, will enable the Navy to ensure the land use controls are followed and that adequate measures are taken to minimize adverse human and environmental effects that may result from any future land development.

In addition to land use controls, both the Town Gut Landfill and the Olsen Road Landfill use engineering controls (signs and a guide rail), and O&M activities to ensure the integrity of the landfill cover systems are maintained. At the time of the site inspection, the north side of the asphalt cap was not protected from vehicular traffic. Subsequent to the site inspection and prior to completing the Remedial Action, a guide rail was added along the length of the asphalt portion (northern side) of the engineered cap to prevent traffic from traversing the engineered cap system. Due to the recent completion of the Olsen Road Landfill remedy construction, no O&M activities have occurred to date.

7.0 TECHNICAL ASSESSMENT

7.1 QUESTION A: IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

Site 12 - Town Gut Landfill

The review of documents, monitoring results, and site inspection indicate that the final remedy which includes a soil cover with vegetation, land use controls (LUCs), and long-term monitoring is functioning as intended by the ROD. The site inspections did not identify any problems or disturbances of the soil cover and vegetation. The land use controls are responsible for the remedial action functioning as intended. The permitting process and the GIS system prevent any intrusive activities or groundwater use from occurring at the landfill without prior approval by the environmental office. No evidence of any activities of an intrusive, residential, or disturbing nature were observed during the site inspection that would have violated any of the land use controls.

Groundwater monitoring showed no significant increase or decrease with respect to the three volatile organics and four metals analyzed for. Although some metals exceeded their respective MCLs for groundwater, it should be noted that the MCLs for some metals are very low (conservative) and the LUCs prevent use of groundwater at Site 12. Surface water locations 7 and 8 showed a slight decrease for a limited number of metals but there was no overall increase or decrease for most of the metals and the volatile organics analyzed for.

In summary, the land use controls, presence of a soil cover, O&M inspections, and long-term monitoring are in place to successfully prevent human exposure to the site-related contaminants from the Town Gut Landfill.

Site 42 - Olsen Road Landfill

The review of documents and the site inspection indicate that the final remedy which includes an engineered cap system, institutional controls, and long-term monitoring, is functioning as intended by the ROD. The site inspection did not identify any problems with the engineered cap system. The permitting process and the presence of the Olsen Road Landfill in the GIS system prevent any intrusive activities form occurring at the landfill without prior approval by the environmental office. The institutional controls that are in place include land use controls to prohibit the potable use of shallow groundwater and activities that could compromise the integrity of the engineered cap system. No activities were observed that would have violated any of these land use controls.

At the time this document was prepared, only two rounds of post-remediation groundwater and surface water monitoring results were available for Site 42. Since the focus of this review is to review performance over a longer time period (5 years), these results (July and October 2006)

are merely presented and compared with the applicable criteria in Tables 6-8 through 6-13 and 6-18 through 6-24 of this document.

In summary, the LUCs, O&M inspections, and engineered cap are in place to successfully prevent human exposure to the site-related contaminants at the Olsen Road Landfill.

7.2 QUESTION B: ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEAN-UP LEVELS, AND RAOs USED AT THE TIME OF REMEDY SELECTION STILL VALID?

The exposure assumptions, toxicity data, and RAOs used at the time of remedy selection are still valid. The current clean-up levels for Sites 12 and 42 for arsenic and iron in groundwater are 10 ug/L (current EPA MCL) and 11,000 ug/L (EPA Region III RBC). These values differ from the values in the Site 12 Post-Closure LTMP (TtNUS, 2002), which had 5 ug/L for arsenic and 22,000 ug/L for iron. The change in the arsenic value (10 ug/L (new) vs. 5 ug/L) will have a minimal effect on the number of results that exceed the groundwater criteria. The change in the iron criteria (11,000 ug/L (new) vs. 22,000 ug/L) would only marginally increase the number of exceedances; however as stated in section 6.4, there was no significant increase or decrease in iron's concentration over the monitoring period. Also, iron is not a carcinogen and there is no toxicity data available for iron. Therefore the overall performance or functionality of the remedial action is not affected by the change in clean-up levels.

7.3 QUESTION C: HAS ANY OTHER INFORMATION COME TO LIGHT THAT CALLS INTO QUESTION THE PROTECTIVENESS OF THE REMEDY?

No additional information has surfaced to question the protectiveness of the selected remedies.

7.4 TECHNICAL ASSESSMENT SUMMARY

Site 12 – Town Gut Landfill

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

Site 42 – Olsen Road Landfill

The final remedy consisting of an engineered cap system, institutional controls, which include land use controls, and O&M inspections are successful in achieving the RAOs in the ROD by restricting exposure to site-related contaminants. Sufficient analytical data from the long-term monitoring program is not yet available to assess the effectiveness of the remedy in reducing/eliminating the migration of landfill contaminants from the landfill to the shallow groundwater and surface water. The LUCs, through the permitting process and the GIS, are the primary reason that the RAOs have been met.

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8.0 ISSUES

Site 12 – Town Gut Landfill

The Town Gut Landfill remedy of soil cover with vegetation, land use controls, and long-term monitoring has been implemented and is functioning as intended by restricting exposure to contaminants by human and ecological receptors. However, the following items have been identified based on the site inspection. These items are not critical to the functionality of the remedy but will enhance the maintenance and performance of the remedy.

- The height of the vegetation (waste high) seems excessive particularly on the central and southern portion of the landfill. Additional mowing would reduce the potential for the establishment of brush and saplings.

- Two of the rip-rap channels (east of the central portion and east of the southern portion) have excessive vegetation growing between the rip rap. In addition, debris and sediment are accumulating in the rip-rap area east of the southern portion. Although this is currently not a critical issue, excessive vegetation and debris could potentially obstruct flow through the channel as the vegetation increases in quantity or if saplings take root in the channel.

- Nearly all the monitoring wells either have missing or rusted locks on the covers.

Site 42 – Olsen Road Landfill

The Olsen Road Landfill remedy of engineered cap, land use controls, and long-term monitoring has been implemented and is functioning as intended by restricting exposure to contaminants by human and ecological receptors. However, the following items have been identified based on the site inspection. These items are not critical to the functionality of the remedy but will enhance the maintenance and performance of the remedy.

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

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9.0 RECOMMENDATIONS AND FOLLOW UP ACTIONS

Based on the issues identified in the previous sections, the following recommendations are provided:

Site 12 – Town Gut Landfill

- The landfill vegetation should be cut once per year to prevent the establishment of trees and brush. The cut height should be appropriate for the time of year (not too short in mid summer to avoid killing the vegetation).

- As a preventive maintenance measure, it is recommended that excess vegetation and debris be removed from the rip rap area so that surface water can flow freely through the channel and so that brush and saplings do not become established.

- New brass locks, all with the same key, should be placed on all the monitoring well covers.

Site 42 – Olsen Road Landfill

Based on the issues identified in the previous sections, the following recommendations are provided:

- Add temporary erosion and sediment controls until vegetation is established on the engineered cap system in order to reduce the velocity of the runoff from the asphalt portion of the engineered cap system.

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10.0 PROTECTIVENESS STATEMENT

The remedies for the Town Gut Landfill and Olsen Road Landfill are protective of human health and ecological receptors based on achieving the RAOs specified in the RODs. LUCs are responsible for the protectiveness provided by the selected remedial actions. LUCs have been effective in preventing usage of groundwater as a potable water supply and have also restricted activities within the limits of the landfills that could affect the integrity of the cover systems. The landfill covers have isolated the solid waste and are expected to prevent erosion, which will result in protection of both human and environmental receptors. To confirm that contamination has not migrated from Sites 12 and 42, long-term monitoring of groundwater and surface water is in progress and additional results will be available in the future.

11.0 NEXT REVIEW

The next Five-Year Review for the Town Gut Landfill and the Olsen Road Landfill will be due by 2012, five years from the signature date of this Five Year Review.

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APPENDIX A

SITE 12 INSPECTION CHECKLIST
SITE 42 INSPECTION CHECKLIST

SITE 12 INSPECTION CHECKLIST

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: Site 12 - Town Gut Landfill	**Date of inspection:** June 2, 2006
Location and Region: Indian Head, MD, Region 3	**EPA ID:** MD7170024684
Agency, office, or company leading the five-year review: JM Waller Associates	**Weather/temperature:** Partly cloudy, light wind, approx. 90°F

Remedy Includes: (Check all that apply)

- ✓ Landfill cover/containment
- ✓ Access controls
- ✓ Institutional controls
- Groundwater pump and treatment
- Surface water collection and treatment
- Other _____

- Monitored natural attenuation
- Groundwater containment
- Vertical barrier walls

Attachments: Inspection team roster attached Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Shawn Jorgensen (Name) | NSF-IH RPM (Title) | 6-2-06 (Date)
   Interviewed (at site) at office by phone Phone no. _____
   Problems, suggestions; Report attached _____
   Had no problems or suggestions

2. **O&M staff** _____ (Name) | _____ (Title) | _____ (Date)
   Interviewed at site at office by phone Phone no. _____
   Problems, suggestions; Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Maryland Dept. of Environment
Contact Curtis De Tore — RPM — Title — Date — Phone no.
Name
Problems; suggestions; Report attached Questionnaire was sent by email.

Agency USEPA
Contact Dennis Orenshaw — RPM — Title — Date — Phone no.
Name
Problems; suggestions; Report attached Questionnair was sent by email.

Agency
Contact — Title — Date — Phone no.
Name
Problems; suggestions; Report attached

Agency
Contact — Title — Date — Phone no.
Name
Problems; suggestions; Report attached

4. **Other interviews** (optional) Report attached.

All property surrounding Site 12 is part of the NSP-IH facility; therefore, no additional interviews were conducted. Questionnaires were made available ~~at~~ the Restoration Advisory Board meeting held on June 14, 2006

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

1.	**O&M Documents**			
	O&M manual	Readily available	Up to date	(N/A)
	As-built drawings	Readily available	Up to date	N/A
	Maintenance logs	Readily available	Up to date	(N/A)
	Remarks A Post-Closure Inspection Checklist will be completed semi-annually during LTM.			
2.	**Site-Specific Health and Safety Plan**	Readily available	Up to date	(N/A)
	Contingency plan/emergency response plan	Readily available	Up to date	(N/A)
	Remarks			
3.	**O&M and OSHA Training Records**	Readily available	Up to date	(N/A)
	Remarks			
4.	**Permits and Service Agreements**			
	Air discharge permit	Readily available	Up to date	(N/A)
	Effluent discharge	Readily available	Up to date	N/A
	Waste disposal, POTW	Readily available	Up to date	N/A
	Other permits	Readily available	Up to date	N/A
	Remarks			
5.	**Gas Generation Records**	Readily available	Up to date	(N/A)
	Remarks No vents since not a sanitary landfill			
6.	**Settlement Monument Records**	Readily available	Up to date	(N/A)
	Remarks			
7.	**Groundwater Monitoring Records**	(Readily available)	Up to date	N/A
	Remarks See Sec. 6			
8.	**Leachate Extraction Records**	Readily available	Up to date	(N/A)
	Remarks			
9.	**Discharge Compliance Records**			
	Air	Readily available	Up to date	(N/A)
	Water (effluent)	Readily available	Up to date	N/A
	Remarks			
10.	**Daily Access/Security Logs**	Readily available	Up to date	(N/A)
	Remarks Landfill is on secured portion of facility			

IV. O&M COSTS

1. **O&M Organization**
   - State in-house
   - PRP in-house
   - Federal Facility in-house
   - Contractor for State
   - Contractor for PRP
   - Contractor for Federal Facility
   - Other_____

2. **O&M Cost Records** Not Available
   - Readily available
   - Up to date
   - Funding mechanism/agreement in place
   - Original O&M cost estimate_____ Breakdown attached

   Total annual cost by year for review period if available

   From_____ (Date) To_____ (Date) _____ (Total cost) Breakdown attached
   From_____ (Date) To_____ (Date) _____ (Total cost) Breakdown attached
   From_____ (Date) To_____ (Date) _____ (Total cost) Breakdown attached
   From_____ (Date) To_____ (Date) _____ (Total cost) Breakdown attached
   From_____ (Date) To_____ (Date) _____ (Total cost) Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS (Applicable) N/A

A. Fencing

1. **Fencing damaged** Location shown on site map Gates secured N/A
   Remarks No fence; however site is within restricted area of NSF-IH facility.

B. Other Access Restrictions

1. **Signs and other security measures** Location shown on site map N/A
   Remarks Adequate - 8 signs are present along Atkins Road Extension

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs ~~not~~ are properly implemented — No evidence of human activity or disturbance! — Yes / No / N/A

Site conditions imply ICs ~~not~~ are being fully enforced — Yes / No / N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Currently: drive by only

Frequency Future: Inspection checklist performed semi-annually

Responsible party/agency Navy

Contact Shawn Jorgensen (Name) — RPM (Title) — _____ (Date) — 301-744-2263 (Phone no.)

Reporting is up-to-date — No checklists to date — Yes / (No) / N/A

Reports are verified by the lead agency — Yes / No / N/A

Specific requirements in deed or decision documents have been met — (Yes) / No / N/A

Violations have been reported — Yes / No / (N/A)

Other problems or suggestions: Report attached

2. **Adequacy** — (ICs are adequate) — ICs are inadequate — N/A

Remarks _____

D. General

1. **Vandalism/trespassing** — Location shown on site map — (No vandalism evident)

Remarks _____

2. **Land use changes on site** — N/A

Remarks None

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

Remarks Unknown

VI. GENERAL SITE CONDITIONS

A. Roads — Applicable — N/A

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

Remarks _____

B. Other Site Conditions

Remarks

VII. LANDFILL COVERS (Applicable) N/A

A. Landfill Surface

1. **Settlement** (Low spots) Location shown on site map (Settlement not evident)
Areal extent_____ Depth_____
Remarks

2. **Cracks** Location shown on site map (Cracking not evident)
Lengths_____ Widths_____ Depths_____
Remarks

3. **Erosion** Location shown on site map (Erosion not evident)
Areal extent_____ Depth_____
Remarks

4. **Holes** Location shown on site map Holes not evident
Areal extent_____ Depth_____
Remarks 1 Ground hog hole east of northern portion, not sure if on or adjacent to cover

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

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

7. **Bulges** NA Location shown on site map Bulges not evident
Areal extent_____ Height_____
Remarks

8. **Wet Areas/Water Damage** (Wet areas/water damage not evident)
   - Wet areas — Location shown on site map — Areal extent_____
   - Ponding — Location shown on site map — Areal extent_____
   - Seeps — Location shown on site map — Areal extent_____
   - Soft subgrade — Location shown on site map — Areal extent_____

   Remarks_____

9. **Slope Instability** Slides — Location shown on site map (No evidence of slope instability)
   Areal extent_____
   Remarks_____

B. Benches Applicable (N/A)

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** — Location shown on site map — N/A or okay
   Remarks_____

2. **Bench Breached** — Location shown on site map — N/A or okay
   Remarks_____

3. **Bench Overtopped** — Location shown on site map — N/A or okay
   Remarks_____

C. Letdown Channels Applicable (N/A)

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** — Location shown on site map — No evidence of settlement
   Areal extent_____ Depth_____
   Remarks_____

2. **Material Degradation** — Location shown on site map — No evidence of degradation
   Material type_____ Areal extent_____
   Remarks_____

3. **Erosion** — Location shown on site map — No evidence of erosion
   Areal extent_____ Depth_____
   Remarks_____

4. **Undercutting** Location shown on site map No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ No obstructions
Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
No evidence of excessive growth
Vegetation in channels does not obstruct flow
Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations (Applicable) N/A

1. **Gas Vents** N/A Active Passive
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance
N/A
Remarks_____

2. **Gas Monitoring Probes** N/A
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

3. **Monitoring Wells** (within ~~surface area~~ of landfill)
Properly secured/locked (Functioning) Routinely sampled Good condition
Evidence of leakage at penetration (Needs Maintenance) N/A
Remarks MW007 (background) is blocked by what appears to be plastic tubing. Most MWs were unlocked or had missing locks.

4. **Leachate Extraction Wells** N/A
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

5. **Settlement Monuments** Located Routinely surveyed (N/A)
Remarks_____

E. Gas Collection and Treatment Applicable (N/A)

1. **Gas Treatment Facilities**
   Flaring Thermal destruction Collection for reuse
   Good condition Needs Maintenance
   Remarks Not a Sanitary landfill

2. **Gas Collection Wells, Manifolds and Piping**
   Good condition Needs Maintenance
   Remarks

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   Good condition Needs Maintenance N/A
   Remarks

F. Cover Drainage Layer Applicable (N/A)

1. **Outlet Pipes Inspected** Functioning N/A
   Remarks

2. **Outlet Rock Inspected** Functioning N/A
   Remarks

G. Detention/Sedimentation Ponds Applicable (N/A)

1. **Siltation** Areal extent_____ Depth_____ N/A
   Siltation not evident
   Remarks

2. **Erosion** Areal extent_____ Depth_____
   Erosion not evident
   Remarks

3. **Outlet Works** Functioning N/A
   Remarks

4. **Dam** Functioning N/A
   Remarks

H. Retaining Walls Applicable (N/A)

1. **Deformations** Location shown on site map Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** Location shown on site map Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge (Applicable) N/A

1. **Siltation** Location shown on site map (Siltation not evident)
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** (Location shown on site map) N/A
   Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks Vegetation was present in 2 ditches adjacent to landfill — DG of 24" CMP under Atkins Rd. Ext.; ~~DG of~~ Ditch east of central portion leading north from Atkins Rd. to pond.

3. **Erosion** Location shown on site map (Erosion not evident)
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** (Functioning) N/A
   Remarks All CMPs below roads were functioning.

VIII. VERTICAL BARRIER WALLS Applicable (N/A)

1. **Settlement** Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   Performance not monitored
   Frequency_____ Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES Applicable (N/A)

A. Groundwater Extraction Wells, Pumps, and Pipelines Applicable N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   Good condition All required wells properly operating Needs Maintenance N/A
   Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines Applicable N/A

1. **Collection Structures, Pumps, and Electrical**
   Good condition Needs Maintenance
   Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks_____

C. Treatment System Applicable N/A

1. **Treatment Train** (Check components that apply)
   Metals removal Oil/water separation Bioremediation
   Air stripping Carbon adsorbers
   Filters_____
   Additive (*e.g.*, chelation agent, flocculent)_____
   Others_____
   Good condition Needs Maintenance
   Sampling ports properly marked and functional
   Sampling/maintenance log displayed and up to date
   Equipment properly identified
   Quantity of groundwater treated annually_____
   Quantity of surface water treated annually_____
   Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   N/A Good condition Needs Maintenance
   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   N/A Good condition Proper secondary containment Needs Maintenance
   Remarks_____

4. **Discharge Structure and Appurtenances**
   N/A Good condition Needs Maintenance
   Remarks_____

5. **Treatment Building(s)**
   N/A Good condition (esp. roof and doorways) Needs repair
   Chemicals and equipment properly stored
   Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   Properly secured/locked Functioning Routinely sampled Good condition
   All required wells located Needs Maintenance N/A
   Remarks_____

D. Monitoring Data

1. Monitoring Data
   Is routinely submitted on time Is of acceptable quality

2. Monitoring data suggests:
   Groundwater plume is effectively contained Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

Properly secured/locked (Functioning) Routinely sampled Good condition
All required wells located (Needs Maintenance) N/A

Remarks All need new locks
MW007 is clogged w/ plastic tubing

X. OTHER REMEDIES

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

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

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

LUCs have been implemented and appear to be effective in controlling site and groundwater usage. LTM is functioning but some wells need maintenance.

B. Adequacy of O&M

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

Vegetation needs mowing particularly on southern portion. Although not critical to performance of remedy, entire landfill should be mowed once/year.

C. Early Indicators of Potential Remedy Problems

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

None.

D. Opportunities for Optimization

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

It is too early in LTM program to identify changes in monitoring tasks.

SITE 42 INSPECTION CHECKLIST

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: Site 42 - Olsen Rd. Landfill	**Date of inspection:** June 2, 2006
Location and Region: Maryland / Region III	**EPA ID:** MD7170024684
Agency, office, or company leading the five-year review: DEPARTMENT OF THE NAVY	**Weather/temperature:** Overcast / ≈ 80° F

Remedy Includes: (Check all that apply)

- ☑ Landfill cover/containment
- ☑ Access controls
- ☑ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- ☑ Other Periodic Groundwater and Surface Water Sampling

Attachments: ☐ Inspection team roster attached ☒ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Not Yet Identified _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

2. **O&M staff** Not Yet Identified _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency MDE
Contact Curtis DeTore — Remedial Proj. Mang. — 7/11/06 — _____
Name — Title — Date — Phone no.
Problems; suggestions; X Report attached Appendix C of 5-Year Review Report

Agency _____
Contact _____ — _____ — _____ — _____
Name — Title — Date — Phone no.
Problems; suggestions; G Report attached _____

Agency _____
Contact _____ — _____ — _____ — _____
Name — Title — Date — Phone no.
Problems; suggestions; G Report attached _____

Agency _____
Contact _____ — _____ — _____ — _____
Name — Title — Date — Phone no.
Problems; suggestions; G Report attached _____

4. **Other interviews** (optional) G Report attached.

Restoration Advisory Board advised of on-going 5-Year review process was under way and members were handed an interview questionaire and asked to return the questionaire.

Questionaires received from RAB members are provided in Appendix C of the Site 42- Olsen Road Landfill Five-Year Review Report

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

1. **O&M Documents**
   - G O&M manual — G Readily available — G Up to date — X N/A
   - G As-built drawings — G Readily available — G Up to date — X N/A
   - G Maintenance logs — G Readily available — G Up to date — X N/A

   Remarks: Construction measures not yet completed O&M manual not yet developed, as-built dwgs not yet developed

2. **Site-Specific Health and Safety Plan** — G Readily available — G Up to date — X N/A
   - G Contingency plan/emergency response plan — G Readily available — G Up to date — X N/A

   Remarks: To be developed with Monitoring Work Plan and O&M Plans.

3. **O&M and OSHA Training Records** — G Readily available — G Up to date — X N/A

   Remarks: O&M activities have not yet begun.

4. **Permits and Service Agreements**
   - G Air discharge permit — G Readily available — G Up to date — X N/A
   - G Effluent discharge — G Readily available — G Up to date — X N/A
   - G Waste disposal, POTW — G Readily available — G Up to date — X N/A
   - G Other permits _____ — G Readily available — G Up to date — X N/A

   Remarks:

5. **Gas Generation Records** — G Readily available — G Up to date — X N/A

   Remarks:

6. **Settlement Monument Records** — G Readily available — G Up to date — X N/A

   Remarks: Settlement Monuments Not established for Site.

7. **Groundwater Monitoring Records** — G Readily available — G Up to date — X N/A

   Remarks: Groundwater Monitoring has yet to begin

8. **Leachate Extraction Records** — G Readily available — G Up to date — X N/A

   Remarks:

9. **Discharge Compliance Records**
   - G Air — G Readily available — G Up to date — X N/A
   - G Water (effluent) — G Readily available — G Up to date — X N/A

   Remarks:

10. **Daily Access/Security Logs** — G Readily available — G Up to date — X N/A

    Remarks:

IV. O&M COSTS

1. **O&M Organization** NA

G State in-house G Contractor for State
G PRP in-house G Contractor for PRP
G Federal Facility in-house G Contractor for Federal Facility
G Other _____

2. **O&M Cost Records** NA

G Readily available G Up to date
G Funding mechanism/agreement in place
Original O&M cost estimate _____ G Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ G Breakdown attached
Date Date Total cost
From _____ To _____ _____ G Breakdown attached
Date Date Total cost
From _____ To _____ _____ G Breakdown attached
Date Date Total cost
From _____ To _____ _____ G Breakdown attached
Date Date Total cost
From _____ To _____ _____ G Breakdown attached
Date Date Total cost

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

Describe costs and reasons: _____

Construction not yet complete therefore O&M practices have not yet started.

V. ACCESS AND INSTITUTIONAL CONTROLS X Applicable G N/A

A. Fencing

1. **Fencing damaged** G Location shown on site map G Gates secured X N/A

Remarks _____

B. Other Access Restrictions

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

Remarks Signs in good condition

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented — G Yes ☒ No G N/A
Site conditions imply ICs not being fully enforced — G Yes ☒ No G N/A

Type of monitoring (*e.g.*, self-reporting, drive by) _____
Frequency _____
Responsible party/agency _____
Contact _____ (Name) _____ (Title) _____ (Date) _____ (Phone no.)

Reporting is up-to-date — G Yes G No G N/A
Reports are verified by the lead agency — G Yes G No G N/A

Specific requirements in deed or decision documents have been met — G Yes G No G N/A
Violations have been reported — G Yes G No G N/A
Other problems or suggestions: G Report attached

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

D. General

1. **Vandalism/trespassing** G Location shown on site map ☒ No vandalism evident
Remarks _____

2. **Land use changes on site** G N/A
Remarks _____

3. **Land use changes off site** ☒ N/A
Remarks _____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable G N/A

1. **Roads damaged** G Location shown on site map ☒ Roads adequate G N/A
Remarks Roads refer to paved cap area adjacent to the Bldg. 1866 parking lot.

B. Other Site Conditions

Remarks E&S features used during construction have not been removed to date. Vegetation has not been established.

VII. LANDFILL COVERS G Applicable G N/A

A. Landfill Surface

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

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

3. **Erosion** X Location shown on site map G Erosion not evident
   Areal extent _____ Depth _____
   Remarks Final vegetation has not yet been established.

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

5. **Vegetative Cover** X Grass G Cover properly established G No signs of stress
   G Trees/Shrubs (indicate size and locations on a diagram)
   Remarks Final vegetation has not been established. E&S controls are still in place.

6. **Alternative Cover (armored rock, concrete, etc.)** G N/A
   Remarks Riprap ~~and~~ stone revetment, and paved portions of the Site 42 Cap are in good condition.

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

8. **Wet Areas/Water Damage** X Wet areas/water damage not evident
- G Wet areas — G Location shown on site map — Areal extent_____
- G Ponding — G Location shown on site map — Areal extent_____
- G Seeps — G Location shown on site map — Areal extent_____
- G Soft subgrade — G Location shown on site map — Areal extent_____

Remarks (wet areas limited to drainage channels that convey flow across and along-side the cap system.

9. **Slope Instability** G Slides G Location shown on site map X No evidence of slope instability
Areal extent_____
Remarks_____

B. Benches G Applicable X N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** G Location shown on site map X N/A or okay
Remarks_____

2. **Bench Breached** G Location shown on site map X N/A or okay
Remarks_____

3. **Bench Overtopped** G Location shown on site map X N/A or okay
Remarks_____

C. Letdown Channels X Applicable G N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** G Location shown on site map X No evidence of settlement
Areal extent_____ Depth_____
Remarks_____

2. **Material Degradation** G Location shown on site map X No evidence of degradation
Material type_____ Areal extent_____
Remarks_____

3. **Erosion** G Location shown on site map X No evidence of erosion
Areal extent_____ Depth_____
Remarks In stabilized channels.

4. **Undercutting** G Location shown on site map ☒ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ ☒ No obstructions
G Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
☒ No evidence of excessive growth
☒ Vegetation in channels does not obstruct flow
G Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations ☒ Applicable G N/A

1. **Gas Vents** G Active G Passive
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance
☒ N/A
Remarks_____

2. **Gas Monitoring Probes**
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance ☒ N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance ☒ N/A
Remarks_____

4. **Leachate Extraction Wells**
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance ☒ N/A
Remarks_____

5. **Settlement Monuments** G Located G Routinely surveyed ☒ N/A
Remarks_____

6. Steam line supports supports ~~xxxxx~~ and heat systems in good condition no signs of leakage at penetrations

E. Gas Collection and Treatment G Applicable X N/A

1. **Gas Treatment Facilities**
   G Flaring G Thermal destruction G Collection for reuse
   G Good condition G Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   G Good condition G Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   G Good condition G Needs Maintenance G N/A
   Remarks_____

F. Cover Drainage Layer X Applicable G N/A

1. **Outlet Pipes Inspected** G Functioning X N/A
   Remarks Pipes outlet behind stone revetment

2. **Outlet Rock Inspected** X Functioning G N/A
   Remarks_____

G. Detention/Sedimentation Ponds G Applicable X N/A

1. **Siltation** Areal extent_____ Depth_____ G N/A
   G Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   G Erosion not evident
   Remarks_____

3. **Outlet Works** G Functioning G N/A
   Remarks_____

4. **Dam** G Functioning G N/A
   Remarks_____

H. Retaining Walls ☒ Applicable ☐ N/A Gabion Baskets

1. **Deformations** ☐ Location shown on site map ☒ Deformation not evident
   Horizontal displacement None Vertical displacement None
   Rotational displacement None
   Remarks

2. **Degradation** ☐ Location shown on site map ☒ Degradation not evident
   Remarks

I. Perimeter Ditches/Off-Site Discharge ☒ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☒ Siltation not evident
   Areal extent Depth
   Remarks E&S controls still in place from construction

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
   ☒ Vegetation does not impede flow
   Areal extent Type
   Remarks Vegetation is not 100% established.

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident
   Areal extent Depth
   Remarks E&S features still in place.

4. **Discharge Structure** ☒ Functioning ☐ N/A
   Remarks

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
   Areal extent Depth
   Remarks

2. **Performance Monitoring** Type of monitoring
   ☐ Performance not monitored
   Frequency ☐ Evidence of breaching
   Head differential
   Remarks

IX. GROUNDWATER/SURFACE WATER REMEDIES G Applicable ☒ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines G Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   G Good condition G All required wells properly operating G Needs Maintenance G N/A
   Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   G Good condition G Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   G Readily available G Good condition G Requires upgrade G Needs to be provided
   Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines G Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
   G Good condition G Needs Maintenance
   Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   G Good condition G Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   G Readily available G Good condition G Requires upgrade G Needs to be provided
   Remarks_____

C. Treatment System G Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
   - G Metals removal
   - G Oil/water separation
   - G Bioremediation
   - G Air stripping
   - G Carbon adsorbers
   - G Filters_____
   - G Additive (*e.g.*, chelation agent, flocculent)_____
   - G Others_____
   - G Good condition
   - G Needs Maintenance
   - G Sampling ports properly marked and functional
   - G Sampling/maintenance log displayed and up to date
   - G Equipment properly identified
   - G Quantity of groundwater treated annually_____
   - G Quantity of surface water treated annually_____

   Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   - G N/A
   - G Good condition
   - G Needs Maintenance

   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   - G N/A
   - G Good condition
   - G Proper secondary containment
   - G Needs Maintenance

   Remarks_____

4. **Discharge Structure and Appurtenances**
   - G N/A
   - G Good condition
   - G Needs Maintenance

   Remarks_____

5. **Treatment Building(s)**
   - G N/A
   - G Good condition (esp. roof and doorways)
   - G Needs repair
   - G Chemicals and equipment properly stored

   Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   - G Properly secured/lockedG Functioning
   - G Routinely sampled
   - G Good condition
   - G All required wells located
   - G Needs Maintenance
   - G N/A

   Remarks_____

D. Monitoring Data First periodic sampling event scheduled for July 2006.

1. Monitoring Data
   - G Is routinely submitted on time
   - G Is of acceptable quality

2. Monitoring data suggests:
   - G Groundwater plume is effectively contained
   - G Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
G Properly secured/lockedG Functioning G Routinely sampled X Good condition
G All required wells located G Needs Maintenance G N/A
Remarks All groundwater monitoring wells in good condition

X. OTHER REMEDIES

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

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

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

Construction of the Site 42 cap has just been completed, Vegetation has not been fully established to date, and E&S structures / controles are still inplace.

The intent of the remedy is to contain the debris left on site and restrict surface water infiltration and mobilization of contaminants to the groundwater. At this early date it appears that the remedy will be effective.

B. Adequacy of O&M

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

O&M proceduces have not been established to date. O&M issues are still the requirement of the construction contractor.

C. Early Indicators of Potential Remedy Problems

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

~~Not Applicable~~ No

No Problems identified to date

D. Opportunities for Optimization

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

Construction Not yet complete (vegetation not fully established and E&S controls still in place). Monitoring program has not started.

No optimization recommendations to date.

APPENDIX B

SITE 12 PHOTOGRAPHS

SITE 42 PHOTOGRAPHS

Note: The photograph reference number provided with each photograph within this appendix (e.g., Photo Ref. 120) refers to the photograph reference recorded on the Site 42 – Olsen Road Landfill Checklist

SITE 12 PHOTOGRAPHS

LF Cover on Southern Portion, Looking South

LF Cover on Central Portion, Looking East

Land Use Control Sign on Southern Portion

LF Cover on Southern Portion, Looking Southwest

Atkins Road Extension and Northeast Side of Southern Portion

Drainage Channel on Southern Portion, Looking Southwest

LUC Sign on Central Portion, Looking Northeast

78 inch Metal Pipe, Connecting the Ponds Beneath Atkins Road Extension

MW – 11 on Southern Portion, Looking South

LF Cover on Southern Portion, Looking Southeast

Southeast Side of Southern Portion and MW - 13

Culvert Beneath Atkins Road Extension, East of Southern Portion

Drainage Swale, East of Central Portion

MW – 12, East of Intersection of Atkins Road and Atkins Road Extension

Drainage Channel East of Central Portion

Edge of Pond, Between Northern and Central Portion

Area of Sparse Vegetation on Northern Portion

SW – 10 on West Side of Northern Portion

Possible Animal Hole or Erosion on Northern Portion

Pond, Between Northern and Central Portions

SITE 42 PHOTOGRAPHS

Photo Ref. 127

Typical Warning Signage

Photo Ref. 126

**Western Branch Of The Western Drainage Ditch
Located Along Northern Side Of The Western Portion Of The Landfill
(Looking Northwest).**

Photo Ref. 126

Western Branch Of The Western Drainage Ditch Located Along Northern Side Of The Western Portion Of The Landfill (Wider Angle Looking Northwest).

Photo Ref. 125

Newly Installed Monitoring Well S42MW13.

Photo Ref. 124

Newly Installed Monitoring Well S42MW11 .

Photo Ref. 123

Typical Depression In Asphalt Cover Portion Of The Engineered Cap System At Steam line Support.

Photo Ref. 122

Asphalt Cover Portion Of The Engineered Cap System (Looking Southeast).

Photo Ref. 121

Patching Of Building 1866 Parking Area (Looking Northwest)

Photo Ref. 120

Rolled Asphalt Curb Where The Asphalt Portion Of The Engineered Cap System Meets The Building 1866 Parking Area (Looking Northwest). Location Of Proposed Guide Rail.

Photo Ref. 119
Unnamed Stream And Gabion Basket Retaining Wall, Looking Northwest.

Photo Ref. 118

Gabion Basket Lined Western Drainage Ditch.
Looking Northeast From The Discharge End Of The Western Drainage Ditch.

Photo Ref. 117

Unnamed Stream And Gabion Basket Retaining Wall.
Looking Northwest From The Discharge End Of The Western Drainage Ditch.

Photo Ref. 116

Unnamed Stream, Gabion Basket Retaining Wall And Discharge End Of Western Drainage Ditch. Looking Southeast.

Photo Ref. 115

Riprap Lined Portion Of The Western Drainage Ditch At The Inlet End Of The Gabion Basket Lined Portion Of The Western Drainage Ditch.

Photo Ref. 114

Gabion Basket Lined Western Drainage Ditch Looking Toward The Unnamed Stream.

Photo Ref. 113

Grass Lined Portion Of The Western Drainage Ditch, Looking Northeast From Riprap Line Portion Of The Western Drainage Ditch.

Photo Ref. 112

Northern Branch Of The Western Drainage Ditch.

Photo Ref. 111

Western Branch Of The Western Drainage Ditch.

Photo Ref. 111

Western Branch Of The Western Drainage Ditch.

Photo Ref. 110

Central Drainage Ditch, Gabion Basket Retaining Wall, And Riprap Lining For Central Drainage Ditch. Looking Upstream Within The Central Drainage Ditch.

Photo Ref. 109

Central Drainage Ditch, Gabion Basket Retaining Wall, And Riprap Lining For Central Drainage Ditch. Looking Downstream Within The Central Drainage Ditch. Temporary Sediment Trap Visible In Distance.

Photo Ref. 108

Construction Crossing On the Eastern Drainage Ditch (Looking Northeast). Crossing To Remain In Place Upon Completion Of Construction Activities.

Photo Ref. 107

Undisturbed Portions Of Eastern Drainage Ditch.
Looking Upstream From Construction Crossing.

Photo Ref. 106

Undisturbed Portions Of Eastern Drainage Ditch.
Looking Downstream From Construction Crossing.

Photo Ref. 105
Monitoring Well S42MW10 With Identification Tag.

Photo Ref. 104

Monitoring Well S42MW09 With Identification Tag.

Photo Ref. 103
Monitoring Well S42MW08 With Identification Tag.

Photo Ref. 102

Evidence Of Erosion On Slope Of Landfill Prior To Establishment Of Final Vegetation. Looking Southeast From Discharge End Of Western Drainage Ditch.

Photo Ref. 101

**Vegetation Being Established On Landfill Slopes. Looking Northwest.
Southern Gabion Basket Retaining Walls, And Unnamed Stream Are Also Visible.**

Photo Ref. 100

**Wetland Restoration Planting In Unnamed Stream
Southeast Of The Discharge End Of The Western Drainage Ditch.
Temporary Sediment Trap Is Also Visible.**

Photo Ref. 099

Vegetation Being Established On Landfill Slopes.
Looking Southeast From Western Drainage Ditch.

Photo Ref. 098

Vegetation Being Established On Landfill Slopes.
Looking Northwest From Western Drainage Ditch.

Photo Ref. 097

**Southern Gabion Basket Retaining Wall System,
Unnamed Stream Restoration, And Southern Landfill Slopes.**

Photo Ref. 096

Northwestern Plateau Portion Of Landfill With Traversing Steam Line.

Photo Ref. 095

Southeastern Plateau Portion Of The Landfill.
Temporary Silt Fence To Be Removed Following Establishment Of Final Vegetation.

Photo Ref. 094

Discharge End Of Western Drainage Ditch And Stream Restoration Plantings.

Photo Ref. 093

Interconnection Of The Grass And Asphalt Covers Of The Engineered Cap System. Southeastern Plateau Portion Of The Landfill.

Photo Ref. 092

Vegetation Process And Temporary E&S Controls On The Ridge Of The Southeastern Portion Of The Landfill. Looking From The Steam Line To The South.

Photo Ref. 091

Bollards Protecting The Fire Hydrant And Newly Installed Monitoring Well S42MW12 Located Along The Building 1866 Parking Area.

Photo Ref. 090

Newly Installed Monitoring Well S42MW12.

APPENDIX C

FIVE-YEAR REVIEW INTERVIEW SHEETS

FIVE-YEAR REVIEW QUESTIONARE

Facility: **Naval Support Facility, Indian Head**
Site(s): **Site 12, Town Gut Landfill**
Interviewee: **Curtis DeTore**
Agency/Title/etc: **Maryland Department of the Environment / Remedial Project Manager**
Date: **July 11, 2006**

Background

1. What effects have site operations had on the surrounding community or area?
   None.

2. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
   No.

3. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, give details.
   No.

4. Are you aware of any recreational uses of the surface water, such as fishing, boating, or other casual uses?
   No.

5. Are you aware of any intrusive activities being conducted on the cap or uses of the site other than monitoring or maintenance?
   No.

6. Are you aware of any uses of the groundwater at or downgradient of the site?
   No.

State and Local Considerations (Regulatory)

1. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.
   The Navy satisfactorily communicates with this office regarding any issues related to Site 12.

   This office conducted a site visit on February 16, 2006 accompanied by a representative from NAVFAC Washington. The purpose of this visit was to verify the findings of a report prepared for the Navy regarding the condition of the landfill cap at Site 12.

2. Have there been any complaints, violations, or other compliance issues related to the site requiring a response by your office? If so, please give details of the events and results of the responses.
   No.

3. Have there been any changes in regulations or cleanup levels since implementation that may impact the site?
   No.

Performance, Operation, and Maintenance Problems

1. Is the remedy functioning as intended by the decision documents? How well is the remedy performing?
   Yes. The remedy is performing to expected levels.

2. Describe the O&M staff and activities. If there is not a continuous on-site presence, describe the staff and frequency of site inspections and activities.
   The Record of Decision for Site 12 did not require an O&M presence from this office. Since the application of the selected remedy, no environmental issues have arisen that would require a site inspection.

3. Have there been any significant changes in the O&M requirements, operational adjustments, maintenance schedules, or sampling routines since start up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe the changes and impacts.
   No.

4. Do you have any comments or feedback on the adequacy of the implemented remedy? Are all the right constituents included? Is the monitoring frequency adequate?
   The remedy is performing to expected levels, all appropriate constituents are included and the monitoring frequency is adequate.

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
   No.

FIVE-YEAR REVIEW QUESTIONARE

Facility: **Naval Support Facility, Indian Head**
Site(s): **Site 42, Olsen Road Landfill**
Interviewee: **Curtis DeTore**
Agency/Title/etc: **Maryland Department of the Environment / Remedial Project Manager**
Date: **July 11, 2006**

Background

1. What effects have site operations had on the surrounding community or area?
   None.

2. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
   No.

3. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, give details.
   No.

4. Are you aware of any recreational uses of the surface water, such as fishing, boating, or other casual uses?
   No.

5. Are you aware of any intrusive activities being conducted on the cap or uses of the site other than monitoring or maintenance?
   No.

6. Are you aware of any uses of the groundwater at or downgradient of the site?
   No.

State and Local Considerations (Regulatory)

1. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.
   The Navy satisfactorily communicates with this office regarding any issues related to Site 42.

   This office has conducted several site visits to witness the progress at Site 42.

2. Have there been any complaints, violations, or other compliance issues related to the site requiring a response by your office? If so, please give details of the events and results of the responses.
   No.

3. Have there been any changes in regulations or cleanup levels since implementation that may impact the site?
   No.

Performance, Operation, and Maintenance Problems

1. Is the remedy functioning as intended by the decision documents? How well is the remedy performing?
   Yes. The remedy is performing to expected levels.

2. Describe the O&M staff and activities. If there is not a continuous on-site presence, describe the staff and frequency of site inspections and activities.
   The Record of Decision for Site 42 did not require an O&M presence from this office. Since the application of the selected remedy, no environmental issues have arisen that would require a site inspection.

3. Have there been any significant changes in the O&M requirements, operational adjustments, maintenance schedules, or sampling routines since start up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe the changes and impacts.
   No.

4. Do you have any comments or feedback on the adequacy of the implemented remedy? Are all the right constituents included? Is the monitoring frequency adequate?
   The remedy is performing to expected levels, all appropriate constituents are included and the monitoring frequency is adequate.

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
   No.